



**NATIONAL TECHNICAL UNIVERSITY OF ATHENS**

**School of Electrical and Computer Engineers**

**INTERDEPARTMENTAL POSTGRADUATE PROGRAMME  
“TRANSLATIONAL ENGINEERING IN HEALTH AND MEDICINE”**

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**REGULATION  
FOR THE OPERATION OF  
INTERDEPARTMENTAL/INTERINSTITUTIONAL POSTGRADUATE  
PROGRAMMES**

**In accordance with the provisions of Law 4957/2022**

**OPERATIONAL REGULATION OF THE INTERDEPARTMENTAL  
POSTGRADUATE PROGRAMME OF THE SCHOOLS OF ELECTRICAL AND  
COMPUTER ENGINEERING AND MECHANICAL ENGINEERING OF THE  
NATIONAL TECHNICAL UNIVERSITY OF ATHENS ENTITLED  
“TRANSLATIONAL ENGINEERING IN HEALTH AND MEDICINE”**

**CHAPTER A: GENERAL TERMS**

**Article 1**

**“Objectives of the MSc Programs”**

With its prominent position internationally as a leading public university of science and technology, the NTUA organizes and operates Interdepartmental and Interinstitutional Postgraduate Programmes (MSc Programs) promoting interdisciplinarity. The MSc Programs of the NTUA lead to the awarding of a Diploma of Postgraduate Studies (DPS).

Depending on its duration, the DPS is equivalent to: 90 credits, for the MSc Programs of 3 academic semesters or 120 credits (ECTS), for the MSc Programs of 4 academic semesters.

The DPS is an academic qualification of specialization. It is equivalent to a *Master of Science* and is considered as a second postgraduate degree for holders of a 5-year integrated Master’s Degree, such as engineers. The DPS serves as evidence of the high-level education its holder has received in the interdisciplinary discipline of the corresponding MSc Program. However, awarding of the DPS does not entail awarding of the NTUA’s Diploma of undergraduate studies.

The MSc Programs of the NTUA are intended to address cutting-edge technological topics with approaches characterized by coherence and scientific depth, contributing therefore to the preservation and enhancement of the quality and international recognition of the degrees awarded by the NTUA.

Every MSc Program of the NTUA:

- a) serves the objectives and strategic choices of the University as provider of high-quality postgraduate studies,
- b) preserves the principle of interdisciplinarity and interdepartmentality of education,
- c) addresses the scientific and technological disciplines served by the participating Schools; and
- d) does not overlap significantly, in terms of content, with existing programs/specializations of the NTUA undergraduate studies or with actions aiming at professional training or lifelong

learning.

## Article 2

### “Competent Bodies”

According to the Greek Law 4957/22 (Article 81), the competent bodies governing the establishment, organization, operation and administration of the MSc Programs are:

- a) The Senate of the NTUA.
- b) The Programme Studies Committee (PSC) of the MSc Program.
- c) The Steering Committee (SC) of the MSc Program.
- d) The Director of the MSc Program.

In particular:

- a) **The Senate of the NTUA** is the body responsible for the academic, administrative, organizational and financial affairs of the MSc Programs, holding the following specific authorities:
  - i. approves the establishment and amendments in the composition and structure of the MSc Program,
  - ii. approves and amends the MSc Programs Regulations,
  - iii. grants extension of the MSc Programs duration,
  - iv. approves collaborations with domestic or foreign universities or research centers - institutes and technological entities of the Article 13A of the Greek Law 4310/2014 (A' 258) for the organization of joint (second-cycle studies) curricula as well as the protocols for academic or research cooperation with domestic or foreign entities,
  - v. establishes the Postgraduate Studies Committee of the university, upon recommendation of the Deaneries of the NTUA Schools,
  - vi. establishes the Programme Studies Committee, in the case of interdepartmental or interinstitutional or joint MSc Programs,
  - vii. decides on the abolition of the MSc Programs offered by the NTUA; and
  - viii. exercises those responsibilities relating to the MSc Programs that are not assigned by law to other bodies specifically.

A Postgraduate Studies Committee NTUA is established in accordance with the Greek Law 4957/2022 (Article 79).

As a body, the **Postgraduate Studies Committee** of the NTUA is advisory to the Senate and responsible for the supervision and general coordination of the University's postgraduate studies.

The Committee consists of one (1) Faculty Member from each School of the University, one (1) member from the categories of: the Special Teaching Staff (STS), the Laboratory Teaching Staff (LTS) and the Technical Laboratory Staff (TLS) of the University. The NTUA Vice-Rector, acting as the Committee Chairman, holds responsibility for academic matters. The Committee members have experience in organizing and participating in second-cycle studies curricula. The Committee's term of office shall be two (2) academic years.

The Postgraduate Studies Committee NTUA:

- i. submits its opinion on the establishment of new postgraduate programs or the amendment of existing, upon evaluation of the requests of the General Assemblies (GA) of the Schools. This evaluation considers the proposals for the establishment of new postgraduate programs, the accompanying reports on their feasibility and sustainability and the cost analysis of operating the MSc Program. The Postgraduate Studies Committee has the authority to refer back proposals if they lack sufficient justification or the accompanied reports are incomplete,
- ii. prepares draft Regulation for the University's second- and third-cycle studies curricula and submits the documents to the Senate,
- iii. prepares a model draft of the Regulation for a postgraduate programmes,
- iv. oversees the compliance of the postgraduate programmes with the Regulations,
- v. oversees the implementation of the legislation, Regulation and decisions of the University administrative bodies by the postgraduate programs; and
- vi. oversees the implementation of the student fee waiver procedure.

- b) **The Programme Studies Committee (PSC)**, is the body exercising the responsibilities of the General Assembly of the School in the case of interdepartmental, interinstitutional and joint MSc Programs. The PSC consists of Faculty Members of the participating Schools and is established by decision of the Senate of the NTUA upon the recommendation of the General Assemblies of the participating Schools or the competent bodies of the collaborating entities in accordance with the provisions of the Special Cooperation Protocol of the MSc Program. If other entities participate in the MSc Program (in accordance with par. 6 of Article 80), then at least one (1) representative from each collaborating entity shall participate as a member of the Committee. By decision of the PSC may be established a Steering Committee (SC) to serve a two-year term. In the SC must participate the Director of the MSc Program and four of the members of the PSC.

As long as they undertake teaching duties in the MSc Program, Professors Emeriti of the participating Schools may participate in the PSC and the SC. In the PSC meetings participates the officer of the Secretariat of the coordinating School being responsible for the Program's secretarial support and for taking record of the meeting minutes. Based on the findings of annual reports and evaluation procedures of the NTUA's MSc Programs and the scientific and technological advances, the PSC of each MSc Program decides on all educational and research affairs, with a view to the continuous improvement of the content, quality of studies and general operation and development of the program.

**The PSC shall exercise the responsibilities for the organization, administration and management of the MSc Program in accordance with par. 2 of Article 82 and par. 3 of Article 82 [in the absence of a Steering Committee (SC)] of the Greek Law. 4957/2022 as follows:**

- i. establishes Committees for evaluating the applications of candidate postgraduate students and approves their enrollment in the MSc Programs,
- ii. assigns the teaching loads to the lecturers of the MSc Program,
- iii. recommends to the General Assembly of the coordinating School the amendment of the decision by which the MSc Program is established, as also the extension of the MSc

Program duration,

- iv. establishes examination committees for the examination of postgraduate students' theses and designates the supervisor for each individual thesis,
- v. ascertains that students have successfully completed their studies in order to be awarded the MSc degree; and
- vi. approves the review report of the MSc Program, upon the recommendation of the Steering Committee (SC).

By decision of the PSC, the responsibilities described in points i) and iv) may be transferred to the SC of the MSc Program.

- c) The **Steering Committee (SC)** may be established by decision of the PSC of the MSc Program to serve a two-year term. It consists of the Director of the MSc Program and four members of the Programme Studies Committee (PSC). The composition of the SC members shall be specified in the Special Cooperation Protocol.

Provided its establishment, the SC is responsible for monitoring and coordinating the operation of the program and in particular:

- i. for preparing the initial annual budget of the MSc Program and its amendments, provided that the MSc Program has available resources in accordance with Article 84, and for recommending its approval to the Research Committee of the Special Account for Research Funding (SARF),
- ii. for preparing the program report and recommending its approval to the PSC,
- iii. for approving the expenditure of the MSc Program,
- iv. for approving the awarding of (contributory or non-contributory) scholarships, in accordance with the provisions of the MSc Program establishment decision and of the Regulation for postgraduate and doctoral studies,
- v. for recommending, to the PSC, the allocation of the teaching loads, as also the assignment of the teaching loads to the lecturer categories specified by the Greek Law 4957/2022 (Article 83),
- vi. for recommending, to the PSC, the call for Visiting Professors in order to cover teaching needs of the MSc Program,
- vii. for preparing a plan for the amendment of the academic curriculum, which subsequently has to be submitted to the PSC; and
- viii. for recommending, to the PSC, the reallocation of courses between academic semesters as well as matters related to the qualitative upgrade of the academic curriculum.

- d) **The Director of the MSc Program** comes from the Faculty Members of the participating Schools and is of the rank of Professor (preferably) or Associate Professor. The Director is a member of the PSC and is appointed by decision of the PSC to serve a two-year term, which is renewable without limitation, according to the provisions of the Special Cooperation Protocol. The PSC assembles with the most senior member as chairman and elects the Director.

The responsibilities of the **Director of the MSc Program** are:

- i. to chair the PSC and SC, prepare the agenda and convene the meetings of both bodies,
- ii. to recommend, to the PSC, agenda items related to the organization and operation of the MSc Program,

- iii. to recommend, to the SC and the other (MSc Program and HEI) bodies, agenda items related to the effective operation of the MSc Program,
- iv. to serve as the Scientific Manager of the program, in accordance with the Greek Law 4957/2022 (Article 234), and exercise the corresponding responsibilities,
- v. to oversee the implementation of the decisions made by the MSc Program bodies and of the Regulation as well as to oversee the implementation of the MSc Program budget; and
- vi. to exercise any other responsibility specified in the decision by which the MSc Program is established.

The Director of the MSc Program along with the SC and PSC members are not entitled to any remuneration or any kind of compensation for carrying out their assigned responsibilities in relation to performing their duties.

### **Article 3**

#### **“MSc Program Administrative Support at the NTUA”**

- a) School Secretariats are upgraded in order to support the postgraduate studies at School level, in line with the University’s policy for decentralization of responsibilities and strengthening of the Schools.
- b) At central administration level, within the University’s Directorate of Studies, is created a dedicated department overseeing the University’s programs of postgraduate studies.
- c) The University aims at leveraging the staff hired for research projects of relevance to the postgraduate studies for supporting the teaching in the postgraduate programs of each School.
- d) In each School’s postgraduate programs, the administrative support is carried out by employing information technology aids and involves the following actions:
  - i. Preparing, uploading and circulating the announcement of postgraduate study openings.
  - ii. Providing information on the program to interested students responding to the announcement.
  - iii. Collecting the applications and the supporting documents of candidate postgraduate students.
  - iv. Administering the assessment procedure and compiling the lists of successful candidates.
  - v. Running the postgraduate students enrollment procedure and preparing the catalogs of the enrolled postgraduate students per program and course.
  - vi. Maintaining course attendance records (per course).
  - vii. Maintaining a register to track the progress of each postgraduate student throughout their period of study.
  - viii. Issuing student grade sheets.
  - ix. Preparation of timetables and examination schedules.
  - x. Arrangement of educational visits.
  - xi. Maintaining a depository of postgraduate diploma theses written by the School’s postgraduate students.
  - xii. Continuous updating of the program’s website.

- xiii. Issuing certificates and other documents, granted upon request of the postgraduate students.
- xiv. Preparing procedures for granting loans and scholarships.
- xv. Maintaining a computerized record of postgraduate students.
- xvi. Supporting the PSC and SC of the MSc Program.
- xvii. Providing all kinds of information and data concerning the School's postgraduate studies and uploading them to the world wide web.
- xviii. Preparing procedures for the awarding of the DPS.
- xix. Updating the record of DPS holders.

## **Article 4**

### **“Preparation and Approval of the MSc Programs Curricula”**

The MSc Program curriculum is prepared by the PSC of each MSc Program every academic year, considering the recommendations of the GA of the coordinating School as well as of each participating School. It is approved by the Senate, after recommendation of the **Postgraduate Studies Committee of NTUA**.

- a) Considering the MSc Program Regulation, the PSC of each MSc Program specifies the courses of the five-year curricula at the NTUA which provide the necessary background knowledge for the enrollment in the MSc Program and any other requirements. In particular, by decision of the PSC, considering also the findings of the evaluation procedures, the following must be specified by mid-April every year:
  - i. the titles and detailed contents of the prerequisite courses from the NTUA's five-year programs, in conformance to the interdisciplinary discipline of each MSc Program, along with the bibliography and supporting teaching material,
  - ii. the titles and detailed contents of all courses (obligatory and elective), in the same spirit with the above,
  - iii. the weekly teaching hours for each course, in which all teaching activities shall be included,
  - iv. the chronological sequence or interdependence of the courses,
  - v. the course characteristics in terms of technical support,
  - vi. the overlaps with other undergraduate and postgraduate courses offered; and
  - vii. the course grading system.

The PSC of the MSc Program carries out continuous quality control and objective evaluation of all the courses of the program, in terms of the postgraduate, interdepartmental and interdisciplinary nature of the syllabus and examination topics. It is therefore verified that no overlap arises with the (undergraduate) five-year program of the School.

By a well-justified proposal, which should not alter the character of the MSc Program, the PSC may amend the program by adding, removing or merging courses. This could include the reallocation of courses between academic periods (semesters), yet always within the framework of the prescribed procedure for the preparation and approval of the MSc Program curriculum.

- b) The procedure for the preparation and approval of the MSc Program curricula is the following:
- i. In accordance with the Senate decisions regarding the general principles, structure and content of the MSc Programs, the PSCs organize the necessary working groups per course, or sets of courses, they prepare the MSc Program curricula and the analysis of the proposed program; and also inform the GAs of the coordinating and of each participating, in the MSc Program, School.
  - ii. Taking into account the recommendations of the GAs of the coordinating and of each participating School, the PSC formulates and approves the final recommendation for the curriculum and then forwards it to the Postgraduate Studies Committee through the Directorate of Studies.
  - iii. The Postgraduate Studies Committee assembles, with the MSc Programs of the University as special agenda items, in the presence of the Directors of the MSc Programs and proceeds to detailed recommendations to the Senate on each of them.
  - iv. The Senate assembles with the approval of the University's MSc Programs on the agenda. The associated decisions of the Senate are communicated to the PSCs and the GAs of the Schools, while their implementation is subject to periodic control by the Postgraduate Studies Committee.
  - v. Non-compliance with the above procedure for the preparation, approval and reporting of the work of the corresponding MSc Program entails, first of all, the release of the NTUA from the duty to provide material or academic support and also from assuming the responsibility for the content and quality of the postgraduate studies offered by the MSc Program in question. Subsequently, through its bodies, the University initiates the procedure for discontinuing the operation of this MSc Program.

The above procedure is summarized in the following table.

Deadline	Competent body	Action
20/4	PSC	Prepares the draft curricula and lecturers' assignment for the next academic year and informs the GAs of the coordinating and of each participating, in the MSc Program, School.
20/6	PSC	Prepares and approves the final recommendation on the curriculum and lecturers' assignment for the next academic year taking into account the recommendations of the GAs of the coordinating and of each participating School and then forwards it to the Postgraduate Studies Committee.
30/7	Senate	Approves the MSc Program of the NTUA upon the recommendation of the Postgraduate Studies Committee.



## Article 5

### “Lecturers”

- a) The teaching duties of the Postgraduate Programmes are assigned upon decision of the competent body of the Postgraduate Programmes, to the following categories of lecturers provided the relevance of their scientific and teaching work to the discipline of the MSc Program:
  - i. Faculty Members,
  - ii. members of the Special Teaching Staff (STS), Laboratory Teaching Staff (LTS) and Technical Laboratory Staff (TLS) of the Department or other Departments of the same or other Higher Education Institution (HEI) or Supreme Military Educational Institution (SMEI), who shall undertake additional workload (beyond their statutory obligations) in the case of a Postgraduate Programme with tuition fees,
  - iii. Professors Emeriti or retired Faculty Members of the Department or other Departments of the HEI offering the MSc Program or of another HEI,
  - iv. cooperating professors,
  - v. designated lecturers,
  - vi. visiting professors or visiting researchers,
  - vii. researchers and expert scientists from the research and technological entities of Article 13A of the Greek Law 4310/2014 (A' 258) or from other research centers and universities (domestic or foreign); and
  - viii. scientists of recognized standing, specialized knowledge and experience in the discipline of the MSc Program.
- b) The MSc Program teaching duties are assigned by decision of the PSC of the MSc Program, informing the GAs of the coordinating and each participating, in the MSc Program, School.
- c) The right to supervise diploma theses is held by the Faculty Members. The same right is held also by the MSc Program lecturers mentioned in points ii) to vii) of par. a, provided that they hold a PhD. By justified decision of the PSC, the supervision of diploma theses may be assigned to the lecturers mentioned in point viii) of par. a. Also, by justified decision of the PSC, the supervision of diploma theses may be assigned to Faculty, STS and LTS members of the Schools (Departments for Interinstitutional Postgraduate Programmes) to whom no MSc Program -related teaching duties have been assigned.
- d) Lecturers from all the above-mentioned categories may be remunerated from the MSc Program funds exclusively. No remuneration or other benefits are allowed from the state budget or the public investment program. The remuneration corresponding to each lecturer shall be determined by decision of the body of the MSc Program being responsible for the assignment of the teaching duties. As a particular case, lecturers with the status of Faculty Member may receive additional remuneration for their work in the MSc Programs provided that they fulfil their minimum statutory obligations, as they are defined in par. 2 of Article 155 of the Greek Law. 4957/2022. The last subparagraph shall also apply analogously to STS, LTS and TLS members, provided that they fulfil their minimum statutory obligations.
- e) The application of teaching methods (such as laboratories, computer labs, study labs, fieldwork, thematic studies, group work with individual presentations of the group members, etc.) with high requirements in terms of technological support can be assisted by

LTS and TLS members as well as by PhD degree holders, PhD students and other postgraduate students. For this, the PSC's approval is required, upon recommendation of the responsible lecturer. By decision of the PSC, and after informing the GAs of the Schools participating in the MSc Programs, assistant teaching duties may be assigned to PhD students of the Department or School, under the supervision of a MSc Program lecturer. Their participation in the teaching shall be indicated in the curriculum.

## **Article 6**

### **“Postgraduate Student Eligibility”**

- a) In all the MSc Programs of the NTUA, HEI graduates of Greek or accredited-as-equivalent foreign universities are eligible for acceptance by the corresponding PSCs, after an open call for applications. In particular, applications from the following categories of graduates are welcomed:
  - i. Graduates of the NTUA Schools.
  - ii. Graduates of other Engineering Departments/Schools or graduates of Greek HEIs of other disciplines or graduates of foreign universities being accredited as equivalent to the Greek HEIs which are of relevance to the program's discipline. For these graduates, the awarding of the DPS does not entail awarding of the NTUA's diploma of undergraduate studies.
  - iii. Final-year students of the NTUA or other HEI from the above categories, as long as they provide evidence that they will be awarded a diploma/degree prior to the beginning of the MSc Program. In case of this being a pending issue, no certificate will be issued to the applicant until it is resolved.
  - iv. Graduates of other Departments, in accordance with the applicable provisions.
- b) The MSc Programs of the NTUA are offered free of charge to all postgraduate students from EU countries. There is a participation fee of €500 per semester which may be modified.

## **Article 7**

### **“Admission Requirements and Postgraduate Student Selection Criteria”**

- a) The general admission requirement for postgraduate students who wish to be enrolled in the program is to have the necessary academic background. This is specified by the PSC and may include the attendance of a number of prerequisite undergraduate courses which provide fundamental knowledge in the broader interdisciplinary field of the MSc Program.
- b) As evidence of the above-mentioned background knowledge, candidates must submit, together with their resume, the syllabus of each relevant course attended during their previous academic studies. Else, they are required to pre-enroll and attend (with successful examination) the NTUA (prerequisite) courses specified by the PSC. In particular, during the student selection process, certain criteria are taken into account by the PSC, upon the recommendation of the Selection Committee.
- c) As **selection criteria** are considered the following:
  - i. the degree grade,

- ii. the ranking of the candidates (on the basis of their degree grade) in relation to the other graduates in the same School/Department and academic year,
- iii. the grades in undergraduate courses which are of relevance to the postgraduate program,
- iv. the candidates' performance and the subject of their final-year thesis, if the writing of such a thesis was formally required for successfully completing their undergraduate studies,
- v. any other postgraduate qualifications being of relevance to the discipline of the MSc Program,
- vi. the research, professional and/or technological activity of the candidate,
- vii. the proficiency in foreign languages, particularly English, and for non-Greek candidates, proficiency in the Greek language as well,
- viii. the computer literacy,
- ix. the letters of recommendation; and
- x. for candidates who are employees, the needs and prospects of their employer company or organization.

The PSC shall specify the details of the postgraduate student selection criteria presented in the above. This includes specifying the language proficiency level and any additional criteria or conducting examinations or interviews, the results of all of which shall be taken into account in the selection process. In the case of interviews, these are arranged by the PSC and conducted by a three-member Selection Committee (designated by the PSC) composed of Faculty Members that are lecturers in the MSc Program, one of whom is PSC member.

- d) The list of successful candidates is approved, after the recommendation of the Selection Committee, by the PSC. The list is then communicated to the GA of the coordinating School.
- e) In addition to the number of admissions, each MSc Program may admit one scholarship holder from the State Scholarships Foundation who has succeeded in the relevant competition for domestic postgraduate studies in the discipline of the MSc Program and one non-Greek scholarship holder from the Greek State. The number of scholarship holders may be increased by decision of the PSC.
- f) Those STS, LTS and TLS members who meet the requirements may, upon request, be enrolled as supernumeraries (yet only one per year) in an MSc Program of the School in which they offer service and provided the relevance of their work to the discipline of the specific MSc Program.
- g) The maximum number of postgraduate students enrolled is determined by considering the number of the MSc Program lecturers and the students-to-lecturers ratio, the infrastructure in terms of material and equipment and the available classrooms. In the case of those MSc Programs offered exclusively in English, the number of postgraduate students should be determined such that at least half of them are Greek, provided of course that there is a sufficient number of applications. The total number of postgraduate students will be adjusted accordingly.
- h) The background knowledge required for enrolment in the MSc Program is specified by the corresponding PSC, which is the body determining the prerequisite undergraduate courses that individual students should attend. For each student, the number of such courses cannot exceed a maximum of four (4) per semester while the courses themselves may be selected from the Undergraduate Programs of the Schools participating in the MSc Program. The

postgraduate students in question should successfully complete these courses within the prescribed period of attendance in the MSc Program and in all cases before the assignment of the postgraduate diploma thesis.

## **Article 8**

### **“Study Guide”**

For each MSc Program, the corresponding PSC is responsible for preparing the Study Guide, in accordance with the present Regulation. The Study Guide is uploaded to the MSc Program website.

## **Article 9**

### **“Language of Instruction. Language Used for the Writing of the Postgraduate Diploma Thesis”**

- a) The language of instruction is Greek. Teaching an MSc Program course (or part of a course) in English is allowed upon the approval from the program’s PSC. The language to be used for the writing of the Postgraduate Diploma Thesis (PDT) is Greek or English and is specified by decision of the PSC. The PDT must include an extensive abstract in both Greek and English.
- b) Regarding the MSc Program offered in languages other than Greek, the language of instruction and writing of the PDT is English.

## **Article 10**

### **“MSc Programs’ Structure”**

- a) In exceptional cases in which a postgraduate student successfully completes the obligations for the Diploma of Postgraduate Studies (DPS) to be awarded in a period shorter than the minimum duration of the MSc Program provided for and, in all cases, in a period of not less than one (1) year, the Senate may approve, upon the recommendation of the PSC to the Postgraduate Studies Committee, the awarding of the DPS.
- b) The maximum time period within which students can pursue the DPS, measured from the official time of enrollment in the MSc Program, is two (2) years. By exception, in special cases, a short-period extension of up to one (1) additional year may be granted, upon a reasoned PSC decision. On completion of the second year, the PSC shall decide on whether the student’s period of study should be discontinued, in which case a certificate with the courses passed and corresponding grades should be issued.
- c) Courses requiring laboratory practice or computer use aim to provide, as far as possible, individualized training for the postgraduate students. The introduction of new teaching methods that will enhance active participation of students is pursued. Particular emphasis will also be placed on the training of postgraduate students in groups, with distinctive role for each participating student, in order to enhance their teamwork skills and synthetic ability.

- d) The structure of postgraduate studies is organized into groups of obligatory and elective courses. In the group of obligatory courses, prerequisite basic (also called “core”) courses and specialization courses may be included. The PSC has the authority to decide whether courses can be offered by other Schools of the NTUA or of another HEI. Also, the PSC decides on whether courses may be offered as electives in other MSc Programs of the NTUA. Obviously, many of the MSc Program courses appear as elective in Doctoral Studies Programs.
- e) All the MSc Programs coordinated by a NTUA School follow the “Unified Academic Timetable of Postgraduate Studies”, which is prepared by the Postgraduate Studies Committee and approved by the University’s Senate on an annual basis.
- f) In the case of an Inter-University or part-time MSc Program, the duration of studies is specified by the PSC and then finally approved by the Senate, in the framework of the procedures for the preparation and approval of the MSc Program curricula, while the academic timetable is adjusted accordingly. The academic semesters that add up to the total number of credits of a full program cannot exceed, given that they refer to part-time programs, twice the duration of the full-time MSc Program, i.e., four (4) years.
- g) By a written request, postgraduate students of the MSc Program may temporarily suspend their studies for a period not exceeding two (2) consecutive semesters. The semesters of student status suspension shall not be counted towards the maximum period provided for regular study.

## **Article 11**

### **“Attendance - Examination - Course Grading System”**

- a) Students are required to attend the MSc Program courses and participate in the related educational activities and coursework. If there are extremely serious and documented reasons justifying a postgraduate student’s inability to attend, the PSC may excuse a certain number of absences which cannot exceed a maximum of 1/3 of the total number of lectures delivered. Postgraduate students who have not reached the required number of attendances in a course are entitled to repeat the course (or an equivalent one designated by the PSC) in the next (being also the final) academic year of study, as long as there is such a provision in the specific MSc Program.
- b) The course grading system is on a 0-10 scale, without involving fractional units, with the grade 5 representing the lowest pass. A course grade has to be derived not only from the final examination but also, with non-negligible weight, from the performance of the students in the applied teaching methods (laboratories, personal computer labs, study labs, design labs, fieldwork, thematic studies, group work with individual presentations of the group members) carried out during the course, with a relative weighting that is determined in each course by the responsible lecturer, approved by the PSC and which cannot be less than 30% of the total course grade. It is also clarified that only the DPS grade, which is the average of grades awarded by the individual examiners, may be expressed in a form including the half of a fractional unit.
- c) The final examination is held after the end of the teaching period, within a two-week examination period, in accordance with the University’s Unified Academic Timetable of

- Postgraduate Studies and relevant PSC decisions.
- d) The results are issued by the responsible lecturers within two weeks from the date that the final examination was held.
  - e) There is no provision for repeating the examination period. In exceptional circumstances, the PSC may, by a documented decision, accept a special additional examination for a maximum number of two (2) courses per postgraduate student and academic year, provided that the postgraduate student was unable to take the examination due to force majeure events. Also in exceptional cases, the PSC may set re-examination.
  - f) Students failing the examinations have the option to re-enroll the following year in the same courses or change these courses, if they are elective. In cases of two-year programs in which re-enrolling is not possible in the following year, only one additional examination period, set at a suitable time by the PSC, is allowed as an exception.
  - g) Postgraduate students who fail examinations in up to two courses, in which case they cannot successfully complete the program according to the provisions of the present Regulation, are entitled to be examined, upon their request and a reasoned PSC decision, by a three-member committee of Faculty Members of the School. The members of this committee are designated by the PSC of the MSc Program and should have expertise in the same or at least closely related discipline as the examined courses. Lecturers of the courses in question are exempt from this committee.
  - h) It is possible for postgraduate students who have attended courses of another recognized postgraduate program and have successfully passed the associated examinations to be exempted from the corresponding courses of the MSc Program upon a submitted written request, receiving the positive recommendation of the responsible lecturers and the decision of the PSC.
  - i) Lectures not given have to be re-scheduled in order to reach the number of 13 teaching weeks, required for all the MSc Program courses. Re-scheduling is decided and announced by the PSC of the MSc Program, which takes care of complying with the academic timetable to the greatest extent possible.

## **Article 12**

### **“Educational Process Based on Modern Synchronous and Asynchronous Distance Learning Methods”**

- a) The Senate can decide, based on the recommendation of the Postgraduate Studies Committee and its approval from the PSC of the MSc Program, to organize the educational process in the MSc Program using, partially or fully, modern synchronous or asynchronous distance learning methods. The use of these methods should comply with the European rules and specifications ensuring the excellent pedagogical design and the interactivity of the educational processes as well as the protection of personal data. The decision shall be accompanied by an analysis on the methods used in general for organizing the distance learning process, such as: synchronous, asynchronous, blended learning, the digital educational material, any digital assessment methods for students and digital assessment material, the University infrastructure and equipment to support distance learning programs and the digital skills of the teaching personnel.

- b) The organization and delivery of courses, as well as of other educational activities, using modern distance learning methods refer to traditionally-conducted classroom courses, to which such methods are readily applicable. This does not include the practical or laboratory training of students, which both require students' physical presence.
- c) Courses and other educational activities can be organized and delivered using asynchronous distance learning methods, with the aim of supporting individuals with disabilities or as part of the University's internationalization efforts. The material intended for asynchronous education may include lecturer's notes, presentations, exercises and indicative solutions as well as video lectures, provided that their compliance with the applicable legislation on the protection of personal data is ensured. Any kind of educational material is exclusively provided for the educational use of the students enrolled.
- d) The educational process may be carried out using modern distance learning methods, even in MSc Programs that have not included this possibility in their founding decision. This applies exclusively to the following cases:
  - i. in force majeure events or exceptional circumstances rendering impossible to conduct the in-person educational process or use the NTUA's infrastructure for educational, research and other activities; and
  - ii. organization of courses and tutorial exercises, in addition to the instruction time prescribed per course.
- e) The distance learning process in the MSc Programs is administered through the NTUA's Helios online course management platform. For its support, the NTUA Computer Centre and the NTUA Network Centre are jointly responsible.

## **Article 13**

### **“Postgraduate Diploma Thesis – DPS Awarding and Grade”**

- a) After completing the second semester of the first year of studies, postgraduate students can select the subject and supervisor for their Postgraduate Diploma Thesis (PDT), provided that, by that time, they have fulfilled all requirements for at least half of the MSc Program courses. For postgraduate students who re-enroll in the following year in order to attend first or second semester courses, the PSC decides on whether they can be allowed to start working on their PDT from the beginning of the second academic year of study.
- b) Postgraduate students are required to submit an application in which shall be indicated the proposed title and supervisor of the PDT, with an abstract of the proposed thesis attached. Then, the PSC designates the supervisor and establishes the three-member Examination Committee. This Committee consists of the supervisor and at least one MSc Program lecturer from those identified in a) to f) of the Greek Law 4957/2022 (Article 83, par. 1) and from those identified in Article 5 of the present document. The scientific expertise of the Examination Committee members must be the same with, or relevant to, the discipline of the MSc Program. By the supervisor's proposal, postgraduate students may be scientifically assisted in the preparation of their PDT by PhD holders, PhD students or other postgraduate students and other scientific collaborators of the NTUA or invited external lecturers. In addition, support for the preparation of the PDT in terms of laboratory equipment may be provided by the technical staff (STS, TLS, LTS, and others), whenever such a need arises. The

grade of the PDT is calculated as the average of the grades received from the three examiners on a 1-10 scale, rounded to the nearest half fractional unit, with the minimum pass mark being 5.5 (five and 50%). The PSC is responsible for setting uniform evaluation criteria.

- c) The text of the PDT is composed by using a suitable text compiler, following the template approved by the PSC. On the cover page should appear the University's logo. The thesis should be submitted electronically and, if requested by the Examination Committee and the NTUA Library, in hard copy. It must include a 1,200 to 2,000-word abstract, table of contents, bibliographical references and a 300 to 500-word abstract in Greek and in English. Regarding foreign-language MSc Programs, the abstract shall be written in English only. After the approval of the PDT, postgraduate students are required to deposit an electronic file of their thesis at the NTUA Central Library and to electronically submit the file to the NTUA Institutional Repository. The PDTs approved by the Examination Committee have to be uploaded to the MSc Program website.
- d) If the PDT is not successfully completed within the 3<sup>rd</sup> semester of the program, it can be continued for one more academic semester.
- e) In all cases, successful completion of the postgraduate courses and the PDT is required in order for the DPS to be awarded. If this is not achieved within the maximum prescribed period of study, the postgraduate student receives a simple certificate of attendance for the courses passed and withdraws.
- f) The DPS grade is calculated as the weighted average of the grades received in the postgraduate courses and the PDT. The PDT can be considered to correspond to one (1) semester of courses.
- g) Once a year, specifically in November, the Secretariat of the coordinating School compiles a list of postgraduate students graduating, in which are included those who have successfully completed their obligations in the MSc Program during the previous academic year. The degrees are awarded annually, at a special ceremony organized by the coordinating School, by the corresponding Dean and the Director of the MSc Program.

## **Article 14**

### **“Degree Type - Diploma of Postgraduate Studies (DPS)”**

- a) The degree type (Diploma of Postgraduate Studies) awarded, being either NTUA Interdepartmental or Interinstitutional with the NTUA in the role of the coordinating university, is given in Chapter B of the present Regulation.
- b) Under the responsibility of the Director of the MSc Program and the administrative care of the coordinating School, the DPS are issued timely with the computer support of the NTUA's IT Administration.
- c) The DPS is accompanied by a transcript in which are listed all the courses of the MSc Program that the student has successfully attended, with the corresponding grades received. In the transcript, is indicated the subject of the postgraduate student's thesis (PDT) as also the grade the thesis received.
- d) The DPS and the transcript are awarded in Greek and/or in English, in accordance with the applicable provisions.



- e) In the original DPS issued is not indicated the numerical value of the diploma grade. Instead, a characterization in accordance with the scale “Good”, “Very Good”, “Excellent” appears, which is determined in correspondence with the total grade attained. As regards the correspondence between the two scales, the same with the undergraduate studies apply, i.e., “Excellent” implies a grade from 9 to 10, “Very good” from 7 to 8.99 and “Good” from 5 to 6.99. If the postgraduate student wishes, the numerical value of the DPS grade will be indicated on the corresponding certificate of studies.

## **Article 15**

### **“Prize for Best Postgraduate Diploma Theses (PDT) Awarded by the NTUA”**

The NTUA may award prizes to the best PDTs written for the University MSc Programs by exploiting endowment resources. The procedure for the evaluation of the theses is described below.

- a) A thesis is nominated for a prize by the thesis supervisor who submits a written recommendation concisely stating the reasons why the specific PDT or doctoral thesis is recommended for a prize. The recommendation is accompanied by:
- i. a duly filled submission form in which the thesis author declares that an electronic file of the PDT is submitted in order to be evaluated for winning the prize corresponding to a specific endowment,
  - ii. abstract of the PDT; and
  - iii. the electronic file of the PDT.
- b) Following the selection criteria applied for prize awards at the NTUA, the PSC compiles a list of the PDTs nominated. The number of PDTs included in this list should correspond to the number of the prizes awarded. The list needs to be approved by the GA.
- c) In the selection criteria should be included the following:
- i. the originality and novelty of the PDT; and
  - ii. the papers in high-quality journals and conferences that have been published based on material produced for the PDT.
- d) The Postgraduate Studies Committee establishes an Evaluation Committee, consisted of three (3) or four (4) Faculty Members from different Schools, in which supervisors of evaluated papers cannot participate.
- e) The Evaluation Committee takes into account the evaluations of the Schools and submits its recommendation to the Postgraduate Studies Committee, which reaches a decision that is subsequently announced to the Senate.
- f) The prizes are awarded in a ceremony featuring short presentations of the top three PDTs.

## **Article 16**

### **“MSc Program Monitoring and Evaluation”**

- a) The MSc Programs are subject to a periodic evaluation/accreditation process conducted by the Hellenic Authority for Higher Education (HAHE). In this context, the overall work carried out by each MSc Program is evaluated. This includes evaluating: the extent to which the

objectives that had been set at the time of its establishment have been fulfilled, the program's longer-term economic viability, the employment record of its graduates, its contribution to research, internal evaluations provided by postgraduate students, the reasons for extending its operation as well as other aspects relating to the quality of the work produced and its contribution to the national strategy for higher education.

- b) Postgraduate students attending courses in the MSc Programs at the NTUA actively participate in the course evaluation process. This is based on questionnaires which have already been approved by the NTUA Senate (2012). The PSC is responsible for their processing. The questionnaires mainly concern the quality and means of teaching and research, the structure and content of the studies, student services, administrative services and the infrastructure in terms of material and equipment. The questionnaires are filled in electronically and anonymously.
- c) The results of the processing are communicated to the responsible lecturers after they have issued the corresponding course grades. The members of the PSC and the Director are informed of the results for all courses. The PSC has the authority to modify the content of the questionnaires and ask, possibly through alternative means, for additional evaluation from the postgraduate students and/or MSc Program graduates in order to improve the quality of the program.
- d) Should an MSc Program, undergoing evaluation as per par. a), be found not to meet the necessary conditions for continued operation, its activities will cease upon the graduation of the students already enrolled. This aligns with the decision of MSc Program establishment and the Regulation for postgraduate and doctoral programs.

## **Article 17**

### **“Intellectual Property Rights of Postgraduate Theses”**

- a) As the author, the postgraduate student holds the intellectual property rights to the thesis. This stems from the nature of the procedures followed for the examination and awarding of the corresponding postgraduate diploma/degree, requiring the thesis to reflect the student's personal, unique and original contribution. Also, the author is responsible for the content of the PDT.
- b) Intellectual property rights may be reserved with a suitable statement on the intellectual property rights page, which is placed right after the title page of the PDT, accompanied by information such as © [Year], [Full Legal Name]. ALL RIGHTS RESERVED.
- c) Postgraduate students who avail of the NTUA's infrastructure, staff and expertise, under the guidance of the supervisor, should provide service to the University.
- d) The role of the supervisor must be acknowledged in the PDT and indicated on the front and inside cover. In addition, the supervisor and infrastructure used (e.g., laboratory, fellowship, funding) should be included in the acknowledgements.
- e) Under the amended Greek Law 2121/1993 currently in force, the broader scientific and research work of Faculty Members cannot be considered as part of their official duties.
- f) By agreement or contract, the author grants the University a non-exclusive right to publish (e.g., through the institutional repository of the NTUA Library), reproduce and make the thesis available for educational, research and non-commercial purposes. In order for the

University to legitimately use the above-mentioned rights for commercial purposes, it is essential that the authors of the composite work at hand formally assign these rights to the University through a contractual agreement.

- g) The supervisor/head of research group/laboratory may utilize and publish the results produced (data, studies, computer programs, applications, prototypes, etc.). These actions do not concern commercial exploitation, but rather the use of the results in the context of research and science.
- h) In the case of funded research, the intellectual property rights of the PDT are not transferred. Rather, the right to use/exploit the research results (data, studies, computer programs, applications, prototypes, etc.) is granted to the Scientific Director and/or funder, in accordance with the provisions of the contract between the NTUA and the commissioning entity.
- i) If there is a potential for economic exploitation of the research product (or resulting patent), an agreement or a contract securing the right of the individuals who have substantially contributed to the development of the composite work/product has to be established on the basis of the applicable legal framework.
- j) Both the author and supervisor names are included in the publication of early/completed papers during or after the completion of the PDT. Other persons who may also have contributed creatively to the work produced are listed with a statement of their actual contribution.
- k) Use of or reference to copyrighted material in the context of the PDT must comply with the rules of academic ethics. Violation of these rules entails violation of the copyright law and will be addressed accordingly by the University.

## **CHAPTER B: SPECIAL TERMS FOR THE MSc PROGRAM**

### **“TRANSLATIONAL ENGINEERING IN HEALTH AND MEDICINE”**

#### **Article 18**

##### **“Structure of the MSc Program”**

1. The School of Electrical and Computer Engineering (SECE) at the National Technical University of Athens (NTUA), in collaboration with the School of Mechanical Engineering (SME), operates the Interdepartmental Postgraduate Programme (MSc Program) in the scientific field of “Translational Engineering in Health and Medicine” in accordance with the provisions of this decision and the provisions of Law 4957/2022.
2. The administrative support of the program is provided by the School of Electrical and Computer Engineering at the NTUA.

#### **Article 19**

##### **“Discipline and Objective of the MSc Program”**

1. The discipline of the program is the enhancement of scientific and technological research and the production of new interdisciplinary knowledge in the field of Translational Engineering in Health and Medicine.
2. The objectives of the program are twofold:
  - a) To deepen the understanding of integrated interdisciplinary approaches, research methodologies, and problem-solving techniques among engineers, natural scientists, and health science graduates. This aims to equip graduates with specialized expertise to meet the growing demands of both private and public sectors, nationally and internationally, in addressing complex challenges within the field of “Translational Engineering in Health and Medicine”.
  - b) To provide comprehensive training for engineers, natural scientists, and health professionals, enhancing their research capabilities to contribute to the advancement of knowledge. The program emphasizes interdisciplinary and intercultural collaboration among faculty, students, and learning resources. Furthermore, collaboration with other universities and reputable industry partners is integral to the program's operation.
3. The Postgraduate Programme in "Translational Engineering in Health and Medicine" aims to train specialized professionals capable of:
  - Recognizing, formulating, and solving complex health-related issues using mathematical, scientific, and engineering knowledge in biological or medical contexts.
  - Analyzing, designing, and developing devices, systems, products, and protocols to improve disease diagnosis, treatment, and rehabilitation, employing modern tools and techniques.
  - Integrating knowledge from biomedical sciences and engineering to design and implement innovative solutions to biomedical challenges, considering global societal, environmental, technological, and economic factors.

- Effectively communicating complex interdisciplinary concepts in biomedical engineering and science to both technical and non-technical audiences through written reports and oral presentations.
- Identifying market opportunities for innovative healthcare technologies and products.
- Assuming leadership roles in innovation and entrepreneurship aimed at the potential utilization of biomedical research outcomes to promote health.
- Occupying and assuming leadership roles in various sectors of the healthcare industry with increasing technological demands.
- Creating a collaborative and inclusive work environment by setting and achieving goals through organized task assignments.
- Working effectively as team members in different fields (research, scientific, entrepreneurial, etc.) within the healthcare sector.
- Generating new knowledge as a result of their in-depth training.
- Continuing into further research as doctoral candidates with an enhanced knowledge background.

## **Article 20**

### **“Postgraduate Title”**

The MSc Program awards Diploma of Postgraduate Studies - Master of Science in the field of “Translational Engineering in Health and Medicine” upon successful completion of the relevant cycle of studies.

## **Article 21**

### **“Duration of Studies”**

The minimum duration of studies in the MSc Program "Translational Engineering in Health and Medicine" is 3 academic semesters, while the maximum duration of enrollment is 2 years.

## **Article 22**

### **“Language of Instruction”**

The language of instruction for the MSc Program “Translational Engineering in Health and Medicine” is English.

## **Article 23**

### **“Curriculum”**

The curriculum comprises (2) semesters of coursework and one (1) semester dedicated to the completion of the Postgraduate Diploma Thesis. To obtain the Diploma of Postgraduate Studies – Master of Science, students are required to attend and successfully pass 12 courses (7 obligatory core courses from Group A and 5 elective courses from Group B) which collectively correspond to 60 ECTS credits. The elaboration and successful presentation of the Postgraduate Diploma Thesis is equivalent to 30 credit units (ECTS)

The redistribution of courses across the semesters of the MSc program will be determined by decisions of the relevant authorities.

The detailed curriculum of the MSc program "Translational Engineering in Health and Medicine" is presented in the following table.

<b>FIRST SEMESTER (Total 6 courses)</b>	
<b>COURSES</b>	<b>ECTS</b>
<i>OBLIGATORY CORE COURSES (GROUP A)</i>	20
<i>ELECTIVE COURSES (GROUP B)</i>	10
<b>SEMESTER TOTAL</b>	<b>30</b>
<b>SECOND SEMESTER (Total 6 courses)</b>	
<b>COURSES</b>	<b>ECTS</b>
<i>OBLIGATORY CORE COURSES (GROUP A)</i>	15
<i>ELECTIVE COURSES (GROUP B)</i>	15
<b>SEMESTER TOTAL</b>	<b>30</b>
<b>THIRD SEMESTER</b>	
<b>POSTGRADUATE DIPLOMA THESIS</b>	<b>ECTS</b>
<i>COMPLETION OF THE POSTGRADUATE DIPLOMA THESIS</i>	<b>30</b>
<b>GRAND TOTAL</b>	<b>90</b>

### **Courses Content**

#### **Life Sciences for Engineering**

*An introductory outline of the basic anatomy and physiology of the human body for engineers. The objective of this course is to present the various levels of structural organization of the body, from chemical through cellular and tissue organization to organ, system, and whole body structure and function. The role of physical principles and phenomena as they are known to exist and apply to living systems will be highlighted in engineering terms. The aim is to (i) develop a quantitative intuition of biological systems; (ii) understand how principles in engineering can be used to study biological processes; and (iii) understand the relationships between structure and function at different size and time scales. Guest lectures will include engineers and medical scientists to discuss the relationship between recent advances in biomedical engineering and the underlying anatomy and physiology.*

#### **Engineering for Biomedicine**

*The course is mandatory for Health Sciences graduates and provides an overview of the fundamental concepts and principles of engineering as it applies to biology, medicine, and healthcare. Basic principles of mathematics, computational thinking, physics, mechanics, mechanical design, and electronics will be covered, along with medical use cases, so as to achieve an understanding of advanced technological achievements in healthcare and medicine. A problem-based introduction to building algorithms and data structures to solve problems in medicine and healthcare with a computer will also be provided. The course will include an introduction to (i)*

Matlab, as a standard tool to the fundamentals of computer programming and (ii) Python, via Google's Colaboratory (Colab) and DataCamp, focusing on the analysis and visualization of biomedical data. The course will empower those with non-engineering backgrounds with the knowledge required to critically evaluate and use these technologies in healthcare and medicine.

- **Biostatistics and Machine Learning**

This course provides an introduction to statistical methods used in biological and medical research. Elementary probability theory, basic concepts of statistical inference, regression and correlation methods, and sample size estimation are covered, with emphasis on applications to medical problems. New statistical techniques for both predictive and descriptive learning as applied to the rapidly growing in amount and complexity data collected in imaging, genomic, health registries, wearables are also covered. Machine learning algorithms for classification and prediction, particularly useful for big and complex data, will be presented. Topics include principles of supervised learning, including Bayesian classifiers, decision trees, regression models, support vector machines (SVMs), as well as principles of unsupervised learning, including clustering and density estimation.

- **Biosignal acquisition and processing**

In this course, students learn about different physiological signals of electrical type such as Electrocardiography (ECG), Electroencephalography (EEG), Electromyography (EMG), and of non-electrical type such as blood pressure, blood flowrate, cardiac output, cardiac rate, heart sound, respiratory rate, blood PH, plethysmography, blood gas analysis, etc. Students learn the origins of the biosignals, how they are collected and measured, what kind of sensor technology is required, and how they are analyzed. Signal processing techniques for different types of biosignals are discussed, including preprocessing for the removal of artifacts, coding, feature extraction, and modeling. The course includes hands-on sessions aiming to program these techniques in Matlab/Python, apply them to biomedical signals, and critically evaluate their performance.

- **Research methodology**

This course provides an opportunity for students to establish or advance their understanding of research through critical exploration of research language, ethics, and approaches. It focuses on translational research and provides the fundamentals towards the design and conduct of "use-inspired" research, by building upon basic scientific research and synthesizing knowledge to develop a new or improved drug, device, diagnostic, or behavioral intervention. The elements of the research process within quantitative, qualitative, and mixed methods approaches are introduced. Topics to be covered include: Searching and critically analyzing the latest research, Understanding statistics in quantitative research, Critical appraisal, Writing a research protocol, The setting up of a project, Patient and public involvement in research, Selecting robust outcome measures, Qualitative research methods, Writing a scientific manuscript, Assessing the impact of research, Getting research funding, Disseminating research. The course includes hands-on exercises and "journal clubs", where students evaluate and present the research methodology of specific scientific publications of interest.

- **Translational Bioinformatics**

The course aims at presenting both algorithms and technologies for the analysis of biomedical data at the cellular and subcellular level (e.g. genomics and proteomics) and their translation into diagnostic, prognostic, and therapeutic applications in medicine. The course presents: a) the principles of molecular biology related to cell characteristics, DNA, RNA and gene analysis, focusing on the relation of biology with computer science, b) the basic techniques and algorithms for

sequence comparison and statistical data processing, c) the basic IT infrastructure in which biological data is stored, with particular emphasis on online accessible databases along with the most important software tools used for their analysis (processing, cross-referencing, sharing and archiving of bioinformatics data, etc.), d) utility and limitations of public biomedical resources, e) issues and opportunities in drug discovery, and mobile/digital health solutions.

#### **Biomechanics**

This course introduces students to the mechanical principles that can be applied to study the structure function relationship at different scales, from the molecular and cellular to the tissue and system scales. At the molecular and cellular levels, the course examines how mechanical quantities and processes such as force, motion and deformation influence molecular and cell behavior and function, with an emphasis on the connection between mechanics and biochemistry. At the tissue and system levels, solid and fluid mechanics are introduced, and applications in the musculoskeletal, respiratory, cardiovascular and urinary systems are discussed.

#### **Biodesign Fundamentals**

This is the first part of a two-semester course. Multidisciplinary teams of students identify real-world medical needs, evaluate their potential health and commercial impact, invent new health technology products to address those needs, and plan their full implementation into patient care. In this first course, the students either bring their own ideas or identify real-world needs by visiting clinical settings and interviewing end-users. Via a well-structured process that includes stakeholder analysis and market analysis, the students prioritize the ideas and select the ones that will be implemented in the subsequent semester in the course "Biodesign Innovation Process".

#### **Medical Imaging and Image Analysis**

The course is aimed to teach the principles of biomedical imaging and the foundation techniques required to process, analyze, and use medical images for scientific discovery and applications. The first part of the course will provide students with the underlying principles of biomedical imaging including the basic physics and mathematics associated with each modality (X-ray CT, SPECT, PET, ultrasound, and MRI). The second part of the course will introduce concepts of digital images and will focus on analytic, storage, retrieval, and interpretive methods to optimally use the increasingly voluminous imaging data and integrate and understand them in the context of complementary molecular and clinical information to improve diagnosis and therapy in medicine.

The use of Machine Learning to improve performance of sensing and imaging algorithms will be covered along with principles and algorithms of deep learning to process and analyze biomedical images. Topics covered in the course include: Types of imaging methods and how they are used in medicine; Image processing, enhancement, and visualization; Computer-assisted detection, diagnosis, and decision support; Access and utility of publicly available image data sources; Linking imaging data to clinical data and phenotypes.

#### **Computational modeling and simulation for Medicine**

Primary focus is on quantitative and computational methods to understand and/or model the pathophysiology of complex biological systems and develop efficient therapeutic interventions. Methods for multiscale/multilevel modeling and system identification are covered as applied towards understanding and analyzing biology, from individual molecules in cells to entire organs, organisms, and populations. Some examples include modeling of the glucose-insulin metabolic system, multi-scale cancer modeling and in silico oncology, construction of models to study cardiovascular system health. Modeling and simulation of medical devices such as artificial kidney,



artificial heart and heart valves, are also covered, along with prototype manufacturing using 3D printing technology.

- **Artificial Intelligence in Healthcare**

*This course involves a deep dive into recent advances in AI in healthcare, focusing in particular on deep learning approaches for medicine and healthcare problems. The course will start from foundations of neural networks and will then cover cutting-edge deep learning models in the context of a variety of healthcare data including image, text, multimodal and time-series data. Metrics unique to healthcare, as well as best practices for designing, building, and evaluating AI-based approaches in healthcare will be presented. Advanced topics on open challenges of integrating AI in healthcare, including interpretability, robustness, privacy and fairness will also be covered. The course aims to provide students from diverse backgrounds with both conceptual understanding and practical grounding of cutting-edge research on AI in healthcare.*

- **BioMicroElectroMechanical Systems (BioMEMS)**

*This course targets to: (1) introduce fundamental design and microfabrication concepts of BioMEMS (including microfluidics and lab-on-chip systems) and (2) expose students to the relevant biomedical and biological applications of BioMEMS. The course is divided into three main sections: (i) Microfabrication and Materials of BioMEMS, (ii) Design of BioMEMS sensors and actuators, and (iii) BioMEMS applications.*

- **Introduction to neuroscience and neural engineering**

*This course examines a range of neural engineering approaches to investigating and intervening in the nervous system, emphasizing quantitative understanding and fundamental engineering concepts. Modern neural engineering techniques to measure and modulate neural activity and manipulate how an organism perceives, thinks, and acts are covered. The course focuses on the computing essence of neural processes and explores the relationship with molecules, spikes and synapses. Topics related to synaptic plasticity, learning and memory are examined. Based on the biophysics of brain computation, neurons are also explored as spike processing machines for creating intelligent algorithms inspired by the brain's complexity and self-organization.*

- **Healthcare robotics**

*The course intends to explore human robot interaction (HRI) in healthcare and cover the entire continuum of care from hospital to home, by tackling robotic challenges in surgery, assistance, and rehabilitation — three domains where robots are having the biggest impact. The course will also explore how artificial intelligence is used in surgical procedures, to improve precision diagnostics, in exoskeleton technology, and for patient care. Topics to be covered include: medical imaging-guided surgery; minimally-invasive surgery through miniaturization, novel actuation and sensing; robotic surgery at tissue and cell levels; autonomous robotic systems to assist with daily living activities; multi-modal robot interfaces; robotics-based rehabilitation technologies; upper limb rehabilitation robots; wearable exoskeletons and sensors; implanted neural interfaces.*

- **Biodesign innovation process (prerequisite: Biodesign fundamentals)**

*In this course, students are introduced to various aspects of medical device entrepreneurship. The students acquire a very diverse set of soft skills and are exposed in all steps required to bring a research discovery to a medical product or service. Lectures will be centered around case studies and often given by guest speakers from start-ups, regulatory experts, patent attorneys, clinical trial specialists, and investment firms to give students a sense of the process and challenges in developing their own business idea. Students will have the opportunity to discuss case studies*

based on other people's experience of bringing medical devices to market and the specific challenges associated with the development of new products in the medical sector.

**Indicative Curriculum:**

<b>OBLIGATORY CORE COURSES (GROUP A)</b>	<b>ECTS</b>
<b>WINTER SEMESTER</b>	
<i>Life Sciences for Engineering*</i>	5
<i>Engineering for Biomedicine**</i>	5
<i>Biostatistics and Machine Learning</i>	5
<i>Biosignal acquisition and processing</i>	5
<i>Research methodology</i>	5
<b>SPRING SEMESTER</b>	
<i>Medical imaging and image analysis</i>	5
<i>Computational modeling and simulation for medicine</i>	5
<i>Artificial Intelligence in healthcare</i>	5
<b>ELECTIVE COURSES (GROUP B)</b>	<b>ECTS</b>
<b>WINTER SEMESTER (choice of 2 courses)</b>	
<i>Translational bioinformatics</i>	5
<i>Biomechanics</i>	5
<i>Biodesign fundamentals</i>	5
<b>SPRING SEMESTER (choice of 3 courses)</b>	
<i>BioMEMS</i>	5
<i>Introduction to neuroscience and neural engineering</i>	5
<i>Healthcare robotics</i>	5
<i>Biodesign innovation process***</i>	5

- \* Compulsory course for Engineers and graduates of natural sciences
- \*\* Compulsory course for graduates of health sciences
- \*\*\* Prerequisite: Biodesign Fundamentals

## **Article 24**

### **“Number of admitted postgraduate students”**

The maximum number of postgraduate students admitted in the MSc program “Translational Engineering in Health and Medicine” is set at forty (40), with exceptions as provided in Article 7 of this Regulation. The total number of postgraduate students admitted each year to the program is determined by the Programme Studies Committee (PSC) based on the number of lecturers in the MSc program, the student-to-lecturer ratio, the infrastructure, and the teaching facilities.

## **Article 25**

### **“Organization of the educational process”**

The classes of the MSc program are conducted in person with mandatory physical presence of both lecturers and students. The educational process may be conducted using modern distance learning methods in cases of force majeure or extraordinary circumstances where in-person education or the use of the university's facilities for educational activities is not feasible.

## **Article 26**

### **“Infrastructure”**

The necessary infrastructure, such as classrooms, laboratories, and personal computers, is provided by the collaborating Schools. The Programme Studies Committee (PSC) proposes to the competent bodies of the NTUA the necessary measures to enhance this infrastructure and to secure the necessary resources for the acquisition or renewal of the existing infrastructure of the MSc Program.

## **Article 27**

### **“Funding sources”**

The funding is derived from the following sources:

- NTUA Budget
- Ministry of Education, Religious Affairs and Sports
- Donations, grants, legacies, sponsorships
- Resources from research programs
- Resources from programs of the European Union or other international organizations
- Revenues from the Special Research Fund of NTUA,
- Tuition fees from non-EU students.

**Article 28**  
**“Degree Type”**

HELLENIC REPUBLIC  
THE NATIONAL TECHNICAL UNIVERSITY OF ATHENS  
BY RECOMMENDATION  
OF THE PROGRAMME STUDIES COMMITTEE  
OF THE INTERDISCIPLINARY POSTGRADUATE PROGRAMME  
"TRANSLATIONAL ENGINEERING IN HEALTH AND MEDICINE"  
UNDER THE COORDINATION OF THE SCHOOL OF ELECTRICAL & COMPUTER ENGINEERING  
AND THE PARTICIPATION OF THE SCHOOL OF MECHANICAL ENGINEERING OF THE N.T.U.A.  
AWARDS TO

...

who in (month, year), fulfilled all the academic requirements

DIPLOMA OF POSTGRADUATE STUDIES

MASTER OF SCIENCE

IN THE SCIENTIFIC FIELD OF

“TRANSLATIONAL ENGINEERING IN HEALTH AND MEDICINE”

WITH THE GRADE "GOOD / VERY GOOD / EXCELLENT"

Athens, Greece, (date)

The Director of the  
Postgraduate Programme

The Secretary of the School of  
Electrical and Computer  
Engineering

The Rector

## **Article 29**

### **“Transitional provisions”**

1. Postgraduate students enrolled in the program up to and including the academic year 2022-2023 will complete their studies in accordance with the provisions of the previous decision 12/2021 of the Senate of NTUA (meeting on 8.11.2021).
2. Any matters not provided for in this decision shall be regulated by the competent bodies in accordance with the current legislation.
3. This decision shall be published in the Government Gazette.