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**National and Kapodistrian  
University of Athens**

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## CLINICAL BIOCHEMISTRY - MOLECULAR DIAGNOSTICS

*Postgraduate Programme*

Departments of Biology, Chemistry, Nursing and School of Medicine



Athens, 2023-2024

## TABLE OF CONTENTS

<b>WELCOME TO THE “CLINICAL BIOCHEMISTRY - MOLECULAR DIAGNOSTICS” POSTGRADUATE PROGRAMME .....</b>	<b>3</b>
<b>THE NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS (N.K.U.A.) .....</b>	<b>4</b>
<b>HISTORY AND PERSPECTIVES .....</b>	<b>4</b>
<b>ADMINISTRATION .....</b>	<b>6</b>
<b>INTERNATIONAL RELATIONS .....</b>	<b>7</b>
<b>INFORMATION ABOUT THE DEPARTMENT OF BIOLOGY .....</b>	<b>7</b>
<b>DEPARTMENT ADMINISTRATION .....</b>	<b>10</b>
<b>DEPARTMENT SECTIONS .....</b>	<b>11</b>
<b>HUMAN RESOURCES .....</b>	<b>12</b>
<b>THE POSTGRADUATE PROGRAM "CLINICAL BIOCHEMISTRY - MOLECULAR DIAGNOSTICS." .....</b>	<b>13</b>
<b>OBJECTIVE AND PURPOSE .....</b>	<b>13</b>
<b>ORGANIZATION &amp; MANAGEMENT .....</b>	<b>13</b>
<b>COURSE COORDINATORS .....</b>	<b>14</b>
<b>POSTGRADUATE STUDIES COMMITTEE (PC) .....</b>	<b>14</b>
<b>SECRETARIAT OF THE M.SC. PROGRAM .....</b>	<b>15</b>
<b>EXPECTED LEARNING OUTCOMES .....</b>	<b>15</b>
<b>CATEGORIES AND NUMBER OF ADMITTED STUDENTS .....</b>	<b>16</b>
<b>DURATION OF STUDIES .....</b>	<b>18</b>
<b>ORGANIZATION OF THE STUDY PROGRAM .....</b>	<b>19</b>
<b>COURSE DESCRIPTION / CONTENTS .....</b>	<b>20</b>
<b>PRINCIPLES IN BIostatISTICS AND BIOINFORMATICS .....</b>	<b>20</b>
<b>CLINICAL CHEMISTRY .....</b>	<b>21</b>
<b>ADVANCES BIOCHEMICAL AND BIOPHYSIC METHODS OF ANALYSIS .....</b>	<b>22</b>
<b>IMMUNOLOGY .....</b>	<b>23</b>
<b>MOLECULAR BASE OF HUMAN DISEASES .....</b>	<b>24</b>
<b>PATHOBIOCHEMISTRY .....</b>	<b>25</b>
<b>MOLECULAR APPROACH IN MEDICAL GENETICS .....</b>	<b>26</b>
<b>SPECIAL CHAPTERS OF ANATOMY – PHYSIOLOGY .....</b>	<b>27</b>
<b>MICROBIOLOGY-MYCOLOGY .....</b>	<b>28</b>
<b>MOLECULAR DIAGNOSTICS .....</b>	<b>29</b>
<b>LABORATORY ADMINISTRATION - PRINCIPLES OF ENTREPRENEURSHIP .....</b>	<b>30</b>
<b>MASTER THESIS .....</b>	<b>31</b>
<b>PROFESSIONAL REHABILITATION .....</b>	<b>32</b>
<b>EXAMINATIONS AND ASSESSMENT OF GRADUATE STUDENTS .....</b>	<b>32</b>
<b>PREPARATION OF THE POSTGRADUATE THESIS .....</b>	<b>34</b>
<b>OBLIGATIONS AND RIGHTS OF POSTGRADUATE STUDENTS .....</b>	<b>35</b>
<b>TUITION FEE EXEMPTIONS .....</b>	<b>36</b>
<b>INFRASTRUCTURE AND FINANCING OF THE M.SC. PROGRAM .....</b>	<b>37</b>
<b>AWARD OF POSTGRADUATE DIPLOMAS .....</b>	<b>38</b>
<b>GRADUATION .....</b>	<b>38</b>
<b>SUPPORTING SERVICES, BENEFITS, AND STUDENT WELFARE .....</b>	<b>39</b>

## **WELCOME TO THE “CLINICAL BIOCHEMISTRY - MOLECULAR DIAGNOSTICS” POSTGRADUATE PROGRAMME**

The postgraduate program 'Clinical Biochemistry - Molecular Diagnostics' was established and operates with the aim of providing high-quality theoretical and practical education to students in the fields of Clinical Biochemistry and Molecular Diagnostics. The program seeks to create professionals who will not only be able to obtain international knowledge for social and economic benefit but also contribute significantly to the development of new technology in the context of timely diagnosis, effective prognosis, and laboratory management of various diseases. This specific M.Sc. program is organized by the National and Kapodistrian University of Athens (N.K.U.A) in collaboration with the Departments of Biology, Chemistry, Nursing, and the School of Medicine. It is a top-notch postgraduate program in its field, with an ECTS curriculum that aligns with high-caliber international university programs.

During the first year, classes are held daily from 15:00 to 18:00 or 15:00 to 19:00. In the second year, students follow the schedule of the laboratory where they are trained for their thesis work. Over the past 18 years, the program has successfully provided:

- Specialized knowledge and laboratory training in fundamental and rapidly evolving areas of applied modern life sciences.
- The latest global research findings related to the pathogenesis, diagnosis, prognosis, and laboratory handling of a wide range of diseases that are at the forefront of Biomedical Research.
- Scientific training and specialization in the application of both classic and modern methodologies systematically used in the field of Biomedical Research and in the applied fields of Clinical Biochemistry and Molecular Diagnostics, which are fundamental pillars of Laboratory Medicine.

In this context, the specific interdisciplinary postgraduate program aspires to meet a significant part of the demand arising from the lack of trained professionals in these fields and provide young scientists with the necessary tools for a successful career in the rapidly evolving research and professional field of Clinical Biochemistry and Molecular Diagnostics.

Specifically, the curriculum follows international professional requirements, and graduates acquire the skills needed for employment in Clinical Biochemistry Laboratories, Molecular Biology & Molecular Diagnostics Laboratories, Hospital Analysis Laboratories, Diagnostic Centers, Research Institutes, and Laboratories in both the public and private sectors (e.g., In Vitro Fertilization Laboratories, Forensics, Public Health, Quality Control, etc.) and in Vocational Education, as well as in laboratories of Technological Educational Institutes (TEI), Higher Education Institutions (HEI), Pharmaceutical Companies, Diagnostic Companies, and other companies in Greece or abroad. Of course, there is also the opportunity to pursue further studies to obtain a Ph.D. in various fields of the Life Sciences.

In this Student Guide, you will find all the necessary information regarding the organization, operation, and structure of the study program, courses, student support, and available support services of the program and NKUA in general for our students.

I wish all of you good progress and success during your studies.

Dr. Andreas Scorilas, PhD  
Director of the M.Sc. Program "Clinical Biochemistry - Molecular Diagnostics"  
Professor of Clinical Biochemistry,  
Department of Biology, NKUA

# **THE NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS (NKUA)**

## **HISTORY AND PERSPECTIVES**

### **PROFILE**

The National and Kapodistrian University of Athens is the largest state institution of higher learning in Greece, and among the largest universities in Europe. As all other Greek universities, it is a self-governed legal entity of public law and all major policy issues are determined by the Ministry of National Education and Religion. Retaining its academic autonomy, it fully respects the constitutionally secured right to everyone for a free education. This is possible because it is funded by the state. Moreover, it is progressively succeeding to benefit from its property and legacies, as well as from the funding of research projects with national and international partners. All funds are invested into the management and operation of educational, research and cultural programmes, into student and staff services and grants. With a student body of about 68.500 undergraduate and postgraduate students, over 2.100 members of academic staff and approximately 1.000 administrative and secretarial staff and specialized personnel, the University of Athens aims at excellence in both teaching and research in a significantly varied range of disciplines. The Faculties and their respective Departments, functioning within the 9 larger academic units entitled Schools, as well as a number of independent Faculties offer a wide range of undergraduate courses, leading to a Diploma equivalent to a Bachelor of Arts or Sciences degree (Ptychio in Greek), after a minimum of four years of studies. Moreover, intra- and inter-Departmental programmes offer an expanding range of taught and research-based postgraduate degrees.

Facilities for academic work and research are growing fast, but because of the poor ratio between academic staff and students in many Departments, presently, the possibilities for individualized attention to students and project work are limited, particularly in the humanities and social sciences. The number of Greek and foreign students to be admitted as full-time students each year is determined by the Ministry of Education, but Faculties and their academic staff decide on the number of European students on mobility programmes each semester. Actually, international students are welcome in the University of Athens and, in recent years, the number of non-Greek nationals studying in the various Faculties has increased. Some of them are enrolled as full-time students in undergraduate or postgraduate programmes, while others are exchange students, studying at the University of Athens for one or two semesters and participating more or less actively in its academic life and in the rich cultural life inside and outside the university. Indeed, many foreign but also Greek students feel it is a privilege for them to be living in the historic and cosmopolitan city of Athens, and to be studying in a university that has maintained its tradition and prestige for 180 years.

### **FROM PAST TO PRESENT**

The University of Athens, inaugurated on 3rd May 1837, was first housed in a neoclassical residence, on the northeastern side of the Acropolis, renovated today and operating as the University Museum. Initially named "Othonian University" after Greece's first King, Othon, it consisted of 4 academic units and 52 students. As it was the first university in the newly established modern Greek state, as well as in the Balkans and the Eastern Mediterranean region, its socio-historically significant role has been decisive for the production of particular knowledge and culture in the country.

In 1841 the administrative services and education units were transferred to what is presently known the "main building" of the University of Athens which, in 1932 was officially named National and Kapodistrian University of Athens, in honour of Ioannis Kapodistrias, the first governor of Greece, after the nation's independence. Today, this building houses the Rectorate, the Senate, the Great Hall of Ceremonies and important central services. Its forecourt, the propylaeum, is socio-historically significant as it has served as a main site for political rallies and demonstrations by students and other social groups involved in social rights movements. Until the early part of the 20th century, the University of Athens was the only university in Greece that provided the Greek society with qualified professionals in medicine, in the physical and social sciences, in law and economics, in archeology and in education as well as in the clergy. In its many years of operation, it has offered the country a centre of intellectual production, stimulating intellectual circles functioning inside and outside its premises. Moreover, it has and still offers important social services as its academic staff regularly serves on national and international committees, carries out educational and other research projects, plans and takes part in seminars for a variety of social groups, oftentimes in addition to their full-time work at University. One of its most important contributions is in the national health scheme, since students of the health sciences in training, under the supervision of professorial staff, offer their medical services to the public. Still perhaps the most prestigious university in the country, the University of Athens has established a tradition in scholarship and constructive participation in the social sphere.

## **GAZING AT THE FUTURE**

The University of Athens is confronted today with a variety of challenges, on the basis of which it is progressively articulating new goals for egalitarian education to its large numbers of students so they develop the required knowledge and skills to function as creative intellectuals and competent professionals in a rapidly changing society, which is part of the larger European community. Opposing the marketisation of university studies and the development of a highly competitive system that one encounters in institutions of tertiary education in many Western countries nowadays, it is denying its traditional role of producing an intellectual elite. Recognizing the importance of human resource development, the University of Athens aims to create closer links between the worlds of the production and the consumption of knowledge, thus contributing to social and economic development in the country. In order to respond to new challenges, some of the major steps the University of Athens is taking concern the rapid development of the following:

- New Faculties and Departments which offer undergraduate programmes in novel areas of knowledge.
- Interdisciplinary programmes of study for different target groups.
- A great variety of taught and research-based postgraduate programmes.
- Laboratories, centres and library schemes providing staff and students with conditions to use new technologies and access information nationally and internationally.
- Infrastructure for the use of ICT in education and the operation of e-classes.
- An academic and career information service.
- Organized programmes and bilateral agreements with European and other foreign educational and research institutions for the exchange of students, academic staff and young researchers.
- Academic and market-based research projects involving national and international partners.
- Better conditions for the teaching and learning of a variety of languages by Greek students and for the teaching and learning of Greek as a foreign language.
- The profile of the University of Athens is changing. As the new millennium begins, the university wishes to play a dominant role in social mobility and in social change.

## ADMINISTRATION

According to the existing legal framework, the administrative bodies of a higher education institution in Greece are the Senate, the Rector and Vice-Rectors.

- **Rector**  
Prof. Gerasimos Siasos  
30 Panepistimiou str., 10679 Athens  
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- **Vice-Rector for Administrative Affairs and Student Welfare**  
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- **Vice-Rector for Academic Affairs, International Relations, and Extroversion**  
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- **Vice-Rector for Research, Innovation, and Lifelong Learning**  
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The administrative structure of the Foundation includes:

**Senate:** The Senate consists of: a) the Chancellor, b) the Vice-Chancellors, c) the Deans of the Schools, d) the Chairs of the Departments, e) the representatives of the students at a rate of ten percent of the total members of the Senate of the cases a' to d, f) three representatives, one per category from the E.E.P., E.D.I.P. members. and E.T.E.P. of the Foundation and g) a representative of the Foundation's administrative staff.

**Rector's Council:** The Rector's Council consists of: a) the Rector, b) the Vice-Rectors, c) a representative of the students, who is indicated and comes from the elected students who participate in the Senate and d) the representative of the administrative staff who participate in the Senate. The University of Athens is structured by academic units of two (2) levels:

**Schools:** The School covers a unit of related scientific disciplines and ensures the interdisciplinary approach, the communication between them and the necessary, for teaching and research, their coordination. Organs of the School are: a) the Dean, b) the Deanship and c) the General Assembly. The 9 Schools of NKUA are:

- SCHOOL OF AGRICULTURAL DEVELOPMENT, NUTRITION AND SUSTAINABILITY
- SCHOOL OF ECONOMICS & POLITICAL SCIENCES
- SCHOOL OF EDUCATION
- SCHOOL OF HEALTH SCIENCES
- SCHOOL OF LAW

- SCHOOL OF PHILOSOPHY
- SCHOOL OF PHYSICAL EDUCATION AND SPORT SCIENCE
- SCHOOL OF SCIENCE
- SCHOOL OF THEOLOGY

**Departments:** The Department is the basic educational and academic unit of the Foundation, promotes science, technology or the arts in the respective scientific field, organizes teaching within the curriculum and ensures the continuous improvement of learning in it. Departments corresponding to related sciences constitute a Faculty. Organs of the Department are: a) The President, b) the Board of Directors, c) the Assembly of the Department, and, if Sectors have been established, d) the Director of the Sector and e) the General Assembly of the Sector. There are 43 Departments at the University of Athens.

**School of Science:** The **School of Science** consists of the following Departments: **Biology**, Chemistry, Geology and Geoenvironment, History and Philosophy of Science, Informatics and Telecommunications, Mathematics, Physics and Digital Industry Technologies.

## **INTERNATIONAL RELATIONS**

The Department of European and International Relations of the National and Kapodistrian University of Athens aims at its active participation in the formation of current developments of the European and international education and culture. It positively contributes to the processes that take place in the decision-making centers regarding Higher Education. Furthermore, the university places emphasis on the promotion of its high standard educational and cultural work.

The accomplishment of these aims is being realized through:

- the active involvement in the ERASMUS+ Programme
- the participation in other European educational programmes of scientific cooperation and mobility
- the conclusion of international bilateral agreements of scientific cooperation with Institutions of Higher Education and the participation in international independent programmes
- the membership in international university organizations, associations and networks
- the development of international joint postgraduate and PhD programmes as well as the co-supervision of PhD dissertations. The long-term strategies and the main directives of the work of the Department of European and International Relations are set by the Rectoral Authorities and the Senate of the university, in collaboration with the Committee of International Relations and European Educational Programmes.

## **INFORMATION ABOUT THE DEPARTMENT OF BIOLOGY**

The **Department of Biology** is one of the newest Faculties of the School of Science at the National and Kapodistrian University of Athens. It was founded in **1970**, along with the current Department of Geology and Geoenvironment, following the division of the **Department of Natural Sciences**, formerly established in 1932. Up to the early 20th century, Biology-related courses such as **Zoology** and **Botany** were being taught in the **Department of Physics** of the School of Philosophy at

the University of Athens, in accordance with the contemporary attitudes and beliefs. **Zoology** was offered as a taught course for the first time in **1837** by the Emeritus Professor of Natural History, **Kyriakos Domnandos**, who was **the first Professor of Natural History** in the newly established Greek State, and one of the main co-founders of the **Physiographical Society** and the **Museum of Physiography** (or Museum of Natural History). In 1839, one of the university Chairs was, amongst others, the Chair of Natural History, which included disciplines such as Zoology, Mineralogy, Geology and Botany. One of the first academics to invoke the Greek government's attention to the Natural Sciences at those times was the Rector of the University, Konstantinos Asopios, who, in his inaugural speech in the academic year 1843 – 1844, called upon the establishment of a new Chair for Mineralogy. The appointment of additional Department members in Natural Sciences promptly followed, while new scholars were encouraged and sponsored to conduct postgraduate studies at western European Universities. In this context, Hercules A. Mitsopoulos was appointed in 1845 as Professor of Physiography (Physical Geography). Prof. Mitsopoulos was in essence the first Department member to introduce Natural Science studies in Greece by teaching Systematic Mineralogy and Zoology for almost half a century. He held this post until 1894 and was hailed as one of the most prominent Greek scholars, rightly regarded as "Father of Natural Sciences in Greece". Renowned for his breadth of knowledge and his multilingualism, Prof. Mitsopoulos was Chairman of the Physiographical Society, co-founder and chairman of the Museum of Physiography, as well as Director of the museum's Zoology Department. In the early 20th century, after the foundation of the School of Science in 1904, Zoology was taught at the Department of Physics by:

(i) Nikolaos C. Apostolidis, who served as Reader and then Professor of Zoology from 1894 to 1919. Prof. Apostolidis directed the Laboratory of Zoology and introduced Systematic Experimental Zoology in Greece,

(ii) Konstantinos A. Ktenas, who in 1912 was elected Professor of Mineralogy and Petrology, served as temporary Professor of Geology and Paleontology (1917-1918), and was Director of the University of Zoological Museum between 1917 and 1923,

(iii) Ioannis C. Politis, who in 1918 was elected Professor of Botany, and during the academic years 1918-1919 and 1919-1920 also taught Zoology, and

(iv) Theodoros G. Skoufos, who was appointed as Professor in the newly established Chair of Geology and Paleontology in 1906. Prof. Skoufos was the first specialized paleontologist in Greece and taught Zoology as a temporary professor from 1920 until 1933.

In 1932, the subjects of Physiography and Geography ceased to be offered by the Department of Physics, and were added in the curriculum of the newly founded Department of Natural Sciences - the fifth Department in the School of Science - that formed part of the National and Kapodistrian University of Athens. In 1933, Georgios P. Pantazis was elected as temporary Associate Professor in Zoology, and in 1937, he was appointed full Professor in the same post. He held this position until 1958, when he was elected Professor of General Biology and took over the respective Chair, served since 1937 by Prof. Thrasyvoulos S. Vlesidis. Prof. Vlesidis was the first Professor of Biology in the University of Athens and founder of the Laboratory of General Biology in 1939. It is worth noting that Prof. Pantazis, during his tenure in Zoology, was also the Director of the University's Zoological Museum and of the Laboratory of Zoology. During his subsequent tenure in General Biology, Prof. Pantazis was rigorously involved in shaping the Faculties of Biology at both the Universities of Patras and Athens, and was one of the pioneers that founded the University Campus (Panepistimiopolis) in Athens, Ilissia, which lies at the foot of Hymettus Mountain. In fact, in 1970, Prof. Pantazis inaugurated the premises of the School of Science at the Campus.

As far as Botany is concerned, it began to be taught as an academic subject in the year 1837, when Karl - Nikolaus Fraas, the Superintendent and Phytologist of the Royal Garden in Athens, was appointed as temporary Professor of Systematic Botany. Prior to that, in 1835, and in compliance to his belief in the importance of Physiography, Prof. Fraas had been pivotal in establishing the



Physiographical Society. In 1844, the Bavarian chief pharmacist of King Othon, Xavier Landerer, was appointed as Professor of Pharmaceutical Chemistry, Prescriptive Pharmacology and Botany, and from this position taught zealously for over a quarter of a century. In 1850, Theodoros G. Orphanides was appointed as Professor of Botany, and this is considered a milestone in the history of the then Department of Natural Sciences. Prof. Orphanides was characterized by his tenacity in exploring the rich flora of Greece and bestowed a naturalist angle in the Department's curriculum during the first period of its formation (1837-1865). He held the Chair of Botany for more than thirty years - until 1882 - and left an important body of work comprising, among others, of numerous scientific reports, catalogues of the Greek flora, and the introduction of foreign plants from abroad, that render him the founder of modern Greek Phytology. It should be noted here that in the 19th century, Botany was a particularly popular science. Indeed in those days, the rare plant species of the Greek land were considered as a part of the National wealth, and the work of Botanists was equalled to that of Archaeologists. In 1882, upon retirement of Prof. Orphanides, the former Professor of Medicine, Theodoros Afentoulis, took over the teaching of Pharmacology and Botany until 1892, the year that Professor Spyridon Miliarakis succeeded him. Prof. Miliarakis introduced Systematic Phytology in Greece and established the Laboratory of Experimental Phytology.

At the beginning of the 20th century, in 1918, Ioannis C. Politis was appointed as Professor of Botany and also taught Zoology for the first two years of his tenure. From 1923 to 1957, Prof. Politis became the Director of the Museum of Phytology and attended the registration and classification of its flora collection. He also contributed to the creation of the first collection of thalloid plants of Greece. In 1942, Charalambos A. Diapoulis became Professor of Phytogeography and Systematic Botany and remained in this position until 1967. In the mid-50's, Prof. Diapoulis contributed to the classification of approximately 800 plant species and subspecies of Mount Parnitha, which is located in close proximity to the city of Athens. During the '60s, there was a worldwide fervour in the development of Earth (geological) and Life (biological) Sciences. In full accordance to the spirit of the times, the renowned Professors M. Mitsopoulos, C. A. Diapoulis and P. Psarianos, prompted by the Professor of Biology and Dean of the School of Sciences, G. P. Pantazis, propose in 1967 the modernization of the academic curriculum and the division of Natural Sciences into its two founding components: Biology and Geology. This resulted in the division of the Department of Natural Sciences into the Faculties of Biology and Geology that came into effect in the academic year 1970-1971. The newly formed Department of Biology was divided into several Chairs: that of General Biology held by Prof. Georgios P. Pantazis, General Botany held by Prof. Konstantinos A. Mitrakos, Zoology held by Prof. Vasileios-Kleitos G. Kiortsis, and Systematic Botany held by Prof. Konstantinos T. Anagnostidis. The aforementioned Professors and their teams laid the foundations for current research and education in the Department of Biology. After the retirement of **Prof. G. Pantazis** in 1971, **Prof. Fotis K. Kafatos** was invited from Harvard University to fill the position. Professor Kafatos accepted the **Chair of General Biology** and served until **1981**. During his 10-year tenure in the Department of Biology, Prof. Kafatos **undertook a major initiative in organizing and uplifting the Department**, both in numerous research directions and in the academic studies program. In doing so, **he successfully summoned a number of scientists** who, in later years, adopted a pivotal role in the further development of the Department. Upon his resignation in 1981 to move on to new challenges, **Prof. Theoharis Patargias** succeeded F. Kafatos in superintending the **Laboratory of Biology**.

During the '70s, the Department of Biology was **housed in buildings scattered in the centre of Athens**, i.e., the basement of the Department of Law (where in 1967, **the first electron microscope** of the Department was installed and operated), or close to the University student dormitories and maintenance buildings of the current University Campus at Ilissia (Panepistimiopolis). In **1981**, the Department of Biology **was relocated to its current premises at the Campus's upper east**. In 1982, a new Higher Education Act comes into effect and introduces the replacement of Chairs, as functional and administrative bodies, with the newly formed Departments. The first Chairman of the Department of Biology, under the new legislation, was Professor Konstantinos T. Anagnostidis. In the same year, the independent Chair of Biochemistry of the School of Science, initially founded in 1978 and served to that date by Prof. Constantine E. Sekeris, was merged with the Department of Biology. Prof. Sekeris' contribution to promotion of Life Sciences was of such magnitude that he is rightly regarded as "Mentor" of Biochemistry in Greece. After the implementation of the Higher Education Act of 1982, the Department of Biology was divided into three Departments: a) the Department of Biochemistry, Cellular

& Molecular Biology, and Genetics, b) the Department of Botany & Zoology, and c) the Department of Ecology & Systematics. The Act of 1982 was a turning point for the Department of Biology in every respect: administrative, organizational, educational and scientific. New Department positions were offered, the academic curriculum was reformed, research and teaching infrastructures were modernized and new research activities and directions were embarked upon. In 1991, and in order to improve the quality of academic teaching and research, the Department decides upon the division of the Department of Botany & Zoology into two: the Department of Botany and the Department of Zoology. In the same direction, in 1996, the Department of Biochemistry, Cellular & Molecular Biology, and Genetics divides into three separate Departments, those of Cell Biology & Biophysics, Genetics & Biotechnology, and Biochemistry & Molecular Biology, while at the same time, the Department of Zoology is also further divided into the Department of Zoology-Marine Biology and the Department of Animal & Human Physiology. These seven Departments stand as the main administrative and research sectors of the Department of Biology to date. In the '90s, the Department of Biology substantially reformed its academic curriculum to standards fully equivalent to those of high-caliber institutions abroad and established its first Interdepartmental postgraduate course in 'Oceanography'. Other postgraduate courses, leading to Master's Degrees, were soon to follow. In 1997, the course 'Applications of Biology in Medicine' started as a Departmental course, while from 1998 it has been offered as a joint course between the Faculties of Biology and of Medicine of the University of Athens. This course aims to offer knowledge and skills for a career path in Healthcare or for a continuation of studies at the Doctorate level. Additionally, since 2003, the Department of Biology has been offering postgraduate courses in (i) 'Bioinformatics', which provides knowledge and skills required at research and professional levels, (ii) 'Clinical Biochemistry–Molecular Diagnostics', Interdepartmental course organized by the Faculties of Biology, of Chemistry and of Nursing, that offers graduate level knowledge in a particularly dynamic and competitive area of science, as well as practical skills to be implemented in University or hospital laboratories, and at research or diagnostic centres, (iii) 'Microbial Biotechnology', providing expert knowledge in Molecular Biology and Genetics, Ecology, Physiology and Biochemistry of Microorganisms, Environmental and Clinical Microbiology, as well as Food Microbiology, and lastly, (iv) 'Modern Trends in the Teaching of Biology with the Aid of New Technologies', which offers high-level training in rapidly developing disciplines and subjects pertinent to the field of Education through lectures, laboratory exercises, and multimedia-assisted presentations. Detailed descriptions of the undergraduate and postgraduate courses taught at the Department of Biology can be found at their websites.

## **DEPARTMENT ADMINISTRATION**

According to the existing legal framework, Department is the basic academic unit which covers the discipline of a science and grants a single degree that may have orientations or specializations. Faculties corresponding to relative sciences comprise a School. The Department of Biology, together with the Faculties of Physics, Chemistry, Mathematics, Geology & Geoenvironment and the Department of Informatics & Telecommunications establish the School of Science. Like all Faculties of the Greek Higher Education Institutions, the Department of Biology is administered by: the Department Council, the Department Board, the Department Chairman and the Deputy Chairman, who replaces the Chairman when he is absent, unavailable or lacking.

The Department Council consists of Academic/Teaching & Research Staff, student representatives equal to 50% and postgraduate student representatives equal to 15% of the Teaching & Research Staff who are members of the Department Council. In the Department Council also participate representatives of the Special Laboratory Teaching Staff, the Special Technical Laboratory Staff as well as non-doctoral Assistants, Scientists and Curators when members of the respective categories of personnel holding permanent posts in the Department. Each of these three categories of personnel participates in the Department Council with representatives equal to 5% of the Teaching & Research Staff who are members of the Department Council.

The Department Council: a) decides on issues such as Courses, Studies Regulations and the award of scholarships to graduate students, b) validates the decisions of the Department (teaching assignments, textbooks, etc.) and the Department Board (funds allocation), c) proclaims academic posts and elects new Department Members.

The Department Board consists of the Department Chairman and the Deputy Chairman, the Heads of Department, two (2) undergraduates and one (1) graduate student representatives, as well as a representative of the Special Technical Laboratory Staff or non-doctoral Assistants, Scientists and Curators (when discussing issues that affect them).

The Department Chairman: a) convenes the Department Council, and the Department Board, b) prepares their agenda and chairs them, c) proposes to the Department Council for various areas of its responsibility, d) ensures the implementation of the Department Council's and Department Board's decisions, e) establishes Committees for studying and forwarding specific issues and f) supervises the administration of the Faculty.

## **DEPARTMENT SECTIONS**

The Department of Biology is divided into Sections. Each Section coordinates the teaching of a Department's subject that corresponds to a specific field of Biological Science. Bodies of the Section are the General Assembly and the Director. The General Assembly of the Section consists of Section's Members, the representatives of students (up to two), and by a representative of: a) Assistants & Research Associates, b) Special Laboratory Teaching Staff, c) Special Technical Laboratory Staff as well as non-doctoral Assistants, Scientists and Curators from those assigned to the Section.

The Section's General Assembly: a) elects the Director of the Section, b) coordinates the work of the Section under the decisions of the General Assembly of the Section, c) submits proposals to the General Assembly of the Section related to curriculum, d) allocates the funds of the Section in various teaching and research activities, e) elects the Directors of Laboratories of the Section, f) decides on the allocation of teaching to the Section's academic staff and on every issue that may concern the Section.

The Director of the Section convenes the Section's General Assembly, draws up the agenda, presides over the meetings and ensures the implementation of the General Assembly's decisions.

The Department of Biology currently includes the following Sections:

- the Section of Animal & Human Physiology,
- the Section of Biochemistry & Molecular Biology, which includes the Laboratory of Biochemistry,
- the Section of Botany, which includes the Laboratory of General Botany,
- the Section of Cell Biology & Biophysics,
- the Section of Ecology & Systematics, which includes the Laboratory of Systematic Botany,
- the Section of Genetics & Biotechnology, which includes the Laboratory of Biology and
- the Section of Zoology - Marine Biology, which includes the Laboratory of Zoology.

In addition the Department of Biology is responsible for the operation of the Zoological Museum, the Botanical Museum and the Botanical Garden of the University of Athens. Also, the Department of Biology effectively participates in the administration and assists to the proper functioning of the Botanical Garden of Julia & Alexander Diomidous.

## **HUMAN RESOURCES**

Currently, the Department has 40 permanent Members of Academic/Teaching & Research Staff - who contribute to its under- and post-graduate programmes, along with many impermanent visiting professors and distinguished scientists - 21 Members of Teaching Staff from other University's Schools and Faculties, around 500 undergraduate students, 70 postgraduate students and over 50 graduate research students.

The staff of the Department is composed of:

A. Academic/Teaching & Research Staff: Those who belong to the Department of Biology because they hold permanent University posts: Professors, Associate Professors and Assistant Professors.

All these Department Members hold doctorate degrees in their field and are engaged in under- and post-graduate teaching as well as in research conducted under national or international collaborative programmes. Thus, the undergraduate students benefit from the research activities of the Faculty. Specially selected Department Members serve as Academic Advisers who are always available to supervise undergraduate and postgraduate students. In addition, most of them are responsible for one or more of the Department 's main resources and participate in more than one of its Committees.

B. Laboratory & Administrative Staff: Those Department Members without official teaching duties who work as Tutors, Technicians and post-doctoral Researchers on various Department projects, as well as other Support Staff that provide essential back-up services for the whole Faculty:

a) Assistants & Research Associates, who are mainly postdoctoral researchers engaged in a range of significant research and teaching activities of the Department. Their main role is to cooperate with the Members of Academic/Teaching & Research Staff and assist them in their teaching duties.

b) Special Laboratory Teaching Staff, who are administering the Department 's laboratories and perform specific applied and laboratory teaching work.

c) Special Technical Laboratory Staff who provide infrastructure for the overall operation of the Department, offering specialized technical laboratory services for the most complete implementation of its educational, research and applied work.

# **THE POSTGRADUATE PROGRAM "CLINICAL BIOCHEMISTRY - MOLECULAR DIAGNOSTICS."**

## **OBJECTIVE AND PURPOSE**

The purpose of the M.Sc. Program "Clinical Biochemistry - Molecular Diagnostics" is to provide high-level postgraduate education at the level of Master of Sciences (M.Sc.) in the scientific fields of Clinical Biochemistry and Molecular Diagnostics. Specialized knowledge and laboratory training are offered for research in fundamental and rapidly evolving areas of applied modern life sciences. Students gain knowledge about the most current global research findings on the pathogenesis, diagnosis, prognosis, and laboratory handling of a wide range of diseases that are at the center of interest in Biomedical Research. Furthermore, they are capable of training in the application of classical as well as modern methodologies systematically used in both the field of Biomedical Research and the applied fields of Clinical Biochemistry and Molecular Diagnostics, which are fundamental pillars of Laboratory Medicine.

## **ORGANIZATION & MANAGEMENT**

The Interdepartmental Postgraduate Program (M.Sc.) "Clinical Biochemistry - Molecular Diagnostics" is administratively supported by the Department of Biology, N.K.U.A.

- **Director: Andreas Scorilas, Professor of Clinical Biochemistry - Sector of Biochemistry and Molecular Biology, Department of Biology, N.K.U.A.**
- **Deputy Director: Evi Lianidou, Professor of Analytical Chemistry - Clinical Chemistry, Department of Chemistry, NKUA.**

The Director of the M.Sc. Program comes from the Department of Biology of NKUA and, primarily, holds the position of Professor or Associate Professor. They serve a two-year term, with the possibility of renewal without restrictions in accordance with the Law (4957/22), and are appointed by the Program Committee of the M.Sc. Program. The Director of the M.Sc. Program has the following responsibilities:

- Chairs the Program Committee, prepares the agenda, and convenes its meetings.
- Proposes matters related to the organization and operation of the M.Sc. Program to the Program Committee.
- Proposes to the Program Committee and other bodies of the University matters related to the effective functioning of the M.Sc. Program.
- Serves as the Scientific Coordinator of the program and exercises the relevant responsibilities.
- Monitors the implementation of decisions by the bodies of the M.Sc. Program and the Internal Regulations of postgraduate and doctoral study programs, as well as the execution of the budget of the M.Sc. Program.
- Exercises any other authority specified in the founding decision of the M.Sc. Program.

The Director and members of the Program Committee do not have the right to receive compensation or any form of remuneration for the execution of the responsibilities assigned to them in their roles as members of the Program Committee. In essence, they are not entitled to payment for their duties related to the Program Committee's activities.

## COURSE COORDINATORS

- **Vassilacopoulou D., Associate Professor, Department of Biology (Molecular Basis of Diseases)**
- **Aggeli IK., Assistant Professor, Department of Biology (Special Topics in Anatomy-Physiology)**
- **Kavantzias N., Professor, Medical School (Special Topics in Anatomy-Physiology)**
- **Lianidou E., Professor, Department of Chemistry (Clinical Chemistry, Modern Biochemical and Biophysical Analysis Methods)**
- **Sideris D., Associate Professor, Department of Biology (Molecular Diagnostics)**
- **Scorilas A., Professor, Department of Biology (Biostatistics, Pathobiochemistry, Laboratory Management- Principles of Entrepreneurship)**
- **Stamatakis A., Professor, Department of Nursing (Molecular Approach to Medical Genetics)**
- **Tsakris A., Professor, Medical School (Microbiology - Mycology)**
- **Tsitsilonis O., Professor, Department of Biology (Immunology)**
- **Fragoulis EG. Em Professor, Department of Biology (Laboratory Management- Principles of Entrepreneurship)**

According to Law 4957/2022, the responsible authorities for the functioning of the M.Sc. program are: At the institutional level, the responsible authorities are the Postgraduate Studies Committee and the Senate. At the departmental level, the responsible authorities are the Course Program Committee.

## POSTGRADUATE STUDIES COMMITTEE (PC)

The Postgraduate Studies Committee (PC) is established by decision of the Senate of the University of Athens, following the recommendation of the Assemblies of the collaborating Departments, and is composed of members of the Teaching and Research Staff (TRS). The number of members and its composition are determined in the Protocol of Cooperation of the M.Sc. as follows: The PC consists of five (5) members, three (3) members from the Department of Biology of the University of Athens, one (1) member from the Department of Chemistry of the University of Athens, one (1) member from the Department of Nursing of the University of Athens, and one (1) member from the Medical School of the University of Athens.

- **Lianidou E., Professor, Department of Chemistry**
- **Sideris D., Associate Professor, Department of Biology**
- **Scorilas A., Professor, Department of Biology**
- **Stamatakis A., Professor, Department of Nursing**
- **Tsakris A., Professor, Medical School**

The responsibilities of the Course Program Committee are:

- Proposing to the Senate, through the Postgraduate Studies Committee, the need to amend the M.Sc. program and extend its duration.
- Appointing the Director of the M.Sc. program.
- Establishing Committees for the evaluation of applications of prospective postgraduate students and approving their enrollment in the M.Sc. program.
- Assigning the teaching duties among the instructors of the M.Sc. program.
- Constituting examining committees for the examination of diploma theses of postgraduate students and appointing a supervisor for each thesis.
- Certifying the successful completion of studies and awarding the Master of Science Degree.
- Approving the M.Sc. program's financial report.

- Assigning postgraduate students to conduct auxiliary teaching work.
- Exercising any other lawful authority.

## **SECRETARIAT OF THE M.SC. PROGRAM**

Biochemistry and Molecular Biology Section, Department of Biology, National and Kapodistrian University of Athens

Tel.: 210-727-4502 (13:00-17:00), e-mail: [cbmd.secretary@gmail.com](mailto:cbmd.secretary@gmail.com).

- a) The Secretariat of the Department of Biology is responsible for the secretarial and administrative support of the M.Sc. Program.
- b) The Secretary of the School/Department appoints one or more employees, depending on the number of M.Sc. programs and the workload, to be responsible for the Postgraduate Programs of the School/Department.
- c) In case the M.Sc. Program has its own resources, it can hire external associates, according to the current legislation, for secretarial and administrative support, who are again under the supervision of the Secretariat of the Department of Biology of the University of Athens.

## **EXPECTED LEARNING OUTCOMES**

The M.Sc. program ‘‘Clinical Biochemistry and Molecular Diagnostics’’ provides specialized knowledge and laboratory training for research in fundamental and rapidly evolving areas of applied modern life sciences. Students acquire knowledge of the latest global research findings related to the pathogenesis, diagnosis, prognosis, and laboratory handling of a wide range of diseases that are at the forefront of Biomedical Research interest. In this context, this interdisciplinary postgraduate program aspires to cover a significant portion of the needs arising from the lack of trained personnel in the above-mentioned fields and to equip young scientists with the necessary skills for a successful career in the dynamically developing research and professional field of Clinical Biochemistry and Molecular Diagnostics. More specifically, the curriculum of the program follows international professional requirements, and graduates gain the necessary qualifications for employment in Clinical Biochemical Laboratories, Molecular Biology & Molecular Diagnostics Laboratories, Hospital Analysis Laboratories, Diagnostic Centers, Research Institutes, and Laboratories in the Public and Private Sector (e.g., In Vitro Fertilization Laboratories, Forensics, Public Health, Quality Control, etc.), as well as in Vocational Education and in laboratories of Technological Educational Institutes, Universities, and Pharmaceutical companies, Diagnostic Companies, and other companies in Greece or abroad. Of course, there is also the possibility of continuing studies to obtain a Ph.D. in various fields of Life Sciences.

The purpose of the M.Sc. program in Clinical Biochemistry and Molecular Diagnostics is to help students:

- Acquire advanced postgraduate education at the level of a Master of Science (M.Sc.) in the scientific fields of Clinical Biochemistry and Molecular Diagnostics.
- Receive specialized knowledge and laboratory training for research in fundamental and rapidly evolving areas of applied modern life sciences.
- Gain knowledge of the latest global research findings related to the pathogenesis, diagnosis, prognosis, and laboratory handling of a wide range of diseases that are at the forefront of Biomedical Research.
- Specialize in the application of both classic and modern methodologies systematically used in the field of Biomedical Research and in the applied fields of Clinical Biochemistry and Molecular Diagnostics, which are fundamental pillars of Laboratory Medicine.

Upon successful completion of the M.Sc. program, students will be able to:

- Combine specialized knowledge and laboratory training in fundamental and rapidly evolving areas of applied modern life sciences.
- Effectively manage the latest global research findings related to the pathogenesis, diagnosis, prognosis, and laboratory handling of a wide range of diseases that are at the forefront of Biomedical Research.
- Attain scientific training and specialization in the application of both classic and modern methodologies systematically used in the field of Biomedical Research and in the applied fields of Clinical Biochemistry and Molecular Diagnostics, which are fundamental pillars of Laboratory Medicine.

## **CATEGORIES AND NUMBER OF ADMITTED STUDENTS**

In the M.Sc. program, graduates of relevant University Schools such as Biology, Chemistry, Nursing, and Medicine (indicatively including departments of Biology, Chemistry, Medicine, Nursing, Pharmacy, Biochemistry, Molecular Biology, Biotechnology, Biomedical Sciences, Dietetics-Nutrition, Food Sciences, Veterinary Medicine, Agricultural Schools, Animal Sciences, Dentistry, etc.) are admitted. Graduates may come from domestic Higher Education Institutions or departments of recognized equivalent foreign institutions as well as from other recognized Tertiary Education Institutions relevant to the subject matter. The maximum number of students admitted to the Postgraduate Program is set at a total of fifty (50). The exact number of admitted students is determined annually by the Curriculum Committee, depending on the ability of the faculty of the collaborating departments of the M.Sc. to support the graduate theses technically, and based on academic criteria that define the ability of each candidate to attend the M.Sc. program. State Scholarships Foundation scholarship recipients, foreign state scholarship recipients, for the same or related subject matter to that of the M.Sc. program, are admitted without an entrance examination. The selection of students is made in accordance with current legislation, the Regulations for Postgraduate and Doctoral Studies of the National and Kapodistrian University of Athens (N.K.U.A), and the provisions of these Regulations. Between March and July, with a decision of the Curriculum Committee of the M.Sc., an announcement for the admission of postgraduate students to the M.Sc. program is published and posted on the websites of the Department of Biology, M.Sc., and N.K.U.A. The relevant applications, along with the necessary supporting documents, are submitted to the Secretariat of the M.Sc. program, within a deadline set by the announcement and may be extended by a decision of the Curriculum Committee. A second announcement may be made with a decision of the Curriculum Committee. The Curriculum Committee assigns the selection process of admitted students to an Admissions Committee, which consists primarily of at least three members of the Curriculum Committee, or at least three members of the Teaching and Research Staff who are involved in the M.Sc. program's teaching. The required documents are:

- Application for participation
- Curriculum Vitae
- Copy of both sides of the ID card
- Copy of the diploma or a certificate of completion of studies. In case the results of the last examination period are pending for the completion of studies, a relevant declaration is provided.
- Detailed grading of undergraduate courses
- English language proficiency certificate. Essential requirement for participation in the M.Sc. program is sufficient knowledge of the English language. If this is not certified by a diploma of level B2 or higher, the candidate is examined in writing on the translation of a scientific text.
- At least one (1) Letter of Recommendation
- Scientific publications (if any)
- Proof of professional or research experience (if any)



- Certificate of Greek language proficiency or a statement, certified by the Admissions Committee of the M.Sc., of sufficient knowledge of the Greek language for foreign candidates wishing to participate in the M.Sc. program
- Recognition of an academic degree from abroad. For students from foreign institutions who do not provide a certificate of recognition (or an application for recognition) of an academic degree from DOATAP, the following procedure is followed: The Curriculum Committee appoints a committee to determine whether a foreign institution or a type of foreign institution degree is recognized. To recognize a degree, the following must be satisfied:
  - The institution that awards the degrees must be included in the list of foreign institutions maintained and updated by DOATAP.
  - The student must provide a certificate of place of study, which is issued and sent by the foreign university. If the place of study is verified as the Greek territory, the degree is not recognized unless the place of study is in a public university.

The evaluation of candidates and the selection of admitted students are based on the following criteria, the percentages of which can be modified by a decision of the Curriculum Committee:

- Overall grade of the bachelor's degree (10%)
- Bachelor's or diploma thesis (10%)
- Scientific publications, participation in conferences (10%)
- Grade in relevant courses as defined by the Curriculum Committee with the subject of courses (participation rate: 10%)
- Recommendation letters (10%)
- Research or related professional experience (participation rate: 10%)
- Oral interview with the assessment committee appointed by the Curriculum Committee (participation rate: 40%)

Based on the overall criteria mentioned above, the Admissions Committee prepares the evaluation table of the students, which is submitted for approval to the Curriculum Committee. Successful candidates must enroll in the M.Sc. program following the prescribed procedures within thirty (30) days from the decision of the Curriculum Committee. In case of a tie (with mathematical rounding to the nearest whole number in the 100-point scale), tie-breaking students will be admitted, in a percentage not exceeding 10% of the maximum number of admitted students. In case of non-enrollment of one or more students, the next eligible candidates will be invited to enroll in the M.Sc. program, if any, in order of their ranking in the approved evaluation table.



## DURATION OF STUDIES

The duration of studies in the Postgraduate Program leading to a Master's Degree (M.Sc.) is set at four (4) academic semesters, which include the time for the preparation of the thesis. The maximum completion time for studies and the thesis is set at six (6) academic semesters. In special cases, after completing the six (6) academic semesters, a student may request an extension of their studies for two (2) additional academic semesters. Students who have not exceeded the maximum duration of studies can, following a reasoned request to the Curriculum Committee, interrupt their studies for a period not exceeding two (2) consecutive semesters. An interruption of studies is granted for serious reasons (indicatively mentioned are military service, illness, childbirth, absence abroad, etc.). The application must be justified and accompanied by all relevant documents from competent public authorities or organizations, which demonstrate the reasons for the suspension of studies. The student status is suspended during the interruption of studies, and participation in any educational process is not allowed. The semesters of suspension of student status are not counted in the maximum duration of regular studies. At least two weeks before the end of the suspension of studies, the student is obligated to re-register for the program to continue their studies with the rights and obligations of an active student. Students may, by their request, interrupt the suspension of studies and return to the program only in the case, that they have requested the suspension of studies for two consecutive academic semesters. The application for the interruption of the suspension of studies must be submitted no later than two weeks before the start of the second semester of the suspension. The duration of suspension or extension of the maximum period of study is discussed and approved on a case-by-case basis by the Curriculum Committee, with the possibility of further temporal differentiation beyond the above in particularly exceptional cases.



## ORGANIZATION OF THE STUDY PROGRAM

The M.Sc. program begins each academic year during the winter semester. To obtain the M.Sc. degree, a total of one hundred and twenty (120) credit units (ECTS) are required. All courses are taught on a weekly basis and may include lectures and laboratory exercises according to the academic judgment of the Curriculum Committee. The language of instruction and writing for the postgraduate thesis is Greek (or, in some cases, English, subject to a decision by the Curriculum Committee). During their studies, postgraduate students are required to attend and successfully pass the courses of the M.Sc. program, as well as prepare a postgraduate thesis. The preparation of the postgraduate thesis takes place during the fourth semester of the studies and is credited with thirty (30) ECTS.

Teaching of the courses is conducted either in person or through distance learning, in accordance with current legislation. The indicative course program is as follows:

<b>Clinical Biochemistry and Molecular Diagnostics</b>		
<b>1st Semester</b>	<b>Teaching Hours</b>	<b>ECTS</b>
<b>Clinical Chemistry</b>	<b>3</b>	<b>7</b>
<b>Advances Biochemical and Biophysic Methods of Analysis</b>	<b>3</b>	<b>6</b>
<b>Molecular Basis of Human Diseases</b>	<b>3</b>	<b>6</b>
<b>Immunology</b>	<b>3</b>	<b>6</b>
<b>Principles in Biostatistics and Bioinformatics</b>	<b>3</b>	<b>5</b>
<b>Per week/ Total</b>	<b>15</b>	<b>30</b>
<b>2nd Semester</b>		
<b>2nd Semester</b>	<b>Teaching Hours</b>	<b>ECTS</b>
<b>Pathobiochemistry</b>	<b>4</b>	<b>9</b>
<b>Molecular Approach in Medical Genetics</b>	<b>3</b>	<b>6.5</b>
<b>Special Chapters of Anatomy - Physiology</b>	<b>4</b>	<b>8</b>
<b>Microbiology-Mycology</b>	<b>3</b>	<b>6.5</b>
<b>Per week/ Total</b>	<b>14</b>	<b>30</b>
<b>3rd Semester</b>		
<b>3rd Semester</b>	<b>Teaching Hours</b>	<b>ECTS</b>
<b>Molecular Diagnostics</b>	<b>3</b>	<b>7</b>
<b>Laboratory Management- Principles of Entrepreneurship)</b>	<b>3</b>	<b>6</b>
<b>Master Thesis</b>		<b>17</b>
<b>Per week/ Total</b>	<b>12</b>	<b>30</b>
<b>4th Semester</b>		
<b>4th Semester</b>	<b>Teaching Hours</b>	<b>ECTS</b>
<b>Master Thesis</b>	–	<b>30</b>
<b>Total</b>		<b>120</b>

## COURSE DESCRIPTION / CONTENTS

### PRINCIPLES IN BIOSTATISTICS AND BIOINFORMATICS

**Semester: 1st**

**Course Code: 7001**

**Credit Units: 5 ECTS credits**

**Teaching Hours: 3 hours of teaching per week**

The purpose of the course is to provide knowledge in the fields of Biostatistics and Bioinformatics, both in terms of the analysis of results from specific diagnostic procedures and in terms of data mining from specialized databases. Today, the rapid development of Biological sciences and their multiple applications in Medicine are accompanied by a corresponding rapid development in Informatics, making it essential to acquire knowledge of the basic principles and capabilities of computational systems, as well as the rational use of the Internet.

More specifically, the course material includes the teaching of the following chapters:

- Biostatistics in Clinical Biochemistry. Selection and size of a representative statistical sample, randomization. Biological variability, the concept of normal values.
- Diagnostic indicators. Methods of combining molecular indicators - ROC analysis. Epidemiological and medical-demographic coefficients.
- Databases (types, structure, specific comments). Computer networks, the Internet, a brief reference to the Office software package, Excel's capabilities in statistical analysis. Bibliographic data and DNA, RNA, and protein sequence mining. Application fields.
- In silico analysis: DNA sequence analysis via the internet. Online analysis tools. A brief presentation of PCR primer design software. Detecting similarities in DNA sequences. Statistical evaluation of BLAST and FASTA search programs. Global and local alignment, identification of sequence motifs.
- Needleman & Wunsch and Smith & Waterman matrix techniques. The logic of testing the statistical significance of an alignment. The problem of deletion weight. Multiple sequence alignments, internet sites, and local programs (CLUSTAL). Representation of the degree of similarity in aligned sequences. The MEGA2 program.
- Basic statistical processing of analytical data. Errors in the analytical process, evaluation of measurement accuracy and correctness. Chemometrics and the analytical process. Calibration. Characteristics of analytical method quality. Reliability, drift, sensitivity, detectability, selectivity, separability. Optimization of analytical methods.
- Introduction to probabilities, random variables, random variable distribution, distribution parameters, discrete and continuous random variables (binomial, Poisson, normal), distribution parameters (mean, variance).
- Central limit theorem, use of probability tables. Numerical examples.
- Basic principles of statistical tests.
- Basic parametric statistical tests (Student, Pearson, ANOVA). Applications.
- Variance analysis - F-test. Applications.
- Basic non-parametric statistical tests ( $\chi^2$ , Wilcoxon, Kruskal-Wallis, McNemar, Friedman, Spearman). Regression analysis. Applications.
- Survival analysis: Clinical survival tables - Kaplan-Meier survival analysis. Applications.
- Univariate and multivariate survival analysis (Cox and logistic regression). Presentation of biostatistical analysis results.

**Teachers:** A. Scorilas, P. Adamopoulos, Y. Almirantis, M. Avgeris, M. Diamantopoulos, T. Karamitros, C. Kontos, V. Koumandou, M. Koupparis, F. Siannis

**Coordinator:** A. Scorilas

# CLINICAL CHEMISTRY

**Semester: 1st**

**Course Code: 7002**

**Credit Units: 7 ECTS credits**

**Teaching Hours: 3 hours of teaching per week**

Clinical Chemistry utilizes chemical and biochemical knowledge to understand the function/dysfunction of the human body. With the help of modern molecular techniques, it contributes to disease prevention, diagnosis, prognosis, and treatment. Its analytical techniques make use of all biological fluids and tissues (urine, blood, etc.).

More specifically, the course material includes the teaching of the following chapters:

- Introduction. Sampling.
- Reference values.
- Internal and external quality control.
- Investigation of acid-base and electrolyte balance - Blood gases.
- Trace elements: the role of trace elements in the functioning of the human body and analytical techniques.
- Clinical analyzers - Automation in the Clinical Laboratory.
- Analytical and Diagnostic Enzymology.
- Investigation of hepatic function and the digestive system.
- Cancer markers.
- Investigation of carbohydrate disorders.
- Investigation of renal function.
- Investigation of the cardiovascular system: Predisposing risk factors, assessment of MI, other cardiac function markers, prothrombotic factors.
- Absorption, distribution, biotransformation, and excretion of xenobiotics.
- Pharmacokinetics: Monitoring drug concentrations during therapy. Analytical Toxicology.
- Endocrinology, hormones, and dynamic function tests.
- Investigation of adrenal function. Investigation of gonadal function.
- Laboratory investigation of nervous system diseases.
- Biochemical and hormonal monitoring of pregnancy.

Content of visits to biochemical laboratories of hospitals and diagnostic centers:

- Biological sample processing. Determination of glucose, urea, creatinine clearance, enzymes, electrolytes.
- Determination of lipids and lipoproteins.
- Study and comparison of biochemical analyzers.
- General examination of urine.
- Electrophoretic techniques and protein electrophoresis.
- Immunochemical techniques.
- Laboratory pregnancy testing.
- Determination of surface-active phospholipids.
- Determination of hormones, cancer markers, and drugs in the blood using various modern methods and techniques (Nephelometry, RIA, ELISA, TDX, IMX, DELFIA, HPLC, etc.).

**Teachers:** E. Lianidou, K. Georgakopoulos, E. Kassi, H. Kroupis, A. Markou, V. Moutsatsou, D. Paraskevis, D. Rizos, A. Strati, A. Chroni

**Coordinator:** E. Lianidou

# ADVANCES BIOCHEMICAL AND BIOPHYSIC METHODS OF ANALYSIS

**Semester: 1st**

**Course Code: 7003**

**Credit Units: 6 ECTS credits**

**Teaching Hours: 3 teaching hours per week**

The objective of the course is to convey knowledge about a wide range of modern methodologies used in both the field of Biomedical Research and the applied areas of Clinical Biochemistry and Molecular Diagnostics.

Specifically, the course material includes the teaching of the following topics:

- Fluorimetry. Basic principles, applications in biomedical research, and clinical analysis.
- Spectrophotometry. Principles of quantitative spectrophotometry, spectroscopy, methodology, special techniques, and applications in clinical analysis. Densitometry, reflectance spectrophotometry.
- Atomic absorption spectrometry. Atomic emission spectrometry. Chemiluminescence. Trace element determination. Basic principles, applications in biomedical research, and clinical analysis.
- Electrochemistry. Potentiometry. Reference electrodes, indicator electrodes, membrane electrodes, ion-selective electrodes, applications of potentiometry in clinical analysis. Conductometry. Biosensors.
- Chromatography. Liquid chromatography. Basic principles. Coupled techniques (GC-MS, LC-MS). Applications in clinical analysis.
- Immunoassays. Basic principles. Non-isotopic labeling systems in immunoassays. Biomarker labeling methods. Enzyme immunoassays. Organology, methodology, special techniques, fluorescence energy transfer systems, homogeneous and heterogeneous systems. Examples of automated immunoassay systems. Immunoassay applications in clinical analysis.
- Flow cytometry. Basic principles, organology, methodology, special techniques, applications in clinical analysis.
- Nuclear Magnetic Resonance (NMR). Basic principles, Organology, methodology, special techniques. Applications in clinical analysis.
- Basic principles of X-ray crystallography. Application in the study of protein structure.
- Circular Dichroism Spectroscopy. Basic principles. Qualitative methods. Microcalorimetry. Basic principles. Qualitative and quantitative methods.
- Modern protein analysis methods using mass spectrometry and biosensors.
- Gene microarrays. Basic principles, results processing, applications in clinical analysis.
- Transgenic animals. Basic principles and applications.
- Qualitative and quantitative methods for chromosomal abnormalities determination. Basic principles. Qualitative and quantitative determination of chromosomal abnormalities.
- Confocal Microscopy. Basic principles, results processing.

**Teachers:** E. Lianidou, V. Aidinis, M. Vlasi, I. Zoidakis, N. Thomaidis, M. Thomaidou, Ch. Kokkinos, A. Markou, M. Mikros, E. Bakeas, A. Oikonomou, G. Panagiotou, K. Tambakopoulos, G. Terzoudi, K. Psarra.

**Coordinator:** E. Lianidou

# IMMUNOLOGY

**Semester: 1st**

**Course Code: 7009**

**Credit Units: 6 ECTS credits**

**Teaching Hours: 3 teaching hours per week**

The aim of the course is to impart knowledge on specific topics in Immunology, which concern the cellular and molecular mechanisms of immune cell activation in various physiological and pathological conditions, as well as the applications of immunological techniques in the diagnosis of various human diseases.

Specifically, the course material includes the teaching of the following topics:

- Mechanisms of innate immunity induction. The role of the complement system.
- Maturation and activation mechanisms of B-lymphocytes. Induction of humoral immunity.
- Major Histocompatibility Complex (MHC).
- Maturation and activation mechanisms of T-lymphocytes.
- Cytokines. Th1/Th2 polarization. Laboratory diagnosis and applications.
- Structure of immunoglobulins. Antibody diversity. Biotechnological production of monoclonal antibodies and their use in diagnostic and therapeutic medicine.
- Tolerance, detection of tolerance mechanisms by modern methods.
- Autoimmune diseases.
- Genetic technology and its applications in biomedical practice and research.
- Tumor antigens. Serological identification, design, synthesis, and characterization of molecular mimicry.
- Immune escape mechanisms of cancer cells.
- Cancer immunotherapy. In vivo animal models: transgenic and knock-out mice.
- Transplantation immunology.
- Use of immune response to address diseases. Immunodeficiencies (congenital-acquired).
- The danger model and the redefinition of "self" or "non-self."

Laboratory Exercises:

- General immunological methods and clinical applications.
- Western blot analysis.
- Immunohistochemical techniques.
- Immuno-diagnostic techniques: Basic principles and applications.
- Stem cells - Bone marrow transplantation conditions.

**Teachers** O. Tsitsilonis, I.K. Aggeli, A. Marmari, S. Papavasileiou, P. Papazafiri, A. Fotinopoulou, G. Vasilopoulos, P. Verginis, A. Germanis, K. Kambas, E. Karagkouni, E. Kastritis, Th. Katsila, P. Lyberi, D. Mastellos, E. Stratikos, A. Argyriou, I. Galani, G. Kostopoulos, E. Paronis.

**Coordinator:** O. Tsitsilonis

# MOLECULAR BASE OF HUMAN DISEASES

**Semester: 1st**

**Course Code: 7005**

**Credit Units: 6 credit units (ECTS)**

**Teaching Hours: 3 teaching hours per week**

The aim of this course is to provide a broad understanding of the fundamental molecular mechanisms involved in the development of human diseases, highlight significant research approaches, and contribute to the comprehension of the use of various diagnostic tests.

Specifically, the course curriculum includes the teaching of the following chapters:

- Cardiovascular diseases
- Molecular basis of Alzheimer's disease
- DNA repair and diseases
- DNA repair: A review of repair mechanisms
- Genetic causes of aging and longevity
- Cellular homeostasis disruption in aging: cell cycle, proteolysis, apoptosis
- Molecular mechanisms of carcinogenesis
- Environmental effects on diseases, toxins, and environmental pollutants (Environmental estrogens and endocrine disruptors, dioxins, heavy metals). An overview of Toxicology, mechanisms
- Functional genomics: New factors in cancer diagnosis and treatment
- Involvement of mitochondrial DNA in pathogenesis
- Viral diseases
- Alzheimer's - Treatment in the post-genomic era
- Molecular basis of Parkinson's disease
- Molecular basis of Schizophrenia
- Autoimmune diseases
- Molecular basis of Neurofibromatosis (von Recklinghausen): learning and neuro-oncogenesis disorders
- Cardiovascular diseases, microbes, and diseases with an emphasis on protozoa (malaria, leishmaniasis)

**Teachers:** D. Vassilakopoulou, V. Vasilaki, Z. H. Georgousi, S. Efthymiopoulos, D. Kletsas, H. Kontos, P. Mavromara, E. Dotsika, G. Panagiotou, P. Papazafiri, E. Reboutsika, A. Scorilas, N. Arvanitis, K. Stefi, P. Adamopoulos, A. Vasileiou, I. Halatsa

**Coordinator:** D. Vassilakopoulou



# PATHOBIOCHEMISTRY

**Semester: 2nd**

**Course Code: 7006**

**Credit Units: 9 credit units (ECTS)**

**Teaching Hours: 4 teaching hours per week**

The purpose of this course is to study the biochemical basis of the function of various tissues, organs, and systems of the human body in pathological conditions.

Specifically, the course curriculum includes the teaching of the following chapters:

- Metabolic Disorders: Glycogen storage diseases, Galactosemia, Lipid disorders, Cystic fibrosis, Phenylketonuria - Alkaptonuria, Urea cycle disorders, Porphyrrias
- Pathobiochemistry of the digestive and hepatobiliary systems. Lipid metabolism disorders, hepatitis, pancreatitis. Diseases of the stomach and intestine
- Etiopathogenesis and therapeutic approaches to diabetes mellitus
- Pathobiochemistry of the thyroid and parathyroid glands. Gastrointestinal hormones
- Atherosclerosis
- Principles of metabolism
- Reactive oxygen species and their pathobiochemistry
- Cancer pathobiochemistry: Biological properties of neoplastic cells. Oncogenes and tumor suppressor genes
- Hormones and their mechanisms of action. Hypothalamic and pituitary gland hormones
- Kidney diseases - Renal failure, artificial kidney
- Blood: Red blood cell dysfunctions, iron transport, hemoglobin synthesis, membrane permeability
- Chemotherapy of neoplasms, smart drugs
- Neoplasms by location. Gynecological cancers, urogenital and gastrointestinal cancers
- Musculoskeletal and nervous system neoplasms. Leukemias - lymphomas
- Genetically modified animals in the study of human disease pathobiochemistry

**Teachers:** A. Scorilas, A. Angelousi, A. Ardavanis, M. Avgeris, P. Adamopoulos, H. Vretou, MA. Diamantopoulos, E. Kassi, A. Klinakis, G. Kostantoudakis, S. Loukidis, A. Ndokou, M. Peppas, I. Papadopoulos, S. Papageorgiou, D. Sideris, Th. Soteroudis, E. Fragoulis, A. Psyri, E. Katsantoni

**Coordinator:** A. Scorilas

# MOLECULAR APPROACH IN MEDICAL GENETICS

**Semester: 2nd**

**Course Code: 7007**

**ECTS Credits: 6.5 ECTS**

**Teaching Hours: 3 teaching hours per week**

The aim of this course is to teach the molecular mechanisms through which genetic mutations are involved in the occurrence of genetic diseases in humans. Additionally, the course aims to contribute to the understanding of the use and applications of gene therapy.

Specifically, the course content includes the teaching of the following topics:

- Introduction to Human Molecular Genetics. Structure and organization of Chromosomes. Basic principles of Genetic Diseases: Inheritance (Autosomal-Dominant-Recessive, X-linked), Penetrance, and Expressivity. Categories of genetic diseases (Monogenic-Polygenic-Chromosomal). Types of Mutations.
- Genetic Basis of Sex Determination
- Polymorphisms (RFLPs, SNPs, VNTRs, microsatellites)
- Examples of Monogenic Genetic Diseases: Hemoglobinopathies
- Mutation Identification - Clinical Examples
- Examples of Monogenic Genetic Diseases: Cystic Fibrosis
- Monogenic Central Nervous System Diseases: Alzheimer's
- Monogenic Central Nervous System Diseases: Parkinson's
- Examples of Polygenic Genetic Diseases: Type I Diabetes
- Polygenic Central Nervous System Diseases: Schizophrenia, Depression
- Linkage Analysis. Genetic Mapping
- Tri-nucleotide Repeat Expansion Diseases: Mechanisms of repeat expansion, non-coding sequence repeats
- Genes involved in carcinogenesis
- Genetic Influences on the Development of Environmental Diseases (alpha-1 antitrypsin deficiency, paroxysms). Pharmacogenetics, Pharmacogenomics
- Prion Diseases
- Diseases related to genetic imprinting. Differential expression of two parental alleles. Prader-Willi (PWS), Angelman (AS), and Beckwith-Wiedemann syndromes
- Gene Therapy: Gene Transfer to Somatic Cells, Ex vivo and In vivo. Gene Delivery Methods. Viral Gene Delivery Systems. Non-viral Gene Delivery Systems. Applications and Examples of Gene Therapy: Gene Addition, Gene Replacement or Correction - Diseases amenable to Gene Therapy

**Teachers:** A. Stamatakis, S. Efthymiopoulos, E. Kitraki, G. Koutsis, Ch. Kroupis, E. Bozas, G. Patrinos, I. Synodinou-Traeger, M. Tzeti, S. Tsitilou

**Coordinator:** A. Stamatakis

# SPECIAL CHAPTERS OF ANATOMY – PHYSIOLOGY

**Semester: 2nd**

**Course Code: 7004**

**ECTS Credits: 8 ECTS**

**Teaching Hours: 4 teaching hours per week**

The purpose of the course is to teach students the interaction of various systems in both normal and pathological conditions and to provide the necessary knowledge for the interpretation of various diagnostic tests and therapeutic interventions. More specifically, the topics that will be taught include:

## SPECIAL CHAPTERS IN ANATOMY

- Microscopic Anatomy - Tissues
- Special Senses: Ear, Eye
- Macroscopic Anatomy of the Central - Peripheral - Autonomic Nervous System
- Circulation, Blood, Heart
- Higher Functions of the Central Nervous System
- Vessels, Respiratory System
- Lymphatic System
- Modern Methods of Anatomical Imaging
- Reproductive System, Immune System
- Digestive System, Urinary System

## SPECIAL CHAPTERS IN PHYSIOLOGY

- Introduction to the Physiology of the Nervous System
- Physiology of Nervous Systems (Central, Peripheral, and Autonomic)
- Neuron Simulation
- Study of Synapses, Neuronal Circuits
- Regulation of the Cardiovascular System
- Cardiovascular System Simulation
- Study of the Functions of the Digestive and Urinary Systems
- Endocrine System Functions
- Immune System Functions
- Study of the Respiratory System Functions

**Teachers:** I.K. Aggeli - N. Kavantzias, S. Efthymiopoulos, P. Papazafiri, O. Tsitsilonis, A. Marmari, G. Drosopoulou, L. Zagoraiou, D. Beis, M. Xylouri, N. Thalassinou, G. Agrogiannis, P. Foukas, S. Sakellariou

**Coordinators:** I.K. Aggeli - N. Kavantzias

# MICROBIOLOGY-MYCOLOGY

**Semester: 2nd**

**Course Code: 7008**

**ECTS Credits: 6.5 ECTS**

**Teaching Hours: 3 teaching hours per week**

The course aims to provide basic knowledge of microbiology required for modern molecular diagnostics.

Specifically, the course content includes the teaching of the following topics:

- General properties, metabolism, culture, and nutrition of bacteria
- Organization of microbiological laboratory and safety conditions - Collection and transport of clinical samples
- Diagnostic approach to infections (microscopy, culture, immunological, and molecular techniques, rapid diagnostic methods) - Quality control
- Mechanisms of action of antibiotics - Biochemical and genetic approach to mechanisms of resistance to antimicrobial drugs
- Microbial susceptibility tests to antibiotics and methods for determining antimicrobial substances in biological fluids
- Diagnosis of viral infections of the CNS and gastrointestinal system
- Infections caused by gram-negative bacteria: Diagnostic approach
- Microbial agents of atypical respiratory infections
- Infections caused by mycobacteria, legionellae, and rickettsiae
- Sexually transmitted diseases: pathogenicity and diagnosis
- Protozoa. Diagnostic approach
- Helminths. Diagnostic approach
- Introduction to Mycology: Pathogenic action, infections, diagnosis, methods of antifungal drug testing
- Dermatomycoses: Diagnostic approach
- Superficial mycoses: Diagnostic approach
- Viruses. Structure, biochemistry, and pathogenicity - Laboratory methods in clinical virology
- Infections caused by herpesviruses, paramyxoviruses, and HPV: Diagnostic approach
- Infections caused by gram-positive bacteria: Diagnostic approach
- New Respiratory Viruses: pathogenicity and diagnosis
- Hepatitis and AIDS: Diagnostic approach

**Teachers:** Ath. Tsakris, A. Velegkraki, G. Vryoni, E. Dimitroulia, G. Kaparos, V. Kapsimali, A. Markogiannakis, A. Michos, B. Lampropoulou, E. Balis, E. Papadogeorgaki-HatziaPOSTOLOU, I. Papaparaskevas, E. Piperaki, V. Pitsirigka, S. Pournaras, I. Routsias, N. Siafakas, N. Spanakis

**Coordinator:** A. Tsakris

# MOLECULAR DIAGNOSTICS

**Semester: 3rd**

**Course Code: 7010**

**Credit Units: 7 ECTS credits**

**Teaching Hours: 3 teaching hours per week**

The aim of the course is to familiarize students with the basic methods and approaches of molecular diagnostics, particularly in the fields of functional genomics and proteomics. These methods are either already in use for disease diagnosis or are in developmental stage for future applications.

Specifically, the course curriculum includes the teaching of the following topics:

- The theoretical basis of modern molecular diagnostic techniques.
- Polymerase Chain Reaction (PCR) and other nucleic acid amplification techniques.
- Real-time PCR.
- Basic molecular techniques (gene cloning, Southern, Northern, Western blotting).
- Analysis of nucleic acid amplification products by hybridization methods on solid surfaces.
- Directed mutagenesis - Single Nucleotide Polymorphisms (SNPs).
- Detection of mutations using molecular methods (SSCP, DGGE, DHPLC, sequencing).
- Gene mapping techniques - Human genome project.
- Experimental approaches for the discovery of new genes and the study of their function (e.g., RNAi).
- Application of microarrays in diagnostics.
- Study of protein-protein interactions (Yeast Two Hybrid, Phage display, FRET, biosensors).
- DNA-protein interactions and reference gene control.
- Recombinant protein expression systems.
- Functional proteomics and the design of new drugs.
- Stem cell technology.
- Study of chromosomal abnormalities in diagnostics: Classical and molecular cytogenetics (FISH).

Teachers D. Sideris, L. Kravvariti, E. Lianidou, E. Emmanouilidou, A. Scorilas, M. Avgeris, Ch. Kontos, I. Trougakos, S. Tsitilou, Ch. Sofokleous, K. Giannoukakos, G. Panagiotou, K. Sampani, Th. Rampias, A. Ntzifa

Coordinator: D. Sideris

# **LABORATORY ADMINISTRATION - PRINCIPLES OF ENTREPRENEURSHIP**

**Semester: 3rd**

**Course Code: 7011**

**Credit Units: 6 ECTS credits**

**Teaching Hours: 3 teaching hours per week**

The course aims to present new trends in the organization of Clinical Biochemistry - Molecular Diagnostics laboratories, introduce the principles of proper laboratory management and operation, address legal issues that arise and are encountered, and establish quality control standards necessary for the operation of laboratories that produce reliable results.

The course curriculum includes the teaching of the following topics:

- Laboratory strategy: General - Health policy
- Definitions of economic concepts
- Laboratory safety - Reagent safety - Radioactive materials - Infectious diseases - Safety during sampling
- Use of computers - Collaboration software platforms - Website creation - Intranet communication
- Establishment of a laboratory with new data
- Health economics
- Laboratory operation: Blood sampling - Metrology
- Legal framework for laboratory operations. Personal data
- Laboratory operation: Responsibilities
- Investigation of errors
- Analysis of errors in Clinical Biochemistry
- Quality control program of the National External Quality Assessment System (NEQAS)
- Clia system
- Certification

Teachers: Em. G. Fragoulis, N. Arvanitis, P. Skourou, D. Heraclous, D. Kremalis, A. Scorilas, O. Panagiotakis

Coordinator: A. Scorilas, Em. G. Fragoulis

## MASTER THESIS

**Semester: 3rd & 4th**

**Course code: 7012**

**Credits: 47 credits (ects)**

**Teaching hours: -**

The main objective of the diploma thesis is the extensive practical exercise of postgraduate students in modern techniques and methodologies of Clinical Biochemistry and Molecular Diagnostics. Each student is accepted in one of the collaborating laboratories of the University, Research Centers, or Hospitals.

The master thesis allows students to engage in original research topics focused on areas of strong scientific interest. After completing this specific M.Sc., students can optionally continue for a Ph.D. degree. In the context of the diploma thesis, students are taught and subsequently required to apply modern molecular techniques.

Among the techniques that postgraduate students become familiar with are, for example: cell and bacterial cultures, protein isolation and purification, DNA and RNA, electrophoresis, immunoprecipitation, immunodiagnosics, Western Blotting, ELISA, immunohistochemistry, detection of circulating cancer and embryonic cells, primer design, polymerase chain reaction (PCR), multiplex polymerase chain reaction, reverse transcription polymerase chain reaction (RT-PCR), real-time polymerase chain reaction (Real-Time PCR), miRNA analysis, single nucleotide polymorphism (SNP) analysis, classic DNA sequencing, pyrosequencing, next-generation sequencing, DNA cloning, plasmid purification, visible, ultraviolet and infrared spectrophotometry, ion exchange chromatography, high-performance liquid chromatography, flow cytometry, development of rapid molecular analysis strips, etc. Special emphasis is placed on the students' familiarity with the search and study of relevant scientific articles and their interpretation within the framework of the completion and writing of their thesis.



## **EMPLOYMENT PROSPECTS**

This specific postgraduate program aims to meet the demand for high-level specialized education that will provide essential skills to new scientists to enter the dynamically developing research and professional field of Clinical Biochemistry and Molecular Diagnostics. The existence of scientific workforce with infrastructure and training lays the foundation for the progress of this field in our country. Graduates, with both general knowledge (specialized knowledge, classic and modern laboratory techniques, etc.) and special skills (quality control, laboratory management, etc.) acquired from this specialized postgraduate diploma, can be employed in positions of responsibility in businesses and organizations related to the field of Clinical Biochemistry & Molecular Diagnostics and constitute essential pillars in Laboratory Medical Practice. Specifically, the study program follows international professional requirements, and the graduates acquire the appropriate qualifications for their selection and employment in Clinical Biochemical Laboratories, Molecular Biology & Molecular Diagnostics Laboratories, Hospital Analysis Laboratories and companies, Diagnostic Centers, Research Institutes and Laboratories in the public and private sector (e.g., In Vitro Fertilization, Forensics, Public Health, Quality Control, etc.) in Vocational Training and in laboratories of Technical Educational Institutes, Higher Educational Institutes, as well as in Pharmaceutical Companies, Diagnostic Companies, and other Companies in Greece or abroad. There is, of course, the possibility of continuing their studies to obtain a Ph.D. in various fields of the Biosciences. As far as we can tell, almost all of the graduates have been professionally restored, mainly in the field of health or research.

## **EXAMINATIONS AND ASSESSMENT OF GRADUATE STUDENTS**

The educational work of each academic year is structured into two semesters of studies, the winter and the spring, each of which includes at least thirteen (13) weeks of instruction and at least three (3) weeks of examinations. The courses of the winter and spring semesters are re-examined during the month of September. In case a course cannot be conducted, it is rescheduled. The date and time of the rescheduled course are posted on the website of the Postgraduate Program. Attendance in classes and/or laboratories (if provided) is mandatory. A postgraduate student is considered to have attended a course (and therefore has the right to participate in exams) only if they have attended at least 85% of the course hours. Otherwise, the postgraduate student is required to retake the course in the following academic year. If the non-attendance rate of a student exceeds 15% for all courses, there is a possibility of expulsion. This matter is examined by the Postgraduate Studies Committee, which issues an opinion. The evaluation of postgraduate students and their performance in the courses they are required to attend within the framework of the Postgraduate Program is carried out at the end of each semester through written and/or oral examinations and/or by completing assignments throughout the semester. It may also include intermediate progress assessments, written assignments, or laboratory exercises or a combination of all the above. The method of assessment is determined by the instructors for each course. During written or oral examinations, methods are used to ensure the integrity of the assessment process. Grading is done on a scale of 1-10. The results of the examinations are announced and sent by the instructor(s) to the Secretariat of the Postgraduate Program and the Department of Biology within four (4) weeks at the latest after the examination of the course. In case an instructor repeatedly exceeds the upper limit, the Director of the Postgraduate Program informs the Postgraduate Studies Committee. The participation rate of laboratory exercises, assignments, and seminars (if provided) in the final grade for each course is determined separately for each course, following a proposal by the instructor(s) for each course and approval by the Postgraduate Studies Committee. This rate is indicated in the Study Guide of the Postgraduate Program. For addressing urgent needs or conditions due to force majeure, alternative assessment methods may be applied, such as conducting written or oral exams using electronic means, provided that the integrity of the assessment process is ensured. Alternative assessment methods may also be applied for evaluating students with disabilities and special educational needs following a decision by the Postgraduate Studies Committee and a proposal by the Committee for Students with Disabilities of



the Department, taking into account the relevant guidelines of the Student Accessibility Unit. In cases of illness or recovery from a serious illness, the instructor is recommended to facilitate the student in whatever way they deem appropriate (e.g., remote oral examination). In oral exams, the instructor ensures that they are not alone with the student being examined. Courses for which a student did not achieve a passing grade must be re-examined. However, if a course has a separate grade for its laboratory or exercise component, it is preserved and not repeated, provided that attendance has been successful. Correction of grades is allowed if there is an obvious mistake or cumulative error, following a written request from the responsible instructor and a decision by the Postgraduate Studies Committee. If a student fails a course more than three (3) times, the procedure specified by the applicable legislation is followed. The written examinations are kept in the care of the Secretariat of the Master's Degree (M.Sc.), for two (2) years. After this period, the written examinations lose their validity, and, under the responsibility of the Postgraduate Studies Committee, a relevant record is prepared, and they are destroyed, unless there is a pending criminal, disciplinary, or any other administrative procedure. To calculate the grade of the degree, the weight of each course in the curriculum and the corresponding number of credit units (ECTs) is taken into account. The number of credit units (ECTs) for the course is also the weighting factor for that course. To calculate the degree, the grade of each course is multiplied by the corresponding number of credit units, and the sum of the partial products is divided by the total number of credit units required for the degree. This calculation is expressed by the following mathematical formula.

$$\left( \sum_{k=1}^N \mathbf{BM}_k \cdot \mathbf{\Pi M}_k \right) / \Sigma \mathbf{\Pi M} \text{ \acute{o}που:}$$

- N = number of courses required to obtain the respective degree
- $\mathbf{BM}_k$  = grade of course k
- $\mathbf{\Pi M}_k$  = credit units of course k
- $\Sigma \mathbf{\Pi M}$  = total credit units for obtaining the respective degree

To obtain a Master's Degree (M.Sc.), every postgraduate student must attend and pass all the mandatory courses and the required number of elective courses from those offered by the M.Sc. program. They are also required to complete a postgraduate thesis, thus accumulating a total of one hundred and twenty (120) ECTs (European Credit Transfer and Accumulation System) credits.

## **PREPARATION OF THE POSTGRADUATE THESIS**

Postgraduate students are required to prepare their postgraduate thesis (MSc) during the 3rd and 4th semesters of their studies. The MSc thesis must be individual, original, have a research character, include a sufficient number of laboratory techniques related to the MSc program, and be written according to the writing guidelines posted on the MSc program's website. After submitting a request that includes the proposed title of the thesis, the supervisor, and an abstract of the proposed work, the Program Committee assigns a supervisor. The Program Committee forms a three-member examining committee to approve the thesis, one of whom is the supervisor. The language in which the postgraduate thesis is written can be either Greek or English and is determined along with the thesis topic.

To facilitate students, general topics for experimental theses that fulfill the educational goals of the MSc program and can be executed in the laboratories of the faculty members are announced at the end of the 2nd semester. These topics are proposed by academic faculty members of collaborating departments, in line with the courses offered by the MSc program or based on available opportunities. From these topics, each student can develop and propose three (3) topics with three (3) different supervisors, by filling out the relevant form.

The preparation of the experimental postgraduate thesis can be carried out in either the collaborating departments of the University of Athens or in Academic Institutions, Research Institutes, and Hospitals where faculty members of the MSc program are collaborating. The supervision and scientific guidance for theses prepared at the University of Athens are carried out by faculty members (supervisors and academic coordinators) who teach in the MSc program. The supervision of theses prepared at other Academic Institutions, Research Institutes, or Hospitals is carried out by the academic collaborator (academic coordinator) of the respective institution in collaboration with the assigned supervisor as defined by the Program Committee. The composition of the three-member examining committee may be modified by a decision of the Program Committee. The thesis title can be finalized upon request by the student, with the agreement of the supervisor and the Program Committee. The request must include a concise justification for the change. To obtain approval for the thesis, the student must defend it in front of the three-member examining committee. The supervisor and the members of the examining committee for the postgraduate thesis come from the following categories of faculty members involved in teaching in the MSc program:

By a decision of the Program Committee, the supervision of theses may also be assigned to members of the Teaching and Research Staff (T&RS), Special Teaching Staff (STS), Special Technical Laboratory Staff (STLS), and Laboratory Teaching Staff (LTS) of collaborating departments who have not undertaken teaching in the MSc program. Postgraduate theses are uploaded to the "PERGAMOS" Digital Repository as required by the decisions of the University Senate. If the MSc thesis contains original unpublished results, upon request from the supervisor, co-signed by the postgraduate student, only abstracts may be published on the website, with the full text published at a later time.

The research carried out within the framework of the postgraduate thesis aims to educate the student, acquire laboratory techniques, and gain experience necessary for obtaining the MSc degree and future career development. Applied research within the postgraduate thesis, due to its nature, is part of the continuous, and often long-term, research of the laboratory and the scientific coordinators in the respective field of Science, often within research programs. The scientific coordinator is the determining factor for the student's involvement as a co-author in a broader publication in a scientific journal, organization, scientific conference, etc. Once the postgraduate thesis is completed, any benefits resulting from the continuation of the corresponding research in the laboratory belong exclusively to the scientific coordinator of this phase of the research or other collaborating researchers.



## **OBLIGATIONS AND RIGHTS OF POSTGRADUATE STUDENTS**

Postgraduate students have all the rights and benefits provided for undergraduate students until the end of any granted extension of study, except for the right to provide free textbooks. The University ensures accessibility to the recommended textbooks and teaching for students with disabilities and/or special educational needs (<https://access.uoa.gr/>) The Career Office of the National and Kapodistrian University of Athens (NKUA) provides advisory support for students on academic and professional issues (<https://www.career.uoa.gr/ypiresies/>). Postgraduate students may be required to participate and attend seminars of research groups, discussions on bibliographic updates, laboratory visits, conferences/seminars with subject matter relevant to the Postgraduate Program, lectures, or other scientific events of the Postgraduate Program, etc.

The Postgraduate Committee (PC) has the authority to delete postgraduate students if they exceed the maximum limit of absences, fail an examination of one or more courses, and have not successfully completed the program according to the provisions of this regulation, exceed the maximum duration of study in the Postgraduate Program as defined in this Regulation, violate the current provisions regarding disciplinary offenses by the competent disciplinary bodies, do not pay the prescribed tuition fee, or request their own deletion. In case a postgraduate student is deleted from the Postgraduate Program, they may apply for a certificate for the courses in which they have been successfully examined.

Students can participate in international student exchange programs, such as the ERASMUS+ or CIVIS programs, in accordance with the applicable legislation. In this case, the maximum number of ECTS they can recognize is thirty (30). This opportunity is provided after the first semester of their studies. Students must apply to the Postgraduate Studies Committee and follow the terms of the program. Similarly, the

Postgraduate Program may be attended by students from international student exchange programs, such as ERASMUS+, according to relevant cooperation agreements and after a decision by the Postgraduate Studies Committee. Postgraduate students of N.K.U.A can enroll in Postgraduate Programs of the same or other higher education institutions of Greece or abroad within the framework of educational or research cooperation programs according to the applicable legislation. Simultaneous enrollment in an undergraduate study program and a postgraduate study program or in two (2) Postgraduate Programs of the same or another Department, of the same or another higher education institution, is possible. Postgraduate students may attend courses of related Postgraduate Programs with the same ECTS after signing a relevant agreement with those Postgraduate Programs. At the end of each semester, it is proposed to evaluate each course and each instructor by postgraduate students.

Postgraduate students can request the issuance of an appendix to the diploma in Greek and English. For participation in the Postgraduate Program "Clinical Biochemistry - Molecular Diagnostics," postgraduate students pay tuition fees amounting to 1,000 euros per semester. Payment is made at the beginning of each semester.

## **TUITION FEE EXEMPTIONS**

Postgraduate students of the Postgraduate Programs may be exempted from tuition fees if they meet the economic or social criteria and the excellence criteria during the first cycle of studies, in accordance with the provisions of Law 4957/22 and the Regulation on Doctoral and Postgraduate Studies of NKUA. This exemption is provided for the participation in only one Postgraduate Program. In any case, exempted students do not exceed thirty percent (30%) of the total number of students admitted to the Postgraduate Program per academic year. The application for exemption from tuition fees is submitted after the completion of the selection process of Postgraduate students. In no case does the financial situation of a candidate constitute a reason for non-selection in the Postgraduate Program. Those who receive a scholarship from another source or non-EU citizens are not entitled to an exemption. The examination of the criteria for exemption from tuition fees is carried out by the Postgraduate Studies Committee, and a reasoned decision to accept or reject the application is issued. If the current legislation sets an age criterion, it is recommended for reasons of good administration and equal treatment, to consider December 31 of the birth year as the date of birth of students. Members of the categories of teaching and research staff, adjunct teaching and research staff, laboratory teaching and research staff are not exempted from paying tuition fees unless they meet the financial criteria provided by law. In the case of simultaneous attendance in Postgraduate Programs of the same higher education institution by family members up to the second degree of blood or affinity, the Postgraduate Studies Committee may decide to provide a 50% reduction in the tuition fees paid



## **INFRASTRUCTURE AND FINANCING OF THE M.SC. PROGRAM**

For the smooth operation of the M.Sc. program, priority is given to the infrastructure of the Department of Biology, Chemistry, Nursing, and the Medical School of the University. Existing supervisory equipment is used to understand and assimilate the curriculum. Similarly, for the laboratory training (where applicable) of postgraduate students, both specially designed laboratory rooms of the Departments/Laboratories and the research units of the faculty members are available (e.g., during the preparation of the postgraduate thesis). Finally, the technical infrastructure of cooperating research institutions is also used, which have supervisory and research equipment. More specifically, the Department of Biology has a room with a capacity of forty (40) people and 2 computer laboratory rooms (Ground floor of the School of Sciences - Pharmacy, Building I, level +4.00, rooms 1-3) that were organized with the expenses of the M.Sc. program and are used by this specific M.Sc. program. In addition, the Department of Biochemistry and Molecular Biology will also provide the lecture hall with a capacity of sixty (60) people (meeting room - new Wing). Furthermore, in the Department of Biochemistry and Molecular Biology, there is the room that houses the Administrative Secretariat of the M.Sc. program. The administrative and secretarial support of the M.Sc. program "Clinical Biochemistry - Molecular Diagnostics" is primarily provided by the Secretariat of the Department of Biology. It is organized by a member of the Secretariat who is based in the Department of Biochemistry and Molecular Biology, Department of Biology, University of Athens and is under the supervision of the Secretariat of the Department of Biology of the University. Its duty is to provide all the administrative and organizational support for the M.Sc. program of the laboratories and the Postgraduate Studies Program. The financing of the M.Sc. program may come from: a) tuition fees, b) donations, sponsorships, and all kinds of financial assistance, c) legacies, d) resources from research projects or programs, e) the own resources of the University, in collaboration with f) the state budget or the public investment program, and g) any other legal public or private source. The payment of tuition fees is made by the student himself or by a third natural or legal person on behalf of the student. The management of the resources of the M.Sc. programs of the University is carried out by the Special Research Fund Account of the University. The resources of the M.Sc. program are distributed as follows:

- an amount corresponding to thirty percent (30%) of the total income from tuition fees is withheld by the Special Research Fund Account of the University. This amount includes the withholding percentage in favor of the S.R.F.A. for the financial management of the M.Sc. programs.

- When the income of the M.Sc. program comes from donations, sponsorships, and all kinds of financial assistance, legacies, or resources from research projects or programs, the withholding in favor of the Special Research Fund Account of the University, that applies to income from similar sources of financing, also takes place.
- The remaining amount of the total income of the M.Sc. program is allocated for covering the operational expenses of the M.Sc. program.

## **AWARD OF POSTGRADUATE DIPLOMAS**

The student completes the studies to obtain a Postgraduate Diploma (M.Sc.) by completing the minimum number of courses and credit units required to receive the M.Sc. The Postgraduate Studies Committee verifies the completion of the studies in order to grant the Diploma of Studies (M.Sc.). With the completion of the above procedure, a postgraduate student receives a certificate of completion of studies, his/her student status is terminated, and his/her participation in the University's governing bodies ceases. The M.Sc. certifies successful completion of studies and includes a grade, accurate to two decimal places, according to the following scale:

- Excellent (8.5 to 10),
- Very Good (6.5 to 8.5 excluding) and
- Good (5 to 6.5 excluding).

The type of M.Sc. by type of M.Sc. is common to all Departments and Schools of the University and is included in the Regulations for Postgraduate and Doctoral Studies of the University. Within the framework of the M.Sc. program, a Postgraduate Diploma is awarded in "Clinical Biochemistry - Molecular Diagnostics."

## **GRADUATION**

The graduation is not a compulsory requirement for the successful completion of studies, but it is a necessary condition for the issuance of the diploma title document. The swearing-in takes place within the Assembly of the Department of Biology and in a location of the Department unless otherwise specified by the decision of the Senate. A request for the graduation ceremony of postgraduate students in the Great Ceremony Hall of the Central Building is examined on a case-by-case basis by the Rector, based on the assessment of the current possibilities and the number of sworn students to be declared by the Secretariat of the M.Sc. at the Directorate of Education and Research of the N.K.U.A. Postgraduate students who have successfully completed the M.Sc. in exceptional cases (studies, residence or work abroad, health reasons, etc.) can apply to the School/Department Secretariat for an exemption from the obligation to swear. An exemption from the obligation to swear is approved by the Senate and the Vice-Rector for Academic Affairs and Student Welfare.





## **SUPPORTING SERVICES, BENEFITS, AND STUDENT WELFARE**

**Account Creation and Activation Instructions:** A university account allows you to use both the Email service and other digital services provided by the Network Operations and Management Center (KLEIDI). An active account during your postgraduate studies at the M.Sc. is necessary, as communication and information are exclusively provided through your university email.

**E-Class (E-classroom):** The Electronic Classroom (eClass) is an integrated system for managing online courses and supports asynchronous distance learning services at the University of Athens. It provides digital organization and distribution of course materials and a variety of communication tools between instructors and students, facilitating smooth course delivery. Postgraduate students access eClass at [eclass.uoa.gr](http://eclass.uoa.gr) using their university email username and password. Course registration on eClass is separate from course registration/declaration with the M.Sc. Secretariat at the beginning of each semester. Registration for eClass courses is not automatic, and students must register for the courses they wish to attend in order to access course materials and receive relevant announcements.

**Digital Services:** Postgraduate students have access to additional services provided by the University of Athens, such as personal website hosting, access to the campus Wi-Fi network, Virtual Private Network (VPN) connection to the University network, software and licenses from Microsoft, and access to electronic libraries.

**Academic Identity:** Academic identity with reduced fare entitlement for those eligible is granted upon electronic application through the "Acquisition of Academic Identity" website.

**Student Welfare:** The University of Athens offers a variety of educational and social programs through the University Club to benefit students. These include the Department of Student Catering, the Department of Public Relations and Job Search, the University of Athens Cultural Club, the University Gym, and the University Health Service.

**Accessibility Unit for Students with Disabilities at the N.K.U.A:** The Accessibility Unit for Students with Disabilities at the UoA is responsible for ensuring equal access for students with different abilities and requirements in the educational process and exams by providing environmental adaptations, IT support, and access services. More information is available on the website of N.K.U.A.

**Foreign Language Teaching Department:** The University of Athens offers the opportunity for students to acquire knowledge of one or more languages during their studies to enhance their academic integration. This work is carried out by the Department of Foreign Language Teaching at the University of Athens, which is located at 7 Hippocrates Street, 2nd floor, 106 79 Athens.

**Contact Information:**

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