



**ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ**  
HELLENIC REPUBLIC



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# Accreditation Report for the Undergraduate Study Programme of:

**Physics**

**Institution: Aristotle University of Thessaloniki**

**Date: 13 February 2021**



Επιχειρησιακό Πρόγραμμα  
Ανάπτυξη Ανθρώπινου Δυναμικού,  
Εκπαίδευση και Διά Βίου Μάθηση  
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης



Report of the Panel appointed by the HAHE to undertake the review of the Undergraduate Study Programme of **Physics** of the **Aristotle University of Thessaloniki** for the purposes of granting accreditation

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## **PART A: BACKGROUND AND CONTEXT OF THE REVIEW**

### **I. The External Evaluation & Accreditation Panel**

The Panel responsible for the Accreditation Review of the Undergraduate Study Programme of **Physics** of the **Aristotle University of Thessaloniki** comprised the following five (5) members, drawn from the HAHE Register, in accordance with Laws 4009/2011 & 4653/2020:

- 1. Prof. Nikolaos Dimakis (Chair)**  
University of Texas Rio Grande Valley, USA
- 2. Prof. Alexios Polychronakos**  
The City College of the City University of New York, USA
- 3. Prof. Emeritus Harry Mavromatis**  
American University of Beirut, USA
- 4. Prof. Georgios Palasantzas**  
University of Groningen, the Netherlands
- 5. Dr. Demosthenes Kazanas**  
NASA - Goddard Space Flight Centre, USA

## II. Review Procedure and Documentation

The External Evaluation and Accreditation Panel (henceforth the “Panel”) conducted the accreditation and evaluation of the undergraduate programme of Physics at the Aristotle University of Thessaloniki, during the period 8-13 of February 2021. Due to the COVID-19 pandemic, the Panel did not visit the site physically, but conducted the accreditation evaluation via Zoom teleconferencing. On Thursday, January 28<sup>th</sup>, several members of the Panel attended an orientation meeting via Zoom teleconference, presented by HAHE’s General Director Dr. Christina Besta. This orientation was optional for Panel members, who had attended these orientations in the past at least twice. Dr. Besta outlined and expanded the procedures and the rationale for the accreditation. Dr. Besta’s presentation was sent to all Panel members in advance. From February 11<sup>th</sup>- 13<sup>th</sup> the Panel prepared the report using Zoom teleconferencing meetings for its members.

HAHE provided to the Panel the following documentation and supporting material related to the Physics undergraduate programme:

1. The guidelines for accreditation created by HAHE.
2. The standards for quality accreditation of the undergraduate programme created by HAHE.
3. The mapping grid created by HAHE.
4. A tabulation (prepared by HAHE) of the scores of the programme regarding the quality indices for the academic years 2015-2016 to 2018-2019.
5. The accreditation information for the programme prepared by the School.
6. A set of annexes to the accreditation proposal, including the study guides, course descriptions, etc.
7. Statistical data regarding the School and the specific programme of studies.
8. A set of documents presenting quality indicators both for the School of Physics and the programme.
9. The 2011 external evaluation report and its recommendations conducted by HQAA for the entire School of Physics and their undergraduate, MSc, and Ph.D. programmes.
10. The results of the internal evaluation of the undergraduate programme.
11. Additional information provided by the School, which included copies of past homework assignments, exams, and undergraduate theses.

On Tuesday, February 9, the Panel met with the Vice Rector for Academic and Students Affairs and President of the Quality Assurance Unit (MODIP), Prof. Dimitrios Koveos and the Head of the School of Physics, Prof. Dimitrios Melas. Prof. Dimitrios Koveos gave a presentation about the history and the current structure of the Aristotle University of Thessaloniki, its research funding and ranking, the university quality assurance process and results from its most recent accreditation, and information on the internal evaluation units and their processes. Immediately thereafter, Prof. Dimitrios Melas gave a presentation on the history of the School of Physics and its organization, the School’s goals, the Physics undergraduate and graduate programmes, statistical data on the School’s teaching staff (also referred to in this document as faculty) and its students, its research funding, and its teaching staff publications. After Prof.

Dimitrios Melas' presentation, Prof. Georgios Tagaras from the University Quality Assurance Unit (MODIP) gave a short presentation on the internal evaluation structure and policies of the institution, followed by a presentation by the School's Internal Evaluation Group (OMEA) coordinator Prof. Nikolaos Stergioulas. Prof. Nikolaos Stergioulas presented details on the internal evaluation of the School of Physics. This presentation included information about 1) the School of Physics history and structure, the number of students and staff, 2) the procedure of the School's internal evaluation, 3) its quality assurance policy, including the School's goals on improving their quality assurance indices, 4) the procedure for the planning and approval process of their undergraduate studies, 5) the actions taken by the School toward a more student-based learning environment, 6) extracurricular activities by its current students, 7) monitoring the progress of its graduates, 8) the School infrastructure, 9) the continuing monitoring of its curriculum and its assessment, and 10) the School information available to the public.

Electronic copies of these presentations were provided to the Panel.

During the same day, the Panel met with the teaching staff, listened to their points of view and concerns about the School's teaching policy and load, the students' performance, and the procedures of the internal evaluation. The Panel discussed and listened to the teaching staff views about the students' participation in their teaching evaluations, the attendance in their courses, and the large number of incoming students compared to the number requested by the School. After this meeting, the Panel met with Physics undergraduate students. The Panel discussed with the students the standards of the overall undergraduate programme and the quality of the teaching staff. Specifically, the students emphasized the strengths and weaknesses of the study programme as they are experiencing it. Furthermore, the Panel discussed how the School could inform prospective undergraduate students on continuing their studies as graduate students (MSc and Ph.D.) in Greece and abroad.

On Wednesday, February 10, the day started with a video tour of selected laboratories and classrooms, followed by a discussion of the School infrastructure. The Panel was unable to attend a live video tour of the School's classrooms and laboratory spaces because these facilities were inaccessible due to protests. Upon the Panel's request, the School provided photos of the buildings' common areas. The Panel observed a diverse number of experiments for general and advanced undergraduate Physics courses. The day continued with meetings with former students (i.e., alumni) and social partners. Some of these former students are now academics employed outside of Greece, while others are employed by industry and research organizations. These graduates discussed the standards of the undergraduate programme and the knowledge gained during their studies at the School of Physics and how it influenced them in their careers. The social partners stated that several students and graduates from the programme have been employed in their companies. The day continued with a Panel debriefing, followed by a second meeting with the OMEA, MODIP, and the Head of the School of Physics. The discussions helped to clarify several points and findings. A closure meeting with the Vice-rector/President of the MODIP and the Head of the School and OMEA members then took place.

In its deliberations, the Panel took into consideration the items 1-11 listed above, information from the School's website (available both in Greek and English), and additional information sent electronically to the Panel.

All meetings took place in a cordial and highly professional atmosphere. The faculty, students, and staff were extremely helpful, forthcoming and cooperative, and the overwhelming majority participated with enthusiasm in the accreditation process. The documents provided and the presentations were informative.

The Panel would like to express its appreciation to the Vice Rector Prof. Dimitrios Koveos, the Head of the School Prof. Dimitrios Melas, OMEA coordinator Prof. Nikolaos Stergioulas, and all members of the OMEA and MODIP for their efforts to facilitate the work of the Panel. The Panel is also thankful to all the individuals, who participated in the discussions and presentations of the School.

The input and organizational support of the HAHE is greatly appreciated.

### III. Study Programme Profile

The School of Physics at the Aristotle University of Thessaloniki was established in 1928, as School of Physics and Mathematical Sciences. In 1958 it was renamed as Physics and Mathematics School. Currently, the School of Physics has five departments/sectors as follows: Astrophysics, Astronomy and Mechanics, Nuclear and Elementary Particle Physics, Solid State Physics, Electronics and Computers, Applied and Environmental Physics.

The School has 66 full time permanent teaching staff (DEP members; 37 Professors, 17 Associate Professors, 11 Assistant Professors, and one Lecturer). One additional professor is on leave since he has been appointed as the Head of the Hellenic N.A.R.I.C. (Δ.Ο.Α.Τ.Α.Π). The average age of the DEP faculty is approximately 54, with the significant majority being male (54 male; 12 female). The faculty distribution in the departments/sectors is as follows: 8 in Astrophysics, Astronomy, and Mechanics; 13 in Nuclear and Elementary Particle Physics; 25 in Solid State Physics; 5 in Electronics and Computers; and 15 in Applied and Environmental Physics. Moreover, the school also employs 20 laboratory teaching personnel (EPID), 7 special technical laboratory personnel (ETEP), and 5 administrative personnel.

The School offers an undergraduate degree in Physics (πτυχιον; BSc). Students must enroll for a minimum of 8 semesters (4 years) and successfully complete 240 European Credit Transfer and Accumulations System (ECTS) units.

The majority of the students take about 6.4 years to graduate (2018-2019 data). According to the data provided to the Panel, during the academic years 2015-2016 to 2018-2019, about 9-12% graduated in 4 years ( $N = 4$ ), 20-31% in 5 years ( $N+1$ ), 18-23% in 6 years ( $N+2$ ), and 34-51% in more than 6 years (larger than  $N+2$ ). During 2019-2020, the School produced 161 BSc in Physics graduates. This year (academic year 2020-2021) 248 new students enrolled in the Physics undergraduate programme. This number about double the number requested by the School (about 120-130 students). However, only about 45% of their students participate in the course examinations, which is indicative that about half the students are inactive in the programme.

The general structure of the undergraduate degree in Physics is as follows:

Semesters 1-6: Students must successfully complete 30 compulsory courses (22 lecture courses and 8 laboratory courses), which includes fundamental courses in Physics and Mathematics. The total number of ECTS in semesters 1-6 is 180.

Semesters 7-8: Students must successfully complete 1 compulsory course (Solid State Physics) and 12 elective courses (52 ECTS). A diploma thesis (8 ECTS) is optional. Moreover, an optional 2-month practical training (4 ECTS) to various entities within the Greek public and private sectors is offered every year to students that have completed their 6<sup>th</sup> semester and beyond. For the academic year 2018-19, 47 students completed this training.

The School also offers graduate degrees, an MSc degree and a Ph.D. degree, all in Physics. The number of peer-reviewed publications per faculty is about 5/year and the external funding is about 5M euros for the entire School for the last academic year.

The graduates several employment prospects, becoming educators, or working in the areas of telecommunications, electronics, optoelectronics, computational science, materials science,



and the environment, as well as in meteorology. Selected graduates from the undergraduate programme are currently in universities in Greece and abroad, as graduate students, postdoctoral researchers, and faculty.

## PART B: COMPLIANCE WITH THE PRINCIPLES

### Principle 1: Academic Unit Policy for Quality Assurance

**INSTITUTIONS SHOULD APPLY A QUALITY ASSURANCE POLICY AS PART OF THEIR STRATEGIC MANAGEMENT. THIS POLICY SHOULD EXPAND AND BE AIMED (WITH THE COLLABORATION OF EXTERNAL STAKEHOLDERS) AT ALL INSTITUTION'S AREAS OF ACTIVITY, AND PARTICULARLY AT THE FULFILMENT OF QUALITY REQUIREMENTS OF UNDERGRADUATE PROGRAMMES. THIS POLICY SHOULD BE PUBLISHED AND IMPLEMENTED BY ALL STAKEHOLDERS.**

*The quality assurance policy of the academic unit is in line with the Institutional policy on quality, and is included in a published statement that is implemented by all stakeholders. It focuses on the achievement of special objectives related to the quality assurance of study programmes offered by the academic unit.*

*The quality policy statement of the academic unit includes its commitment to implement a quality policy that will promote the academic profile and orientation of the programme, its purpose and field of study; it will realise the programme's strategic goals and it will determine the means and ways for attaining them; it will implement the appropriate quality procedures, aiming at the programme's continuous improvement.*

*In particular, in order to carry out this policy, the academic unit commits itself to put into practice quality procedures that will demonstrate:*

- a) the suitability of the structure and organization of the curriculum;*
- b) the pursuit of learning outcomes and qualifications in accordance with the European and the National Qualifications Framework for Higher Education;*
- c) the promotion of the quality and effectiveness of teaching;*
- d) the appropriateness of the qualifications of the teaching staff;*
- e) the enhancement of the quality and quantity of the research output among faculty members of the academic unit;*
- f) ways for linking teaching and research;*
- g) the level of demand for qualifications acquired by graduates, in the labour market;*
- h) the quality of support services such as the administrative services, the Library, and the student welfare office;*
- i) the conduct of an annual review and an internal audit of the quality assurance system of the undergraduate programme(s) offered, as well as the collaboration of the Internal Evaluation Group (IEG) with the Institution's Quality Assurance Unit (QAU);*

### Study Programme Compliance

The Aristotle University of Thessaloniki (AUTH) is a public University with international appeal. It has established a quality assurance policy and its University Quality Assurance Unit (MODIP), which follows the HAHE standards. The School of Physics quality assurance policy is fully in line with MOPID's policy. The School's quality assurance policy focuses on the achievement of their objectives related to their study programmes. The internal quality procedure takes place on an annual basis and its objectives and data are published on the School's website.

The School has established policies to support its undergraduate study programme, as well as the infrastructure and resources needed for its successful operation. The study programme has established policies to implement the integration of the students and teaching staff in cooperative research projects via the optional diploma theses. Moreover, the School has policies supporting participation in European and international research activities (e.g., Erasmus+, the ATLAS project). Furthermore, the School strives to successfully integrate research and education via workshops, colloquiums, specialized section talks in each research line, student research teams (e.g., ASAT). Attention is given to students with disabilities/special needs enabling them to participate in the courses including laboratories.

The School of Physics is currently ranked as one of the best in Greece by the World University Rankings by Subject. Select graduates hold academic positions in Greece and abroad. Moreover, the research of the School's teaching staff is highly cited in the literature. Finally, the core and elective courses offered in Physics are of high quality reflecting the School's excellence in research and education.

### Panel Judgement

<b>Principle 1: Academic Unit Policy for Quality Assurance</b>	
Fully compliant	<b>X</b>
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

None

## Principle 2: Design and Approval of Programmes

**INSTITUTIONS SHOULD DEVELOP THEIR UNDERGRADUATE PROGRAMMES FOLLOWING A DEFINED WRITTEN PROCESS WHICH WILL INVOLVE THE PARTICIPANTS, INFORMATION SOURCES AND THE APPROVAL COMMITTEES FOR THE PROGRAMME. THE OBJECTIVES, THE EXPECTED LEARNING OUTCOMES, THE INTENDED PROFESSIONAL QUALIFICATIONS AND THE WAYS TO ACHIEVE THEM ARE SET OUT IN THE PROGRAMME DESIGN. THE ABOVE DETAILS AS WELL AS INFORMATION ON THE PROGRAMME'S STRUCTURE ARE PUBLISHED IN THE STUDENT GUIDE.**

*Academic units develop their programmes following a well-defined procedure. The academic profile and orientation of the programme, the objectives, the subject areas, the structure and organisation, the expected learning outcomes and the intended professional qualifications according to the National Qualifications Framework for Higher Education are described at this stage. The approval or revision process for programmes includes a check of compliance with the basic requirements described in the Standards, on behalf of the Institution's Quality Assurance Unit (QAU).*

*Furthermore, the programme design should take into consideration the following:*

- *the Institutional strategy*
- *the active participation of students*
- *the experience of external stakeholders from the labour market*
- *the smooth progression of students throughout the stages of the programme*
- *the anticipated student workload according to the European Credit Transfer and Accumulation System*
- *the option to provide work experience to the students*
- *the linking of teaching and research*
- *the relevant regulatory framework and the official procedure for the approval of the programme by the Institution.*

### Study Programme Compliance

The School of Physics offers high quality research and education in a coherent manner setting, as it is reflected by the offered undergraduate courses in Physics. The undergraduate curriculum is well described in the programme of study (odigos spoudon/Study guide) and offers core and elective courses in Physics and in other STEM areas. The undergraduate degree requires 240 ECTS units to be completed in 8 semesters (4 years) and complies with Greek and EU standards. The programme is covering both basic and applied Physics areas. Students have the option of participating in curriculum changes, via their representatives in the School and University committees.

Graduates and external stakeholders provide feedback on the curriculum, the latter through practical training final reports. The graduates' participations in the feedback are limited.

The current curriculum structure of the undergraduate programme highlights to a significant degree the intended professional qualifications of its graduates to meet the needs of the labor market. In the case of students intended to become high School teachers, the curriculum has the required educational courses.

The Panel found that the current curriculum includes many General Physics and Mathematics courses in the first two years. The School has initiated a strategy to consolidate the General Physics courses. Moreover, the number of offered electives is still high for a Physics undergraduate programme, despite its reduction following the 2011 external review.

The programme links teaching with research via the optional practical training, the thesis, and the compulsory laboratories. In the last 10 years there have been more than 95 research publications with undergraduate students as co-authors, which is indicative of the direct involvement of students in research. The practical training duration is 2 months. However, the social partners found that the practical training duration is too short. Moreover, the optional thesis' ECTS allocation is only 8, which the Panel found this to be small.

### Panel Judgement

<b>Principle 2: Design and Approval of Programmes</b>	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

Several General Physics (General Physics I, II, III, IV, V) and Mathematics (General Mathematics I, II, III, as well as Applied Mathematics I, II) courses of the first two years courses should be consolidated.

- 1) The School should increase its efforts for obtaining increasing feedback from its graduates.
- 2) The number of available electives should be further substantially decreased from its current number of 75.
- 3) The practical training and the thesis should both increase their ECTS allocations from 8 to 12 and up to 16 if possible.

### Principle 3: Student- centred Learning, Teaching and Assessment

**INSTITUTIONS SHOULD ENSURE THAT THE UNDERGRADUATE PROGRAMMES ARE DELIVERED IN A WAY THAT ENCOURAGES STUDENTS TO TAKE AN ACTIVE ROLE IN CREATING THE LEARNING PROCESS. THE ASSESSMENT METHODS SHOULD REFLECT THIS APPROACH.**

*Student-centred learning and teaching plays an important role in stimulating students' motivation, self-reflection and engagement in the learning process. The above entail continuous consideration of the programme's delivery and the assessment of the related outcomes.*

*The student-centred learning and teaching process*

- *respects and attends to the diversity of students and their needs, enabling flexible learning paths;*
- *considers and uses different modes of delivery, where appropriate;*
- *flexibly uses a variety of pedagogical methods;*
- *regularly evaluates and adjusts the modes of delivery and pedagogical methods aiming at improvement;*
- *regularly evaluates the quality and effectiveness of teaching, as documented especially through student surveys;*
- *reinforces the student's sense of autonomy, while ensuring adequate guidance and support from the teaching staff;*
- *promotes mutual respect in the student - teacher relationship;*
- *applies appropriate procedures for dealing with students' complaints.*

*In addition:*

- *the academic staff are familiar with the existing examination system and methods and are supported in developing their own skills in this field;*
- *the assessment criteria and methods are published in advance;*
- *the assessment allows students to demonstrate the extent to which the intended learning outcomes have been achieved. Students are given feedback, which, if necessary is linked to advice on the learning process;*
- *student assessment is conducted by more than one examiner, where possible;*
- *the regulations for assessment take into account mitigating circumstances;*
- *assessment is consistent, fairly applied to all students and carried out in accordance with the stated procedures;*
- *a formal procedure for student appeals is in place.*

### Study Programme Compliance

The Physics undergraduate programme is of high quality, as verified by its coursework and the linking of teaching with research. The student guide is well-written and provides sufficient information for its students but is entirely available in English. This puts Erasmus+ students in a disadvantage relative to Greek-speaking students in the programme. Moreover, there is an additional interactive document that lists the available undergraduate Physics courses, available both in Greek and English. Selective courses offer assignments for practice, which are corrected by upperclassmen and graduate students. However, there are no recitation sections for the majority of the programme's courses. The offering of recitation sections is a common practice for most Physics programmes worldwide, as it significantly improves student learning.

The Physics undergraduate courses are only taught as traditional face-to-face classes, whereas due to the COVID-19 pandemic synchronous online instruction has been implemented for both lectures and laboratories. Novel pedagogical methods, such as “flipped” classroom and peer instruction, were not evident. Thus, the current Physics undergraduate instruction and its teaching modalities (i.e., modes of course deliveries) are not diverse and thus only offers limited student learning paths.

Students evaluate their course teaching using web-based surveys. The student participation in these surveys is low but increasing.

Every Physics undergraduate student has an advisor/mentor, who monitors their coursework and progress throughout their studies. The Panel found that students are satisfied with the collegial environment and professionalism of the School faculty.

Course assessment criteria are included in the syllabi. However, when multiple examinations take place, the individual weights of these assignments are missing from the syllabi. Some courses use multiple and diverse examination procedures, which improves student retention, whereas others they rely on a Final Exam.

The School provides significant assistance to students with disabilities (AMEA) in attending their courses.

Student grade appeals follow the university’s policies.

### Panel Judgement

<b>Principle 3: Student- centred Learning, Teaching and Assessment</b>	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

### Panel Recommendations

- 1) The study guide must be available both in Greek and English in all its sections, thus providing equal opportunities to both Greek and non-Greek speaking students.
- 2) The School should implement recitation sessions for most of its undergraduate courses, which will improve student learning.
- 3) The School should implement multiple and diverse examinations (e.g., written and oral exams, group presentations, etc.) for its undergraduate courses, and specify the individual weights of these assignments in the course’s syllabi, thus contributing to the diversity and flexibility of the student learning paths.
- 4) The School should consider converting some of its lecture courses to a hybrid mode, which combines face-to-face with online instruction, thus enhancing the course offerings modalities.

## **Principle 4: Student Admission, Progression, Recognition and Certification**

### **INSTITUTIONS SHOULD DEVELOP AND APPLY PUBLISHED REGULATIONS COVERING ALL ASPECTS AND PHASES OF STUDIES (ADMISSION, PROGRESSION, RECOGNITION AND CERTIFICATION).**

*Institutions and academic units need to put in place both processes and tools to collect, manage and act on information regarding student progression.*

*Procedures concerning the award and recognition of higher education degrees, the duration of studies, rules ensuring students progression, terms and conditions for student mobility should be based on the institutional study regulations. Appropriate recognition procedures rely on institutional practice for recognition of credits among various European academic departments and Institutions, in line with the principles of the Lisbon Recognition Convention.*

*Graduation represents the culmination of the students' study period. Students need to receive documentation explaining the qualification gained, including achieved learning outcomes and the context, level, content and status of the studies that were pursued and successfully completed (Diploma Supplement).*

#### **Study Programme Compliance**

Students are admitted to the Physics undergraduate programme via national state examinations. The School of Physics has minimal input on the number and the preparation level of its incoming students. The current number of incoming undergraduate students is about double the number requested by the School. However, only about half of these are active in the programme, as evidenced by the student participation in the examinations. These active students can be adequately managed by the current number of the School faculty, assuming that retired teaching staff positions are covered by new hires and the successful fulfillment of the currently active faculty searches.

Incoming students are informed about the programme via the School orientation meetings and in turn by their advisor/mentors, who are available to advise them throughout their studies. However, several students do not regularly meet with their advisors. The relationship between the students and the teaching staff is very good.

Student mobility is encouraged by the School via student via their participation in the Erasmus programme, with which students may spend time at another EU institution.

The School has defined requirements and a needed format for the diploma thesis (i.e., guidelines), which is optional. The thesis is presented to the School faculty publicly and graded by a three-member faculty committee. The Panel found no evidence on quality metrics and goals related to the thesis, such as an evaluation rubric. This evaluation rubric will serve as a tool for the recognition of the diploma thesis quality.

Graduates receive a Diploma Supplement in addition to their undergraduate degree.



## Panel Judgement

<b>Principle 4: Student Admission, Progression, Recognition and Certification</b>	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

## Panel Recommendations

- 1) The School should increase its efforts to encourage the students' interactions with their advisors throughout their studies.
- 2) The School should define quality metrics and goals for the diploma thesis, by developing a thesis evaluation rubric.

## Principle 5: Teaching Staff

**INSTITUTIONS SHOULD ASSURE THEMSELVES OF THE QUALIFICATIONS AND COMPETENCE OF THE TEACHING STAFF. THEY SHOULD APPLY FAIR AND TRANSPARENT PROCESSES FOR THE RECRUITMENT AND DEVELOPMENT OF THE TEACHING STAFF.**

*The Institutions and their academic units have a major responsibility as to the standard of their teaching staff providing them with a supportive environment that promotes the advancement of their scientific work. In particular, the academic unit should:*

- *set up and follow clear, transparent and fair processes for the recruitment of properly qualified staff and offer them conditions of employment that recognize the importance of teaching and research;*
- *offer opportunities and promote the professional development of the teaching staff;*
- *encourage scholarly activity to strengthen the link between education and research;*
- *encourage innovation in teaching methods and the use of new technologies;*
- *promote the increase of the volume and quality of the research output within the academic unit;*
- *follow quality assurance processes for all staff members (with respect to attendance requirements, performance, self-assessment, training etc.);*
- *develop policies to attract highly qualified academic staff;*

### Study Programme Compliance

The teaching staff of the School of Physics consists of 66 full-time faculty members, 20 laboratory teaching personnel (EPID), and 7 special technical laboratory personnel (ETEP). The faculty's teaching obligation follows the applicable Greek laws and regulations. Overall, the School teaching staff is of high caliber, as verified by their publication and funding records. The School faculty and laboratory-related staff positions have been reduced significantly over the last decade. The School provides a suitable infrastructure and working environment to its members and it cultivates an appropriate academic atmosphere.

The recruitment and appointment of teaching staff (faculty) is governed by the relevant state laws and regulations to fulfill the needs of the School programmes. Available positions are advertised in the state's official online platform (APELLA). The Panel was informed about the existence of a 2-year School strategic plan.

The professional development (promotion and tenure) of teaching staff adheres to the state laws. The School is handling the process and its strains and stresses well, and its faculty appears to be collegiate.

The School has established substantial links between undergraduate teaching and research. This is formalized by the possibility for the students to complete a diploma thesis, which involves research work supervised by a faculty member.

Faculty assessment in teaching is based on regular student evaluations, which are examined by MODIP, OMEA, and the School. However, only a fraction of the students who attend lectures participate in these evaluations.

The Panel did not become aware of encouragement of teaching innovations in the undergraduate courses.

Appropriate mobility and opportunities for professional development of the teaching staff are available through grants.

The teaching staff is also involved in research, including participation in international collaborations, and there is a very good output of research work in the form of peer-reviewed papers in internationally recognized journals and presentations in conferences and workshops. The trend of publications and citations is positive.

Gender balance in faculty is a relative bright spot in the School of Physics. According to the School's website the present faculty includes 12 female members in a faculty of 66. This is a very good percentage by Physics standards.

### Panel Judgement

<b>Principle 5: Teaching Staff</b>	
Fully compliant	<b>X</b>
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

- 1) The School should encourage teaching innovations in the undergraduate courses, thus promoting teaching excellence.

## Principle 6: Learning Resources and Student Support

**INSTITUTIONS SHOULD HAVE ADEQUATE FUNDING TO COVER TEACHING AND LEARNING NEEDS. THEY SHOULD –ON THE ONE HAND- PROVIDE SATISFACTORY INFRASTRUCTURE AND SERVICES FOR LEARNING AND STUDENT SUPPORT AND–ON THE OTHER HAND- FACILITATE DIRECT ACCESS TO THEM BY ESTABLISHING INTERNAL RULES TO THIS END (E.G. LECTURE ROOMS, LABORATORIES, LIBRARIES, NETWORKS, BOARDING, CAREER AND SOCIAL POLICY SERVICES ETC.).**

*Institutions and their academic units must have sufficient funding and means to support learning and academic activity in general, so that they can offer to students the best possible level of studies. The above means could include facilities such as libraries, study rooms, educational and scientific equipment, information and communications services, support or counselling services.*

*When allocating the available resources, the needs of all students must be taken into consideration (e.g. whether they are full-time or part-time students, employed or international students, students with disabilities) and the shift towards student-centred learning and the adoption of flexible modes of learning and teaching. Support activities and facilities may be organised in various ways, depending on the institutional context. However, the internal quality assurance ensures that all resources are appropriate, adequate, and accessible, and that students are informed about the services available to them.*

*In delivering support services the role of support and administrative staff is crucial and therefore they need to be qualified and have opportunities to develop their competences.*

### Study Programme Compliance

The resources available to students' education are sufficient. Fixed educational resources, such as classrooms and desks, teaching laboratories, libraries and IT equipment, range from very good to excellent. The number of available dormitory rooms is too low to accommodate the student needs. The undergraduate Physics student body is linguistically rather homogeneous. There are a few non-Greek speaking students, who are accommodated by teaching the courses they take in English. The School makes provisions for students with disabilities.

Students in the School enjoy the standard benefits of public higher education in Greece, namely free tuition, including textbook materials and course notes, free or subsidized board, and some limited possibilities for free or low-cost accommodation.

There are limited resources devoted to recitation sessions that would contribute towards a student-centered learning environment.

Trained technicians assisting teaching labs are available, but the School finds their number short of the required for optimal student service.

The support and administrative staff are adequate in number and abilities and they appear to be genuinely concerned with the students' needs and engaged in their mission.

### Panel Judgement

<b>Principle 6: Learning Resources and Student Support</b>	
Fully compliant	<b>X</b>
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

- 1) The Panel recommends the school increase its efforts to seek resources in establishing and promoting student-centered teaching methods.

## Principle 7: Information Management

**INSTITUTIONS BEAR FULL RESPONSIBILITY FOR COLLECTING, ANALYSING AND USING INFORMATION, AIMED AT THE EFFICIENT MANAGEMENT OF UNDERGRADUATE PROGRAMMES OF STUDY AND RELATED ACTIVITIES, IN AN INTEGRATED, EFFECTIVE AND EASILY ACCESSIBLE WAY.**

*Institutions are expected to establish and operate an information system for the management and monitoring of data concerning students, teaching staff, course structure and organisation, teaching and provision of services to students as well as to the academic community.*

*Reliable data is essential for accurate information and for decision making, as well as for identifying areas of smooth operation and areas for improvement. Effective procedures for collecting and analysing information on study programmes and other activities feed data into the internal system of quality assurance.*

*The information gathered depends, to some extent, on the type and mission of the Institution. The following are of interest:*

- *key performance indicators*
- *student population profile*
- *student progression, success and drop-out rates*
- *student satisfaction with their programme(s)*
- *availability of learning resources and student support*
- *career paths of graduates*

*A number of methods may be used for collecting information. It is important that students and staff are involved in providing and analysing information and planning follow-up activities.*

### Study Programme Compliance

The School has established a quality data collection and administration system, consistent with the HAHE standards to follow the students' statistics. These compile the students' numbers, distribution and progress (including dropouts and/or perpetual students), as well as their satisfaction with their courses and instructors.

The OMEA follows these statistics and provides, in addition, targets for future improvement, as well as the statistics following the implementation of internal and external recommendations. These, in certain cases, have exceeded the target figures, whereas others are close to the target values.

Most the graduates' career paths are not documented. However, the School has managed to follow the career paths of over 370 graduates through LinkedIn from the time of their graduation till today. The School's top graduates found employment or continued their studies in Greece and abroad.

### Panel Judgement

<b>Principle 7: Information Management</b>	
Fully compliant	<b>X</b>
Substantially compliant	
Partially compliant	
Non-compliant	

### Panel Recommendations

- 1) The School should improve its process to follow the career paths of its graduates, to the extent possible.

## Principle 8: Public Information

**INSTITUTIONS SHOULD PUBLISH INFORMATION ABOUT THEIR TEACHING AND ACADEMIC ACTIVITIES WHICH IS CLEAR, ACCURATE, OBJECTIVE, UP-TO-DATE AND READILY ACCESSIBLE.**

*Information on Institution's activities is useful for prospective and current students, graduates, other stakeholders and the public.*

*Therefore, institutions and their academic units provide information about their activities, including the programmes they offer, the intended learning outcomes, the qualifications awarded, the teaching, learning and assessment procedures used, the pass rates and the learning opportunities available to their students, as well as graduate employment information.*

### Study Programme Compliance

The School of Physics' webpage contains all information relevant to the School and its programmes, including its departments/sectors. The Greek version of the website can be found at <https://www.physics.auth.gr> and the English version at the <https://www.physics.auth.gr/en/>. Interested persons can find general information about the School and its departments/sectors, its programmes, the course descriptions, and the Erasmus programme. There are also details of the research performed in the School with cross-reference to corresponding courses. However, sections of the study guide, the course schedule, and the announcement section are not available in English, which affects Erasmus+ students.

Seminars specific to each department/sector, the School colloquium, and public lectures and student activities are publicly accessible. A search link provides efficient and complete access to any of the above issues to a person interested in a specific issue along with all relevant links.

The School also offers tours of its research facilities to secondary education students who visit the School regularly. These students have the opportunity to obtain "hands-on" experience of different experimental facilities, along with explanations by the relevant staff.

The Greek version of the School's website includes a very nice video about the School of Physics, with details of its buildings, lecturing halls, curriculum and research along with the department/sector laboratories. This provides the visitor with a complete visual perspective of the School. However, this video is absent from the English version of the School's website.

### Panel Judgement

Principle 8: Public Information	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	



## **Panel Recommendations**

- 1) The School of Physics should provide the exact same information in its website in both Greek and English, thus offering equal opportunities to its Greek and non-Greek speaking students.

## Principle 9: On-going Monitoring and Periodic Internal Review of Programmes

**INSTITUTIONS SHOULD HAVE IN PLACE AN INTERNAL QUALITY ASSURANCE SYSTEM FOR THE AUDIT AND ANNUAL INTERNAL REVIEW OF THEIR PROGRAMMES, SO AS TO ACHIEVE THE OBJECTIVES SET FOR THEM, THROUGH MONITORING AND AMENDMENTS, WITH A VIEW TO CONTINUOUS IMPROVEMENT. ANY ACTIONS TAKEN IN THE ABOVE CONTEXT SHOULD BE COMMUNICATED TO ALL PARTIES CONCERNED.**

*Regular monitoring, review and revision of study programmes aim to maintain the level of educational provision and to create a supportive and effective learning environment for students.*

*The above comprise the evaluation of:*

- *the content of the programme in the light of the latest research in the given discipline, thus ensuring that the programme is up to date;*
- *the changing needs of society;*
- *the students' workload, progression and completion;*
- *the effectiveness of the procedures for the assessment of students;*
- *the students' expectations, needs and satisfaction in relation to the programme;*
- *the learning environment, support services and their fitness for purpose for the programme*

*Programmes are reviewed and revised regularly involving students and other stakeholders. The information collected is analysed and the programme is adapted to ensure that it is up-to-date. Revised programme specifications are published.*

### Study Programme Compliance

In the context of a regular internal review of its programme, the School of Physics has, for several years now, been electronically collecting surveys from students for every course of the undergraduate programme. These are reviewed by the School and the MODIP. The results of these evaluations are available to be viewed by the students, who provide this input.

Additionally, the School collects anonymous surveys from students who have graduated to gain insights into their experience at the programme, how satisfying their experience was, their feelings about the various courses they took, and the way they were taught. However, only a small fraction of their graduates responds and complete these questionnaires. Feedback is also collected from external stakeholders via practical training final reports.

However, the Panel found no evidence that results from the graduates' questionnaires and the external stakeholders' final reports and have been used for curriculum changes and updates, such as course additions deletions and modifications.

Major updates of the undergraduate curriculum occur every eight (8) years, which is a very long period of time. This significantly long review cycle is against the common practice followed by similar Physics undergraduate programmes worldwide, thus lacking new developments in the field of Physics.

## Panel Judgement

<b>Principle 9: On-going Monitoring and Periodic Internal Review of Programmes</b>	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

## Panel Recommendations

- 1) The School should analyze the results from the graduates' questionnaires and take them into account for programme updates.
- 2) Major curriculum updates should align with the expected duration of studies, which is four (4) years.

## Principle 10: Regular External Evaluation of Undergraduate Programmes

**PROGRAMMES SHOULD REGULARLY UNDERGO EVALUATION BY COMMITTEES OF EXTERNAL EXPERTS SET BY HAHE, AIMING AT ACCREDITATION. THE TERM OF VALIDITY OF THE ACCREDITATION IS DETERMINED BY HAHE.**

*HAHE is responsible for administrating the programme accreditation process which is realised as an external evaluation procedure, and implemented by a committee of independent experts. HAHE grants accreditation of programmes, with a specific term of validity, following to which revision is required. The accreditation of the quality of the programmes acts as a means of verification of the compliance of the programme with the template's requirements, and as a catalyst for improvement, while opening new perspectives towards the international standing of the awarded degrees.*

*Both academic units and institutions participate in the regular external quality assurance process, while respecting the requirements of the legislative framework in which they operate.*

*The quality assurance, in this case the accreditation, is an on-going process that does not end with the external feedback, or report or its follow-up process within the Institution. Therefore, Institutions and their academic units ensure that the progress made since the last external quality assurance activity is taken into consideration when preparing for the next one.*

### Study Programme Compliance

The School underwent a detailed external evaluation of both its undergraduate and graduate programmes in 2011 by a five-member committee, operating under the auspices of the HQAA. The entire university was evaluated in 2019 but without evaluation of individual departments/Schools. The HQAA did not initiate a further evaluation or accreditation of the School's programmes during the ensuing ten-year period prior to setting up the present Panel this February.

The 2011 HQAA evaluation highlighted several challenges the School of Physics faced due to the large number of courses in their undergraduate programme, the protestor occupations of university premises, the lack of specialized technicians, and the School's aging faculty. The School revised the undergraduate curriculum in partial compliance with the recommendation of the external review. Specifically, currently there are 75 elective courses offered, whereas the 2011 HQAA committee recommended this number to be 40.

The Panel found that the School is open to the Panel's suggestions for its programme.

### Panel Judgement

Principle 10: Regular External Evaluation of Undergraduate Programmes	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

## **Panel Recommendations**

- 1) The School should increase efforts to have its undergraduate programme reviewed by external panels every four years.
- 2) The School should increase efforts to be in alignment with the 2011 HQAA recommendations on the number of elective courses offered.

## **PART C: CONCLUSIONS**

### **I. Features of Good Practice**

1. The teaching personnel are of high caliber, providing a comprehensive education to their students.
2. The Physics undergraduate programme is of high quality, and its top graduates are sought after in the job market or continued their studies in Greece and abroad.
3. The School infrastructure is satisfactory, which positively contributes to its undergraduate education.
4. The School is nationally and internationally recognized for its research and education.
5. The rapport between students and teaching staff is good.

### **II. Areas of Weakness**

1. The Physics undergraduate curriculum is heavy in General Physics and Mathematics in the first two years.
2. The current Physics undergraduate instruction and its teaching modalities are not adequately diverse.
3. Generally, course grading procedures are not diverse and rely heavily on a Final Examination.
4. Graduates and stakeholders are not actively participating in the undergraduate curriculum revisions.
5. Course recitations and tutoring sessions are not widely implemented, which affects student learning.
6. The number of elective courses offered is high.
7. The School's website does not provide the exact same information in both Greek and English.

### **III. Recommendations for Follow-up Actions**

1. The School should consolidate the General Physics and Mathematics courses offered in the first two years.
2. The School should promote novel pedagogical techniques along with diverse course delivery methods (e.g., hybrid courses).
3. The School should implement diverse examination methods in its undergraduate courses.
4. The School should incorporate input from its graduates and stakeholders into the programme revisions.
5. The School should implement recitation sessions for most of their undergraduate courses.
6. The number of elective courses must be substantially reduced.
7. The School's website must be updated to provide the exact same information in both Greek and English.

#### IV. Summary & Overall Assessment

The Principles where full compliance has been achieved are: **1, 5, 6 and 7.**

The Principles where substantial compliance has been achieved are: **2, 3, 4, 8, 9 and 10.**

The Principles where partial compliance has been achieved are: **None**

The Principles where failure of compliance was identified are: **None**

Overall Judgement	
Fully compliant	
Substantially compliant	<b>X</b>
Partially compliant	
Non-compliant	

## The members of the External Evaluation & Accreditation Panel

Name and Surname

Signature

- 1. Prof. Nikolaos Dimakis (Chair)**  
University of Texas Rio Grande Valley, USA
- 2. Prof. Alexios Polychronakos**  
The City College of the City University of New York, USA
- 3. Prof. Emeritus Harry Mavromatis, USA**  
American University of Beirut
- 4. Prof. Georgios Palasantzas**  
University of Groningen, the Netherlands
- 5. Dr. Demosthenes Kazanas**  
NASA - Goddard Space Flight Centre, USA