4.2 Programme learning outcomes:

Aims

1. To cultivate physicists, researchers, and scientists who possess the competence to advance their acquired knowledge in the fundamental and applied fields of physics and their skills in theoretical analysis, experimental application, numerical modelling and using and developing computational physics tools in both disciplinary and interdisciplinary areas of specialisation such as theoretical physics, nuclear physics, condensed matter physics, high energy physics, nanotechnology, renewable/alternative energy technologies, advanced materials design, nuclear technology, and quantum technologies and, who are thereby equipped with the ability to lay the foundations for future technologies and to utilise them effectively.
2. To enhance students' awareness of social responsibility and commitment to the common good by equipping them with the ability to act responsibly in ways that promote environmental awareness, sustainability, accessibility, inclusivity, and well-being, as well as fostering their critical thinking and ethical decision-making skills.
3. To develop and implement innovative educational approaches that meet current scientific and societal challenges, broaden students' career prospects and scientific proficiency, and promote interdisciplinary interaction and specialization.
4. To build stronger links between the university and industry that enable students to develop problem-solving, entrepreneurial, and lifelong learning skills, strengthen their theoretical knowledge through practice, and enhance their employability.
5. To actively integrate artificial intelligence and technological solutions into education and research, continuously enhance digitalisation initiatives, and consequently apply teaching, learning, and assessment methods that address current demands.
6. To increase the Department's international recognition and facilitate the exchange of knowledge and experience among faculty and students at national and global levels through national and international academic exchange programmes, collaborative projects, and dual degree opportunities.

Objectives

The objective of this programme is to cultivate physicists, researchers, and scientists who

- Possess advanced theoretical knowledge to undertake research and development activities in the field of physics; capable of analysing physical systems both theoretically and experimentally by using analytical thinking, numerical modelling, and experimental research skills,
- Act responsibly in ways that promote environmental awareness, sustainability, accessibility, inclusivity and well-being and who have acquired skills in critical thinking, entrepreneurship, problem solving, ethical decision-making, and lifelong learning,
- Have the skills of using and developing current artificial intelligence and information technologies and the competence to advance their acquired knowledge in the fundamental and applied fields of physics and their skills in theoretical analysis, experimental application, numerical modelling and using and developing computational physics tools in both disciplinary and interdisciplinary areas of specialisation such as theoretical physics, nuclear physics, condensed matter physics, high energy physics, nanotechnology, renewable/alternative energy technologies, advanced materials design, nuclear technology, and quantum technologies,
- Are able to use physics terminology in both Turkish and English, conduct field-related research, collaborate in team-based settings, and effectively present their work,

- Have the competence to work in managerial, research, and applied roles in national and international institutions in both the public and private sectors as individuals with the ability to define their career goals and manage their professional development and who are committed to professional ethical values.

Programme Learning Outcomes

Upon successful completion of the programme, students will be able to

PO-1) Use their comprehensive theoretical knowledge in fundamental sciences and physics for analysis, interpretation, and problem-solving at an academic level.

PO-2) Apply their practical knowledge effectively and strategically in modelling physical processes, experimental design, and problem-solving.

PO-3) Use their theoretical and/or experimental knowledge effectively in solving complex physics problems by selecting and applying appropriate analysis and modelling methods for these problems.

PO-4) Synthesise knowledge acquired from different disciplines through an interdisciplinary approach.

PO-5) Advance their acquired knowledge in the fundamental and applied fields of physics and their skills in theoretical analysis, experimental application, numerical modelling and using and developing computational physics tools in both disciplinary and interdisciplinary areas of specialisation such as theoretical physics, nuclear physics, condensed matter physics, high energy physics, nanotechnology, renewable/alternative energy technologies, advanced materials design, nuclear technology, and quantum technologies.

PO-6) Use at least one programming language and computer and artificial intelligence technologies widely employed in physics for problem-solving, data analysis, and simulations.

PO-7) Follow scientific and technological developments in physics and related fields, assess career opportunities, identify personal and professional development goals, and adopt lifelong learning strategies to achieve these goals.

PO-8) Act with a sense of social responsibility and justice and in accordance with professional ethical principles, quality standards, and universal values by taking into account potential legal and societal consequences of their scientific research and professional activities.

PO-9) Work effectively both independently and as part of a team.

PO-10) Access reliable sources of information, conduct literature reviews, and design and carry out academic research in the field of physics.

PO-11) Effectively communicate topics, theories, research, and problem solutions in physics to all relevant stakeholders using appropriate physics terminology, both orally and in writing, in Turkish and in English.

PO-12) Collect scientific data during laboratory work, prepare technical and/or scientific reports and interpret existing reports.

Occupational Profile of Graduates

Graduates of the Department of Physics possess foundational undergraduate-level knowledge of physics theories and demonstrate the ability to analyse and synthesise complex problems. They are equipped with the necessary skills in experimental design and numerical modelling and have a strong academic grounding in areas such as quantum physics, thermodynamics, electromagnetism, statistical physics, nuclear physics, condensed matter physics, high energy physics, and theoretical physics.

Department of Physics

With the competence to integrate their acquired knowledge of physics concepts into fields such as engineering, medicine, energy, materials science, and quantum information, graduates are scientifically minded, inquisitive, and solution-oriented individuals, well-suited for employment across a wide range of public and private sector institutions.

Graduates may pursue academic careers by continuing their studies in master's and doctoral programmes in physics or other related fields and may take on active roles in scientific projects conducted at universities, research institutes, R&D laboratories, or within the frame of international scientific collaborations.

In addition to the high-quality discipline-specific education they receive:

Graduates who have completed the "Theoretical Physics Certificate Programme" may participate in advanced theoretical research -such as quantum field theory, general relativity, particle physics, and cosmology- at universities, institutes, and national or international advanced research centres.

Graduates who have completed the "Nuclear Physics and Applications Certificate Programme" may work in areas such as health physics, radiation safety, radiobiology, and nuclear energy, at hospitals, nuclear medicine centres, nuclear energy institutes, defence and energy institutions, and national/international advanced research facilities.

Graduates who have completed the "Condensed Matter Physics and Applications Certificate Programme" may be employed in R&D laboratories, technology companies, materials characterisation centres, and national/international advanced research centres working on nanotechnology, semiconductor technologies, optical devices, magnetic materials, solar cells, and sensor systems.

Graduates who have completed the "High Energy Physics Certificate Programme" may work in research laboratories, data analysis centres, the defence and aerospace industries, academic institutions, and national/international advanced research centres, particularly in areas such as detector physics, particle accelerators, data analysis, and AI-supported physical modelling.

Graduation Requirements

The Bachelor's Degree is awarded to students who have successfully completed all courses in the curriculum, and have obtained accumulative grade point average of at least 2.0 on scale 2.0-4.0.