PHOTONICS ENGINEER (LIGHT SCIENTIST AND ENGINEER)

DESCRIPTION

A person who conducts research and studies in the fields of optical-photonics theories, involving the production, propagation, transmission, modulation, processing, amplification, measurement, and detection of light. They develop devices that manipulate information and energy carried by light.

A- RESPONSIBILITIES

In the work process, in compliance with occupational health and safety regulations, environmental protection regulations, and the productivity and quality requirements of the profession:

- Organize work processes.
- Study the production and propagation of light in different environments, measure light intensity, and conduct research on modifying, processing, and measuring light properties such as color.
- Conduct research and development activities in sectors such as health, defense, energy, lighting, space, and communication, depending on their specialization.
- Perform tasks related to physics, chemistry, material science, electrical and electronic engineering in production, service, public/private, national, or international organizations.
- Carry out pioneering scientific work in research and educational institutions and universities, and manage tasks related to improving/developing existing technologies.
- Engage in professional development activities.

TOOLS AND EQUIPMENT USED

- Desktop computers, laptops.
- Light-related tools, machinery, and materials used in lighting, energy, display technologies, defense, and telecommunications fields.
- Equipment related to electronic circuits, optics and photonics, quantum physics, device physics, molecular photonics and photonic devices, quantum photonics and optical spectroscopy, biophotonics and medical photonics, laser engineering, and photonic integrated circuits, which are specific to different fields and disciplines.
- Equipment related to electrical and electronic science.
- Tools such as magnifiers and microscopes for examining and processing small-scale work at the micron and nanometer levels.
- Crystal growth and processing systems, optoelectronic device manufacturing equipment.
- Thin film coating systems using physical and chemical vapor deposition.
- Characterization techniques such as X-ray diffraction, atomic force microscopy, electron microscopy, and optical spectroscopic devices and systems.
- Basic chemistry, physics, and electrical/electronic laboratory materials.
- Computer software and hardware specific to the field of work.

PHOTONICS ENGINEER (LIGHT SCIENTIST AND ENGINEER)

B- GENERAL CHARACTERISTICS REQUIRED FOR THE PROFESSION

Those who want to become a photonic engineer (light scientist and engineer) should:

- Have an interest and talent in basic sciences such as physics, chemistry, mathematics, and biology.
- Understand the physical and chemical relationships between substances, devices, and systems with light.
- Have mechanical interest and a deep interest in research.
- Be patient and forward-thinking.
- Be attentive and detail-oriented.
- Have excellent communication skills.
- Have a high ability to observe.
- Have the ability to focus.
- Be inclined to work in a team.
- Be able to identify problems and generate alternative solutions.
- Have analytical thinking skills.
- Stay up to date with technological advancements.

C- WORKING ENVIRONMENT AND CONDITIONS

The work environment may vary depending on the nature of the job and can include factory R&D units, R&D centers and laboratories, and offices, workshops, and laboratories in the fields of lighting, energy, defense, telecommunications, and health. Fieldwork may also be required, especially in research and development activities related to solar energy and other renewable energy sources. The working environment is generally indoors, primarily in R&D laboratories. In R&D laboratories, specific conditions such as humidity, dust, rapid temperature changes, dirt and oil, air quality, heat, and cold may need to be controlled due to the sensitivity of materials and small-sized components used in the work. Depending on the sector and organization they work for, the job may involve working in urban or rural areas, full-time, part-time, or shift work. Working hours may vary depending on project-based work and the individual's own work plan. Depending on the field of work, it may be necessary to use appropriate equipment to protect against the risk of illness or accidents. Failure to take precautions and work with suitable devices/equipment can result in electric shock or material damage. Long periods of working with digital devices and equipment such as computers, which require small-scale work, can lead to vision problems. Depending on the organization they work for, individuals may work independently or need to communicate with managers, colleagues, and target groups of the project.

PHOTONICS ENGINEER (LIGHT SCIENTIST AND ENGINEER)

D- JOB TRAINING

PLACES WHERE THE PROFESSIONAL TRAINING IS PROVIDED

The education for this profession is provided in the "Photonics" undergraduate programs of relevant faculties at universities.

ENTRY REQUIREMENTS FOR PROFESSIONAL TRAINING

To enter the profession's education;

- High school diploma or equivalent is required.
- The candidate must meet the entry requirements specified in the Higher Education Institutions Exam (YKS) guide.

DURATION AND CONTENT OF EDUCATION

The duration of the profession's education is 4 years. During the education, courses such as Physics, Chemistry, Introduction to Photonics, Computer Programming, Differential Equations, Mathematical Methods in Photonics, Fundamentals of Optics and Mathematics, Quantum Photonics, Electrodynamics, Molecular Photonics, Electronic Circuits, Solid-State Optics, Numerical Methods in Photonics, Introduction to Lasers, Biophotonics, Nanophotonics, Biophotonics, and Laboratory are provided. Students have the opportunity to gain research and production experience by participating in industry collaboration projects conducted in university application and research centers. They are required to complete an internship.

CERTIFICATE-DIPLOMA OBTAINED AT THE END OF EDUCATION

Those who complete the professional education receive a "Bachelor's Degree."

PHOTONICS ENGINEER (LIGHT SCIENTIST AND ENGINEER)

E- CAREER OPPORTUNITIES AND EMPLOYMENT PROSPECTS

Photonics engineers can work in public and private organizations and can also establish their own businesses based on their technological application knowledge and entrepreneurship training.

They can work in various areas such as factory R&D units, R&D centers, production units, laboratories, both indoor and outdoor. They have the chance to pursue a career in areas such as lighting, energy, defense, telecommunications, health, space technologies, renewable energy, development and production of photovoltaic cells-modules, display technologies, optoelectronic device production, crystal growth, thin film coating technologies, offices, workshops, laboratories, and production lines. They can also engage in academic work at universities. Photonics is a multidisciplinary field and is currently defined by the European Union as a key enabling technology and by the United Nations as an innovative technology field of the future.

F- DURING EDUCATION AND POST-EDUCATION EARNINGS

DURING EDUCATION

During their professional education, they can benefit from student loans and dormitory services provided by the General Directorate of Credit and Dormitories.

Those who meet the requirements can work in special and publicly supported R&D projects during their education.

Additionally, they can benefit from scholarships provided by various public and private institutions and organizations.

POST-EDUCATION

Those employed in the public sector receive a salary according to the applicable regulations.

In the private sector, the earnings of employees vary depending on factors such as the size of the workplace, individual's experience, knowledge, skills, working capacity, and the wage level of the sector.

G- CAREER PROGRESSION

PROGRESSION IN VOCATIONAL TRAINING

Progression in vocational training depends on the individual's skills and their level of specialization in a particular field. Examples of possible career advancements include becoming an academician, specialist, consultant, team leader, R&D manager, project manager/director, and holding various different titles while advancing in the profession. Additionally, graduates can apply for postgraduate programs after completing their undergraduate education.

By attending paid training programs and courses organized by various universities and private institutions, individuals can enhance their professional knowledge and skills.

PROGRESSION IN EMPLOYMENT

Based on their knowledge and experience in the workplace, individuals have the chance to advance to higher positions in both public and private sectors. They can become managers in the sector's R&D and innovation centers.

SIMILAR PROFESSIONS

- Physicist
- Chemist
- Electrical-electronics engineer
- Electrical engineer
- Physicist engineer
- Optics and Acoustics Engineer
- Nanotechnology Engineer
- Optical Engineer

PHOTONICS ENGINEER (LIGHT SCIENTIST AND ENGINEER)

H. ADDITIONAL INFORMATION

I- REFERENCES

- İzmir Institute of Technology, Faculty of Science, Department of Photonics
- Vocational training members/faculty
- Websites of relevant educational institutions
- Higher Education Programs and Quotas Guide (YKS)
- International Standard Classification of Occupations (ISCO 08)
- Organizations affiliated with the Vocational Advisory Board (MEDAK)

İ- FOR DETAILED INFORMATION

- Relevant educational institutions
- https://kariyerkapisi.cbiko.gov.tr/
- UNI-VERI https://www.cbiko.gov.tr/projeler/uni-veri
- Turkish Employment Agency website www.iskur.gov.tr
- My Profession My Life website https://meslegimhayatim.meb.gov.tr/
- Measurement, Selection and Placement Center of Turkey http://osym.gov.tr/
- Provincial Directorate/Service Centers of the Turkish Employment Agency with Vocational Information Centers

This document is created to provide information to young people in the process of choosing a profession based on the input from professionals, workplaces, educational institutions, and professional chambers.