MSc Energy Engineering and Environment Study Program

Market research

Introduction

The Faculty of Energy Engineering has designed a specific program, considering market demands from local, regional, and global development trends and labor market demands. The MSc Program Energy Engineering and Environment at the UBT College have a 3-year experience (2019 - 2022) related to the great opportunities of teaching and scientific research with the needs of the labor market and the need to provide an offer that responds to the demand, which arises from the needs of the economy. The initiative for re-accreditation of MSc Energy Engineering and Environment study program is fully in line with the mission of the Faculty of Energy Engineering, the mission of UBT, as well as the National Qualifications Framework and the Qualification of the European Higher Education Area.

Research Focus Group and Methods

In accordance with the UBT Statute, the faculty council has approved the decision that the proposed group of professors for the research for the Master Study Program to draft the self-evaluation report for the accreditation with the following details:

Key Personnel Responsible for the study program:

- Prof. Asst. Armend Ymeri
- Prof. Asst. Sami Gashi
- Prof. Asst. Marigona Krasniqi
- Prof. Asst. Nexhmi Krasniqi
- Prof. Asst. Kadri Kadriu
- Prof. Asst. Agron Bislimi

Research team of professors and key faculty staff

- Teaching Staff
- Industry representatives
- Faculty Quality Assurance Sub-committe and
- Other stakeholders

Below are presented some of the industrial partners that were consulted during the MSc Energy Engineering and Environment study program development for Energy engineering Faculty in UBT College.

Name	Profession	Contact
Luigj Imeri	KEK - Chief Operations Office	https://www.linkedin.com/in/luigj-imeri-15528ab9/
Arjeta Gashi	Manager of Administration at KOSTT	https://www.linkedin.com/in/arjeta-gashi-31346b23/
Valbona Kadriaj	KEDS – Quality, OSH & Training Director	https://www.linkedin.com/in/valbona-kadrijaj-55639617b/
Fisnik Osmani	TERMOKOS- Chief Executive Officer	fisnik.osmani@termokos.org
Edon Hajdini	Schneider - Driven Sales Engineer combining technical proficiency	https://www.linkedin.com/in/edon-hajdini-369807204/
Andrew Hemphill	Notus Energy Kosova LLC - Site Manager	https://de.linkedin.com/in/andrew-hemphill-00b649218
Xhevat Muqa	Muqa Solar Company - CEO	https://www.linkedin.com/in/xhevat-muqa-974b9a1b2/
Lutfi Gashi	Electra LLC - CEO	https://www.linkedin.com/in/lutfi-gashi-b9375965/
Enver Ahmeti	MONTING SHPK - CEO	https://www.linkedin.com/in/enver-ahmeti-617b9145/
Ymer Fejzullahu	ERO – President of Bord	https://www.linkedin.com/in/ymer-fejzullahu-833a32223
Agron Orana	Ex Lecturer in FIEK - Expert in the field of Energy, Eelctrical Machines, Driving and Traction.	https://www.linkedin.com/in/agron-orana-9347b1181/
Arjeta Pajziti Qerimi	AWESK- CEO	https://www.awesk.org/

The following methods are applied during market research

1. Qualitative format / and industry needs for such study orientations
2. Meetings (live/ phone calls etc)
3. At company site visits, UBT Premises
4. Working groups at UBT Premises/ all together as avaliable

Labor market research

After the end of the conflict war in 1999, the local production of electricity could not meet the demand for electricity in Kosovo, so Kosovo was forced to cover more than 15 % of the demand for energy from imports and other forms of energy exchange with neighboring countries, such as Albania. Today in Kosovo, over 90 % of the electricity production capacity is located in the two power plants that use lignite as fuel (Kosova A and Kosova B), while the rest is covered by hydropower plants and Renewable Energy Sources (RES).

The main actors in the energy sector in Kosovo are: Ministry of Economy, which includes the Directorate for Energy; Energy Regulatory Office (ERO); Kosovo Energy Corporation (KEK), Operator of Transmission and Energy Market in the Republic of Kosovo (KOSTT); Kosovo Distribution System Operator (KEDS); Electricity Supply Corporation (KESCO); Electricity producers from Hydropower plants such as Ujman and Kelkos as well as a group of small Hydropower plants, Energy producers from wind energy "Notus" in Selac and "Kitka" as well as some producers from photovoltaic systems, Small retail suppliers and cross-border traders to energy.

Energy has been identified as a key national priority for the Government of Kosovo. This was also presented in the last electricity plan approved by the Parliament of Kosovo. The development of the energy sector mainly focuses on the preparation for private investments in the development of new energy production capacities, including the revitalization of existing production blocks, the research of new hydropower plants with small production capacities, the development of new energy production capacities renewable (wind and solar), improving and expanding the energy transmission system as well as new capital investments in strengthening and increasing the capacity of the distribution network.

The New Energy Strategy of the Republic of Kosovo 2022-2031 also recognizes the potential for the development of renewable energy. The aim is to create a friendly environment for private investments in the energy sector, for the development of renewable resources, especially in the production of electricity and heat from biogas, biomass and solar energy, production from small hydropower plants and production of energy from the wind. (https://reskosovo.rks-gov.net/wp-content/uploads/2023/04/Strategjia-e-Energjise-e-Republikes-se-Kosoves-2022-2031_compressed.pdf)

Since 2021, the energy crisis that Europe is going through has worsened the situation with stable energy supply for the citizens of Kosovo. The lack of sufficient domestic energy production capacities, dependence on imports and the enormous increase in energy prices on the international market further complicates the situation, causing not only frequent power cuts, but also voltage drops and other problems of the network. Such a situation is estimated to hinder

the economic development of Kosovo, thus causing high costs for family economies and businesses.

According to statistics, the largest consumer of energy in Kosovo is the residential sector, which contributes about 40 % to its final consumption. Reducing consumption through increasing energy efficiency affects the reduction of energy demand, which continues to increase significantly in Kosovo during the winter and heating season, given that a significant number of households use electricity for heating.

Subsidizing energy efficiency through this call enables citizens to purchase equipment with a high level of efficiency, which directly affects: (I) reducing the demand for energy/electricity and (II) increasing consumer awareness of the need to save of energy.

The equipment which was subsidized by the government of Kosovo are: Heat pumps, high-efficiency inverters (air conditioner/efficient climate), biomass boilers (wood, pellets, and briquettes) and individual biomass stoves.

On 06.02.2024, The Ministry of Economy has launched a Public Call for the support of household consumers and micro, small, and medium-sized enterprises to invest in renewable energy systems – photovoltaic (PV) systems for generation of electricity for self-consumption, financed by the European Union (EU).

One of the main issues in this aspect is the high demand for educated professionals in the field of energy.

Potential students in Kosovo

All applicants within the enrolment quotas for full-time students who have completed bachelor studies with 180 ECTS are eligible to enrol in the program. Admission to the studies is done on the basis of a public call by submitting to UBT College the application to register by completing the standard practice established by the Faculty Council. Based on the results and the submitted documents, the Program Coordinators create a list that specifies which candidates have been eligible to enrol based on the results achieved in prior education.

In the event the demand surpasses available study-program-places, the following criteria shall apply:

- Grade Point Average of minimum 8 during undergraduate studies (100 %);

The following bridging exams must be passed by students who do not come from the main discipline related to the program:

1. Fundamentals of Electrical Engineering
2. Mathematics
3. Physics

Syllabuses of three bridging courses are in Annex under Bridging Exams for bachelor graduates not related to the discipline of master program. (07, 08, 09, Additional. Doc.)

The enrolment of non-energy engineering graduates shall be made from 01.06 until 20.06. The bridging courses shall be delivered from July until October. The students must pass the bridging exams if they want to continue with the regular semester that begins in October.

UBT, the Faculty of Energy Engineering intends to enroll students from the countries of the region as well, as can see from the table below for the number of students registered at the UBT level for the academic year 2022/2023.

Table below presents the total number of students registered from outside the territory of Kosovo at UBT at the bachelor's level in the academic year 2022/2023.

Kolegji	Shqipëria			Maqedonia			Mali i Zi			Preshevë, Bujanoc,Medvegjë			Të tjerë					
	Femra	Meshkuj	Gjithsej	Femra	Meshkuj	Gjithsej	Femra	Meshkuj	Gjithsej	Femra	Meshkuj	Gjithsej	Femra	Meshkuj	Gjithsej	Femra	Meshkuj	Gjithsej
Kolegji UBT	110	104	214	9	20	29	11	14	25	108	110	218	23	34	57	261	282	543

Targeted groups

The program is designed to attract:

- Citizens of the Republic of Kosovo and foreign citizens from the region and beyond, who have the right to apply for registration in the MSC Energy Engineering and Environment program under the same conditions;
- Students who have graduated from BSc Energy Engineering; other similar faculties in the field of construction such as architecture, geodesy, mechanics, informatics and other technical directions;

Labor market ratio

The Kosovo labor market demand for engineering trades has been particularly high in recent years. In essence the number of jobs created in this skills cluster is higher than the number of students register in higher education institutions.

UBT as a provider of higher education has already proven within 20 years of experience as one of the largest and most stable institutions in the region. On the other hand, the MSc Energy Engineering and Environment Program was accredited in the period 2019-2022, thus making

it an experienced department with stable growth both in academic staff and in the number of students. This increase was not made by chance but as a result of many indications over the years. First, we analyze the reports of two reliable institutions, Jobs Diagnostics Kosovo by Alexandru Cojocaru - World Bank Group (https://documents1.worldbank.org/curated/en/814361497466817941/pdf/Kosovo-Jobs-Diagnostic.pdf), and the Kosovo 2020 Report accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. https://ec.europa.eu/neighbourhood-enlargement/system/files/2020-10/kosovo_report_2020.pdf

Based on Jobs Diagnostics Kosovo, although the development of new products is essential, especially in export markets, there is a shortage of energy designers and engineers in Kosovo, which makes it difficult to meet the needs of the market. Also, if we look at the report from the EU, it is clearly stated that various business surveys have identified a skills shortage in the fields of IT and engineering. These reports are one of the many reasons that energy engineering department is growing based on demands in the market and also a clear indicator for the need of engineering workforce. An interesting fact in the report from the EU is the teacher/student ratio where is stated that the ratio remains unfavorable to students, 1:41 in public and 1:61 in private universities. Based on our numbers, this ratio usually never gets higher than 1:10 which helps us to focus on preparing future engineers in the most adequate form.

Now if we look at local statistics (Figure 1) prepared from the Ministry of Finance (Labour Force Survey Q1 2021) we can analyze two main employments statistics and conclude the trend and demand on the local market based on accurate and precise statistics. The table is based on employment by an activity which is showing the percentage of employment based on activities. (https://ask.rks-gov.net/media/6355/lfs-q1-2021.pdf).

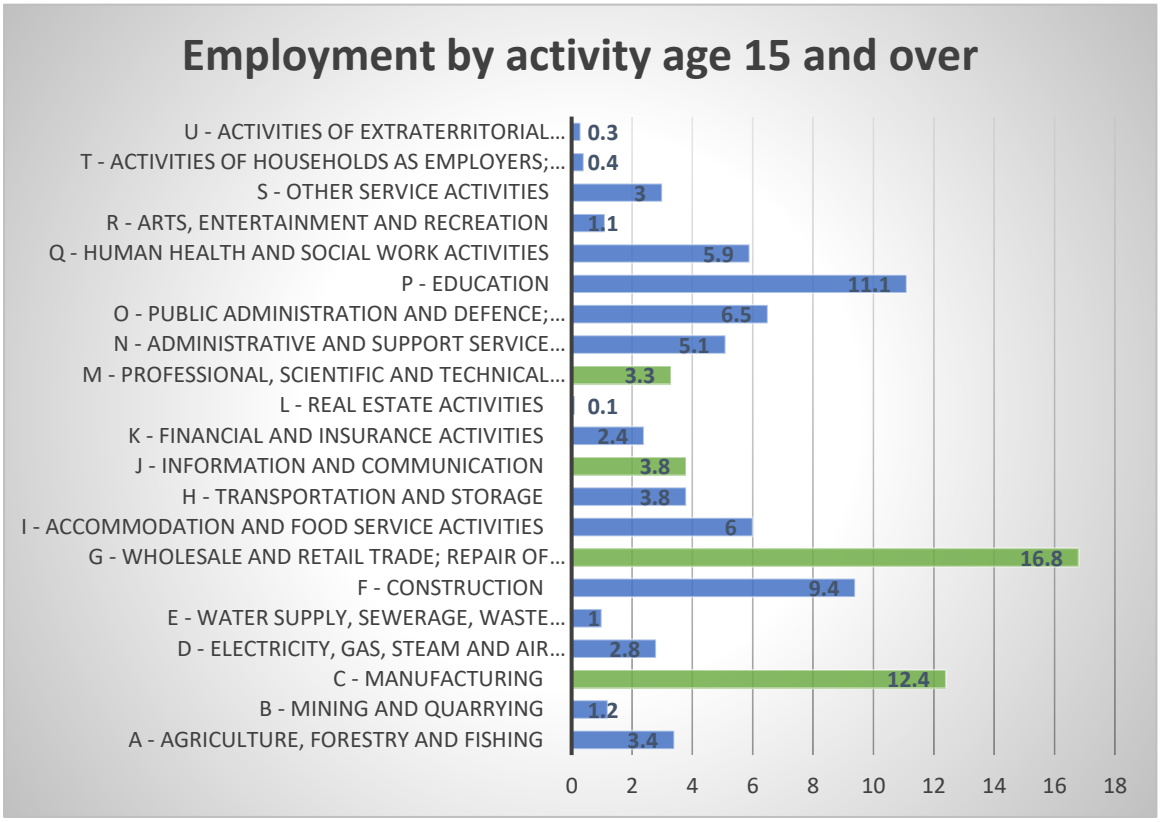

Fig.1.Labor Force Survey in Kosovo

As we can see one of the activities is Electricity, Gas, Steam and Air Conditioners, which is directly related to the field of Energy Engineering and the learning outcomes of the faculty. But what is worth mentioning is that Energy Engineering is a multidisciplinary field and as such contributes to not only one but many fields and activities in that case.

Energy Engineering and Environment students, in addition to engineering and environment fields, are also focused on professional, scientific and technical activities, where engineering skills and knowledge are needed. In addition to these two fields, we can see other categories related to Energy Engineering and Environment that contribute to the percentage of employees by employment-based activities.

So, analyzing table from Labor Force Survey, we can see that Kosovo labor market is in high demand of engineering-based skills and not only focusing on a particular field but demanding multidisciplinary skills which is exactly what we are preparing our students in UBT Energy Engineering faculty.

Exactly with the curriculum in MSc Energy Engineering and Environment program and updated courses, we aim to address these barriers by preparing skilled and well-educated students to be future workers of the industry.

More or less similar data is presented in “The Future of Jobs Report 2020” (Figure 4) by World Economic Forum but in this case with data from global economies. (https://www.weforum.org/reports/the-future-of-jobs-report-2020/in-full).

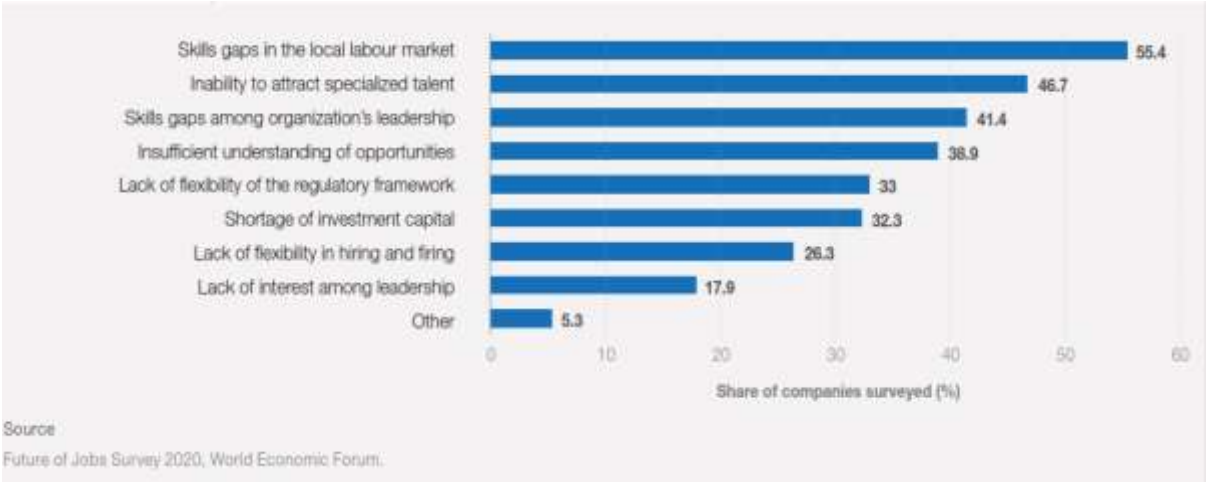

Fig.3. Report 2020 for the Future of Jobs

Figure 3 shows that the leading barrier to adopting new technologies is the skills gap in the local labor market which is very similar to the local reports and tables we showed before.

Finally, in Figure 4, we can see the estimation of near-future technology adaptations, or to be precise what technologies will be more adapted by 2025 in a global aspect.

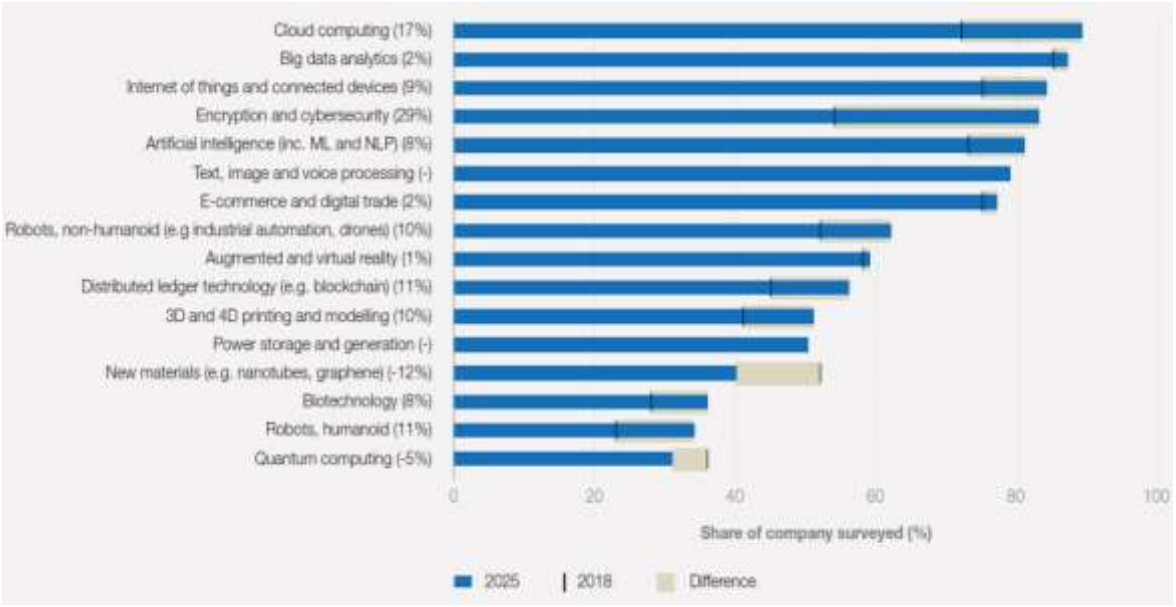

Fig.4. Near-future technology adaptations

If we analyze figure 4, we can see that technologies such as Artificial Intelligence, Internet of Things, and Energy Storage and Generation, will rise and show the need for a workforce to

adapt and implement in the near future. On the other hand, our new courses and updated curriculum aim to respond not only to today's demand in engineering, but also to the demand for future technologies that are growing day by day, such as Augmented and Virtual Reality, etc.

The World Bank's report, which is about providing support for Kosovo's new strategy with a focus on creating jobs and improving living conditions, recommends that in Kosovo should be more connections between academia and industry in order to increase the quality of public services, formalization of private businesses and sustainable environmental growth. According to Massimiliano Paolucci, World Bank Manager for Kosovo (2022), if Kosovo does not empower its own human capital, it will find it difficult to grow quickly and comprehensively. It will lack the workforce prepared for the jobs of the future and will not be ready to face the competition of the global economy. According to the World Bank report, the most sought-after professionals in Kosovo appear to be, managers, engineers, service employees and other similar professions.

Almost 2/3 of the population of Kosovo are aged (age 15-64) and it is considered that Kosovo is among the countries with the youngest population in Europe. Quality education will create cadres who are ready for further development of society, new innovations, quick adaptation in workplaces and this will positively influence the creation of workplaces.

Based on the information given above and the general mentality of the region, we see that the number of girls and women employed in the energy sector is very low. UBT and the MSc Energy Engineering and Environment Program will do their best to include girls and women in the study programs. Currently, UBT is constantly working through financial aid, scholarships, through public speaking of women professors to set an example and change the mentality that Energy Engineering is not a profession only for boys and men, but, this profession and study program is for all. Incentives can help to overcome barriers to market entry, for example through special programs that provide financial or technical support, or even temporary exemptions from standard administrative procedures, improving public awareness and education, such as the Women's Association in energy sector in Kosovo (AWESK).

Many Engineers graduated in the field of energy have found employment and employment opportunities beyond Kosovo, namely Germany and various European countries. If knowledge is created in educational institutions in close interaction with industry, professionals can be employed in enterprises of the energy sector with better income, which affects the increase of general social welfare. Therefore, the growth and development of local knowledge is the key to gain and maintain competitiveness based on the job creation indicator.

Demand for orientations based on BSc students in the field of energy and similar technical disciplines and industrial requirements

One of the reasons why UBT was chosen for university studies is the offer of scholarships, trainings and certifications and the various opportunities that UBT offers to students. In addition, consultations with existing businesses in Kosovo have provided ideas on where the future orientation of the study program should be, as well as provided an important contribution regarding the type of skills a student should have in order to succeed in energy and Environment field.

In Kosovo, there is no other higher public and private institution that offers Master studies in the field of Energy and Environment. However, this program is beneficial for all parties, because it will contribute to increasing the quality of higher education. In fact, this has also been recommended by the European Commission, which in their report on progress in Kosovo states that Kosovo should improve the quality of education at all levels, especially in higher education programs.

Based on feedback received from all stakeholders, such as alumni and industry stakeholders, the MSc Energy Engineering and Environment study program should have a curriculum that integrates subject-related and interdisciplinary content is essential for providing a comprehensive educational experience. . The curriculum should offer a variety of subjects and apply knowledge to real-world scenarios to provide a well-rounded and balanced education. The study program should cover conventional and renewable Energy sources in a modern environment, emphasizing a standardized curriculum that meets national and international requirements and market needs. The curriculum should offer core subjects within the Program, such as:

- Renewable Energy Sources (Solar Systems, Wind Power, Hydro Energy, Geothermal energy, etc)
- Sustainable Development
- Smart Grid and Micro Grid
- System Modelling
- Power electronics
- SCADA systems
- Testing and Commissioning of Equipment’s
- Energy Efficiency
- Energy auditing in Buildings
- Energy market
- Advanced Power Systems
- Environmental Engineering and Management
- Combined Heat and Power Systems (Cogeneration)
- Climate Change

- Carbon Management

In accordance with the results of market research, the MSc Energy Engineering and Environment program offers general knowledge in the field of Energy and Environment, where students gain experience and knowledge based on theoretical and practical program tools, as a result of feedback from meetings of various stakeholders. During this phase of the program, students are expected to be prepared in general academic and professional terms. During this program, students will engage in market research, start-up and development of new businesses, business processes, production and sales of products and services.

Orientation: Energy Engineering

Aim of the orientation

A Master's orientation in Energy Engineering typically focuses on providing students with a comprehensive understanding of key concepts, strategies, and skills related to Energy and Engineering in various industries. The orientation will have different perspectives, ranging from local contexts to regional and even global aspects. Also, the complete cycle of planning, implementation and critical appraisal of energy engineering strategies and approaches are extensively examined throughout this orientation. The orientation gives them a broad and broad insight into the traditional and contemporary aspects of energy production. Contribution of the fundamentals along with practical knowledge will be imparted to students to help them understand contemporary energy strategies.

Teachers in this orientation use different methods, where special importance will be given to the practical aspect. Where part of the assessment will be done by applying the group project, quizzes, and group discussions.

Orientation in Energy Engineering focuses on courses with specialization in the field of energy, such as: Energy Electronics; SCADA Systems and Protective Relays, Testing and commissioning of energy equipment, Integration of renewable energy systems (RES) into energy networks, Energy Market, Network Security, etc.

Orientation: Engineering and Environment

Aim of the orientation

A Master's orientation in Engineering and Environment typically focuses on providing students with a comprehensive understanding of key concepts, strategies, and skills related to Engineering and Environment in various industries. The orientation will have different perspectives, ranging from local contexts to regional and even global aspects. Also, the

complete cycle of planning, implementation and critical appraisal of engineering and environment impacts, strategies and approaches are extensively examined throughout this orientation. The orientation gives them a broad and broad insight into the traditional and contemporary aspects of energy production and their impacts on environment. Contribution of the fundamentals along with practical knowledge will be imparted to students to help them understand contemporary energy and environment strategies.

Teachers in this orientation use different methods, where special importance will be given to the practical aspect. Where part of the assessment will be done by applying the group project, quizzes, and group discussions.

Orientation in Engineering and Environment focuses on courses such as: Basics of Environmental Engineering; Energy and Environment, Advanced Thermodynamics and Heat Transfer; Combined heat and power systems (Cogeneration); Energy Audit in buildings, Carbon Management and Storage, etc.

Learning Outcomes for MSc Energy Engineering and Environment

Upon successful completion of this orientation, students will be able to:

- Understand and critically evaluate theories, principles, and concepts of Sustainable Power Generation;
- Integrate energy storage devices with renewable energy sources in both standalone and grid-tied applications, encompassing hybrid energy systems and the use of battery storage with renewable energy.
- Apply system modelling and complex system design competently, demonstrating effective management skills within the energy sector.
- Demonstrate the capacity to identify and resolve Heat Transfer problems using the principles of thermodynamics.
- Lead and manage professional teams within the energy sector, actively contributing to their knowledge development and performance assessment.
- Integrate knowledge from various fields of advanced power grid analysis.
- Take on the responsibility of contributing to the testing and commissioning of diverse electrical equipment, ensuring their optimal performance.
- Exhibit leadership and management capabilities in overseeing professional teams engaged in Transmission and distribution system functions.
- Design power electronic interfacing systems for the seamless integration of alternative energy sources into the power grid.
- Compose comprehensive reports assessing the environmental impact of energy projects, considering sustainability and ecological factors
- Synthesize knowledge from various Renewable Energy Sources to create new insights about their integration in smart grids.

- Recommend strategies for Carbon Management and Storage, aligning with contemporary environmental and energy industry demands.

Conclusion

The comprehensive market research and detailed design of the Master Energy Engineering and Environment Program at UBT demonstrate a strong alignment with the evolving needs of the energy and environment sector and labor market. By consulting with industry partners and aligning with national and international frameworks, the program is strategically positioned to prepare graduates for successful careers in the energy and environment field. The curriculum, designed around the latest techniques and technologies, ensures that students are well equipped to innovate and lead in their future roles. This orientation towards practical skills, combined with a strong theoretical foundation, addresses the high demand for energy sector and environment professionals, making the program an important contributor to the energy industry and impact to environment and regional economic development.