VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL

ANATOLIAN VOCATIONAL AND ANATOLIAN TECHNICAL PROGRAM

RENEWABLE ENERGY TECHNOLOGY FIELD

The Curriculum Framework

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INTRODUCTION

The rapid changes in science and technology, the changing needs of the individual and society, innovations and improvements in learning teaching theories and approaches have also directly affected the roles expected from individuals. This change describes an individual with qualifications like generating information; being able to use it functionally in life, problem solving, critical thinking, entrepreneurial, decisive, having communication skills, being able to empathize, contributing to the society and culture. Acquiring a profession is prioritized in the expectations of individuals and societies from education. Vocational education, within the integrity of the National Education System, comprises planning, researching, improving and organizing all vocational and technical education services together with agriculture, industry and service sectors and activities of coordinated administration, supervision and teaching. The objective of these educational activities carried out within the scope of a certain plan and schedule included in the applications of Vocational and Technical Education is to raise qualified intermediate member power which is needed at all stages of production and to raise competent individuals that will ensure continuity of the society. While curriculums that will serve to raise individuals having this texture of qualification are prepared, a structure that pays regard to individual differences, aims for the value and skill acquisition and turns out to be comprehensible has been adopted rather than a structure that merely conveys information. In line with this purpose, on the one hand, the repetitive acquisitions and explanations at different subject and grade levels with a spiral approach, and on the other hand, the learning outcomes aimed to be achieved in a holistic and one-time manner were included. Outcomes and explanations in both groups are competent, up-to-date, valid and capable of being interrelated with life during the education and training period of the relevant discipline. These outcomes and their demarcating explanations refer to a plain content with an aspect of providing integrity in the perspective of competencies, skills and values at the level of grades and education degrees. Thus, a total of curriculums providing meaningful and permanent learning, durable and interrelated with previous learning, integrated with other disciplines and daily life around values, skills and competencies has been constituted.

1. CURRICULUM DEVELOPMENT PROCESS IN VOCATIONAL AND TECHNICAL EDUCATION

Vocational and technical education field curriculums are designed to prepare the individuals for the business life and based on the labourmarket needs and the approach of job analysis. In this approach, the profession profile is defined by analyzing the professions and the tasks/duties and processes assigned for the member of the profession are determined. On the one hand, while the curriculum aims to provide the students with the necessary knowledge, skills, manners and attitudes for fulfilling the relevant tasks and processes via courses and their outcomes; educational activities are planned in a way to prepare individuals for business life in accordance with this framework.

The developed curriculum is a detailed plan comprising the preparation, implementation and evaluation of the educational activities.

This plan is prepared in such a manner that

- It will raise members of profession meeting the requirements of the sector, having the national and international knowledge, skills and competencies.
- It will provide internal and vertical transfer opportunities for individuals at all proficiency levels.
- It will present the individuals convenient options in line with their differences and characteristics.

To that end, a curriculum approach based on the analysis of task and profession has been adopted in vocational and technical education.

The curriculum development process is made up of the stages below:

Analysis **:** Labor market needs analysis / skill needs analysis / training needs analysis / occupation analysis / national occupational standards

Planning **:** Specification of the curriculum approach and establishing a framework according to the approach

Development **:** Preparation of curriculum documents

Implementation **:** Approval and implementation of the curriculums

Evaluation **:** Monitoring, evaluation and updating of applications

Within this process, a commission has been established with the participation of labor market representatives, field teachers, specialist academicians in the field and representatives of civil society organizations to carry out the analysis, design and development stages. In the commission studies, the data from the European Qualifications Framework (EQF),the Turkish Qualifications Framework (TQF), international developments, the emerging developments in business life and professions , 3rd and 4th level of national occupational standards and national competencies, feedbacks from educational institutions and practitioners, international classifications and standards, educational policies, protocols, Research and Development (RD) reports, data from the Turkish Statistical Institute (TSI) and other institutions / associations have been referenced.

The curriculum frameworks prepared at the end of this process are based on the competencies of more than one profession within the framework of interdisciplinary curriculum perception. The vocational competencies generating the focus of the curriculum are separated into two units. These are “basic vocational skills” and “advanced or specific vocational skills” related to the profession. In vocational and technical education curriculums, it’s aimed to provide the students with the basic vocational skills by means of workshops, labs and vocational courses, and advanced or specific vocational skills through on-site vocational training and elective vocational courses.

By means of on-site vocational training, outcomes comprising the knowledge and skills required by the branch, necessitating the implementation and practicing of mainly the tasks, projects, experiments and the services are included.

Elective vocational courses aim to ensure the students adapt to the changes in science, industry and technology easily. These courses have been designed in a structure compatible with the properties of the school (students’ interests and needs, educational environments, etc) and with the regional needs of the sector.

2. THE CURRICULUM PERSPECTIVE

The basic objective of our education system is to raise individuals having knowledge, skills and behaviours integrated with our values and competencies. While knowledge, skills and behaviors are tried to be achieved through the curriculums, our values and competencies function as a horizon and a connection that provide integrity among these knowledge, skills and behaviours.

Our values are our own heritage from the national and spiritual resources of our society, which have reached today and will be transferred to our future. Competencies are our operational integrities that enable this heritage to participate and contribute to life and humanity.

2.1. VALUES

Current developments of our era are one of the reasons for the diversification in professions, trade and economy; even the most important one. The diversification in the labor market instruments, frequent use of virtual platforms has weakened face to face communication. This rapid change has revealed how important the human factor is in the work done and in the quality of the goods produced.

Raising members of professions who have national, spiritual, ethical and all humanistic values, stimulating cooperation and reliance between tradesmen and craftsmen; nascence of values like kindness, love, respect have become a social requirement. Professional associations, -Ahi Brotherhood community being in the first place- have regulated the cultural and social life of Turkish society as well as the professional life.

Professionals doing their job within the framework of moral principles always stand out from other colleagues. The Ahi Brotherhood culture is the supreme example of professional ethics in our history. The spread of values such as love, respect, solidarity, philanthropy, cooperation, justice, honesty and reliability, which are the building blocks of this culture, will bring dynamism to the business and commercial world.

2.2. COMPETENCIES

With the transition of societies from the technology age to the information age, the expectations of the society from the future members have also changed in the axis of scientific, technological, social changes and developments that have occurred in recent years. These developments and advancements necessitate providing the students with the competencies and skills such as cognitive ones like critical and original thinking, researching, problem solving; social ones like cultural and social participation, entrepreneurship, communication, developing empathy; personal ones like self-control, self-confidence, stability, leadership along with basic knowledge and skills.

As the skill ranges of the students, the competencies that will be needed in their personal, social, academic and business lives at a national and international level are defined in the Turkish Qualifications Framework (TQF). TQF defines eight key qualifications and describes them as follows:

1. **Communication in the native language:** Means the interpretation and expression of notions, thoughts ,opinions and facts both verbally and in written (listening, speaking, reading and writing); having a linguistic interaction, convenient within all the social and cultural

contexts like education and training, workplace, home and entertainment, so as to be able to generate new ideas.

2. **Communication in foreign languages:** Mostly, shares the basic skill aspects of communication in native language and is based on the skills of interpretation, expression and comprehension of the feelings, thoughts, notions, facts and opinions both verbally and in written within a range of convenient social and cultural contexts like education, training, workplace, home and entertainment according to the requests and needs of the person. Communication in foreign languages also requires the skills of mediation and intercultural understanding. Competency level of the individual will vary between different languages with the aspects of listening, speaking, reading and writing depending on the individual's social and cultural background, environment, needs and interests.
3. **Mathematical competence and basic competencies in science/technology:** Mathematical competence is the improvement and implementation of mathematical thinking style to solve a range of problems encountered in daily life. The processes, activities and knowledge built on a steady arithmetical skill are emphasized. Mathematical competence includes the ability and willingness to use mathematical modes of thinking (logical and spatial thinking) and presenting (formulas, models, constructs, graphs and tables) to varying degrees. Competence in science refers to the ability and willingness to utilize methodology and the existence of the knowledge to explain the natural world in order to define questions and produce evidence-based results. Competence in technology is considered as the application of the methodology and knowledge within the context of meeting the perceived human wants and needs. Competence in science and technology involves understanding of the changes resulting from human activities and the responsibilities of each individual as a citizen.
4. **Digital competence:** Involves the safe and critical use of information communication technologies for business, daily life and communication. This competence is supported by means of basic skills such as access to information and the use of computers for the evaluation, storage, production, presentation and exchange of information, as well as engaging in common networks and communicating via the Internet.
5. **Learning to learn:** It is the ability to pursue and insist on learning so that the individual can organize his / her learning action individually or as a group in such a way to involve the effective time and information management. This competence involves the individual's awareness of learning needs and processes through recognizing the existing potentials and the ability of the individual to deal with challenges for a successful learning action. It means seeking for counselling support and making use of it as well as gaining new knowledge and skills, processing and adapting them to oneself. Learning to learn motivates learners to rely on previous learning and life experiences to use and apply the knowledge and skills in various contexts such as home, workplace, education and training environment.
6. **Social and citizenship competencies:** These competencies include the personal, interpersonal and interculturalcompetencies; involve all courses of action enabling individuals to participate in diversifying society and working life effectively and constructively; providing

them to be equipped with the qualifications to resolve conflicts when needed. Citizenship competence equips individuals to fully participate in civic life based on knowledge of social and political concepts and structures, and a commitment to democratic and active participation.

7. **Taking initiative and entrepreneurship:** States the ability of individuals to turn their thoughts into action. It also includes the ability to plan and manage projects to achieve goals besides innovative thinking and taking risks. This competence supports everyone not only at home and in the community, but also in business life so that they can be aware of the context and conditions of their work and seize job opportunities; it also provides a basis for the more specific knowledge and skills needed by people who engage in or contribute to social and commercial activities. It also includes awareness of ethical values and supporting good governance.
8. **Cultural awareness and expression:** It is an appreciation of the importance of expressing opinions, experiences and feelings more productively using a variety of mass media, including music, performing arts, literature and visual arts.

3. ASSESSMENT AND EVALUATION

Assessment is defined as the representation of the observations after surveying a quality, with numbers or other symbols; and evaluation is the process of concluding by comparing the assessment results with a standard. Assessment and evaluation practices defining the extent to which the knowledge, skills and attitudes specified in the curriculum outcomes are achieved have an important place in making the education effective and successful in the education-training process .Assessment and evaluation practices enable the specification and correction of deficient learning and the conducting of effective guidance in the process with feedback. It is essential for the assessment instruments to be used in education to have sufficiently high validity and reliability and objectively reveal whether the students have learned the intended behaviours to be taught to them and the levels of competency and determination they have reached in these behaviours. Traditional and performance-based evaluation approaches should evenly take part in the curriculums of vocational and technical education institutions. Traditional assessment, also called result-based assessment, is predominantly used to measure acquisitions based on cognitive skills. Assessment instruments in traditional approach consist of true/false, matching, gap filling, short-answer, open ended and multiple-choice question types. Type of the question to be used is determined depending on the cognitive-skill level of the curriculum outcomes. Performance-based assessment, on the other hand, includes practices and tasks that will enable students to transfer their knowledge and skills to real life, taking into account their individual differences. Evaluation doesn't depend on a certain time in this approach in which students are expected to create a product or perform a task including more than one skill; it is carried out throughout the process. Individuals are expected to transform the knowledge they obtained into skills by putting them into practice in vocational and technical education where psychomotor skills requiring mind-muscle coordination are predominant. On the purpose of assessing the process and the product that they present by integrating their knowledge and skills, students are asked to perform a

task oran operation by means of experiments, projects, practices, etc and the results obtained are evaluated in accordance with predetermined criteria. In order to make a performance based evaluation, it is required to evaluate and score the performances of the students for the assigned performance-tasks with the appropriate one of check-list, rating scale, rubric, etc; consisting of previously prepared criteria. Students can be ensured to take part in the training process with the improvement of their critical thinking skills by using self-assessment and peer- assessment forms along with these evaluation approaches. While preparing assessment instruments, manners and behaviours needed for the skill should also be taken into consideration; a holistic structure appropriate for observing the cognitive, affective and psychomotor features as a whole should be constituted.

As diversity in education is influenced by the dynamics such as the individual, course content, social surroundings, school potentials, etc, the role of the education practitioners is considerably important in providing the efficiency of assessment and evaluation applications. The curriculum doesn't set certain limitations for the practitioners in terms of assessment instruments and methods that can be used in the assessment process, it only guides . However, necessary technical and academic standards should be observed within the preferred assessment and evaluation instrument and method.

4. CERTIFICATION

The graduate student is given a diploma showing his / her field and branch, and a business licence, as well as a certificate of the relevant professions that can be accessed through elective vocational courses. Along with an additional Europass certificate/diploma including the information of the basic competencies gained through training period within the scope of Turkish Qualifications Framework; a document representing the name of the business in which the student had his/her traineeship or on-site vocational training, the name of the learning unit taken and accomplished; is arranged for the requestor graduates of vocational and technical secondary education programs.

5. RENEWABLE ENERGY TECHNOLOGIES FIELD

5.1. CURRICULUM OBJECTIVES

The Renewable Energy Technologies sector is in a continuous and rapid development as a result of the rapidly changing market and competitive conditions at global level.Renewable energy technologies; is the field that education and training is given to gain competencies about establishment,operating,maintenance, repair and troubleshooting of small and large-scale power plants that generate electricity from wind and solar energy. Energy sources that take their power from the Sun, are thought to be inexhaustible and do not harm the environment are renewable energy sources.Renewable energy is clean and green energy. Sun and wind are the leading renewable energy sources. With these technologies, electrical energy which is the most needed today is produced.In Turkey this sector is rapidly developing and a significant amount of skilled labor is needed in this area.

Due to these features, the renewable energy technologies sector attracts the attention of countries as a strategic sector. With globalization, competition in the renewable energy technologies

sector increases rapidly and industrialized countries implement special policies to protect this sector and to improve its competitiveness.

The following branches are included in the Curriculum Framework of Renewable Energy Technologies Field;

1. Renewable Energy Technologies Branch.

In this direction, a formal education program has been prepared in accordance with national and international standards in the field of Renewable Energy Technologies and the professions under the field.

It is aimed to provide the students who completes this program with the knowledge and skills not only about:

- Gaining skills that will provide professional development in terms of "professional ethics and Ahilik, occupational health and safety, technological developments and industrial transformation, environmental protection, entrepreneurial ideas, establishing and running a business, intellectual and industrial property rights in line with new age skills and design-oriented thinking approach",
- Performing basic applications of renewable energy systems under occupational health and safety measures,
- Composing technical and vocational drawing according to TS EN ISO Standards and technical drawing rules under occupational health and safety measures,
- Performing vocational electric-electronic applications according to the rules of installing electric-electronic circuit,
- İnstalling renewable energy-based santrals taking occupational health and safety measures,
- Making simulationassemblythe solid modeled parts on the computer in the assembly environment,
- İmplementing basic applications during the operation of renewable energy-based power plants under occupational health and safety measures,
- İmplementing power plant control applications under occupational health and safety measures.

5.2. DURATION

Total duration of the field program has been planned as 4 years.

5.3. REFERENCE DOCUMENTS AND BASES

While the program was being prepared, the below-listed reference documents and bases were taken into consideration along with the educational legislation and reflected in the components of the curriculum.

- ISCED-F classification
- Labor Law No. 4857
- Social Insurance and General Health Insurance Law No. 5510
- Occupational Health and Safety Law No 6331

- Occupational Health and Safety Risk Assessment Regulation
- Regulation on Emergency Situations in Workplaces
- Regulation on Health and Safety Measures to be Taken in Workplace Building and Premises
- Regulation on the Use of Personal Protective Equipment in Workplaces
- Health and Safety Signs Regulation
- Electricity Market Law No. 6446, dated 14/03/2013
- 5346 Law on Utilization of Renewable Energy Sources, dated 10/05/2005
- Electricity Market Licensing Regulation
- Regulation on Technical Evaluation of Wind Source Based Electricity Generation Applications
- Regulation on Technical Evaluation of Sun Source Based Electricity Generation Applications
- Electrical Internal Facilities Regulation
- Regulation on the Authority, Duties and Responsibilities of Scientists Related to Electricity
- Electrical High Current Facilities Regulation
- Electrical Facilities Project Regulation
- Grounding Regulation in Electrical Facilities
- Photovoltaic Power System Personnel 4th Level National Occupational Standard (Reference Code / 12UMS0226-4) published in the Official Gazette dated 05.09.2012 and numbered 28402
- Wind Power System Personnel 4th Level National Occupational Standard (Reference Code / 12UMS0227-4) published in the Official Gazette dated 05.09.2012 and numbered 28402

5.4. ANATOLIAN VOCATIONAL AND ANATOLIAN TECHNICAL PROGRAM WEEKLY COURSE TABLE

VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL
ANATOLIAN VOCATIONAL AND ANATOLIAN TECHNICAL PROGRAM
PATIENT AND ELDERLY SERVICES FIELD
(RENEWABLE ENERGY TECHNOLOGIES BRANCH)
WEEKLY COURSE TABLE

COURSE CATEGORIES	COURSES	9th Grade	10th Grade	11th Grade	12th Grade	
					AVP	ATP
COMMON COURSES	TURKISH LANGUAGE AND LITERATURE (*)	5	5	5	5	
	RELIGIOUS CULTURE AND MORAL KNOWLEDGE	2	2	2	2	
	HISTORY	2	2	2	-	
	TR. REVOLUTION HISTORY AND KEMALISM	-	-	-	2	
	GEOGRAPHY	2	2	-	-	
	MATHS	6	5	-	-	
	PHYSICS	2	2	-	-	
	CHEMISTRY	2	2	-	-	
	BIOLOGY	2	2	-	-	
	PHILOSOPHY	-	2	2	-	
	FOREIGN LANGUAGE	5	2	2	2	
	PHYSICAL EDUCATION AND SPORTS / VISUAL ARTS / MUSIC	2	2	2	-	
	HEALTH KNOWLEDGE AND TRAFFIC EDUCATION	-	-	1	-	
TOTAL		**30**	**28**	**16**	**11**	
VOCATIONAL COURSES	VOCATIONAL DEVELOPMENT	2	-	-		Academic Support Courses
	WORKSHOP (*)	9	9	9		
	VOCATIONAL ELECTRIC-ELECTRONIC	-	3	-		
	TECHNICAL AND VOCATIONAL DRAWING	-	2	-		
	MODELLING AND ASSEMBLY	-	-	2		
	OPERATING A POWER PLANT	-	-	6		
	ON-SITE VOCATIONAL TRAINING (*)	-	-	-	24	
ACADEMİC SUPPORT COURSES TOTAL HOURS		**-**	**-**	**-**	**-**	**31**
TOTAL VOCATIONAL COURSES TOTAL HOURS		**11**	**14**	**17**	**24**	**-**
TOTAL ELECTIVE VOCATIONAL COURSE HOURS (**)		**-**	**-**	**9**	**7**	**-**
TOTAL ELECTIVE COURSE HOURS (**)		**2**	**-**		**-**	
GUIDANCE AND DIRECTION		**-**	**1**	**1**	**1**	
TOTAL COURSE HOURS		**43**	**43**	**43**	**43**	

NOTE:

(*) According to the Ministry of National Education Regulation on Secondary Education Institutions, these are the courses that cannot be considered successful with the year-end success score.
(**) Explanations about the elective vocational courses and elective courses are included in the Implementation Principles of Framework Curriculum

5.5. IMPLEMENTATION PRINCIPLES OF THE CURRICULUM FRAMEWORK

1. The program has been designed as 4 years. Weekly course schedule includes common courses, vocational courses, elective courses, elective vocational courses and academic support courses.
2. The courses that comprise basic vocational skills of the field are involved in the 9th grade whereas the courses that comprise vocational skills of the branch are involved in the 10th and 11th grades. At 12th grade, academic support courses are implemented for Anatolian Technical Program whereas on-site vocational training and elective vocational courses are implemented in Anatolian Vocational Program.
3. Branch education is carried on by considering regional and sectoral needs, school equipment, and the teachers available at school, physical capacity of the school and interest and needs of the students.
4. The students selected with central exam score graduate from Anatolian Technical Program by completing academic support courses or depending upon their preferences they graduate from Anatolian Vocational Program on completing elective vocational courses and also on-site vocational training courses at 12th grade.
5. The students who are selected in Anatolian Vocational Program according to their field of secondary education can apply to Anatolian Technical Program in case of having the necessary qualifications in accordance with the relevant legislation.
6. Branch courses in 11th grade will be held at school in case there are no workplaces that are convenient education units for the practice in accordance with the relevant legislation.
7. The students at Anatolian Vocational Program will continue on-site vocational training along with the elective vocational courses in 12th grade.
8. The students at Anatolian Technical Program will select one of the course tables which encompass the academic support courses at 12th grade. The courses included in the tables are based on the rules/decisions published in the Journal of Announcements of Board of Education and the secondary education curriculums in practice.
9. Vocational courses are planned consecutively within the bounds of possibility or without destroying the integrity of the course hours indicated on the weekly course schedule.
10. Vocational courses indicated with (*) sign are compulsory courses to be achieved for the field and branch.These courses will not be regarded as successful with year-end grade point average in accordance with the Ministry of National Education, Regulation on Secondary Education Institutions.
11. The elective courses at 9th grade will be selected from the vocational courses table in compliance with the decisions published in Journal of Announcements of Board of Education.
12. The total of elective courses and elective vocational courses has been planned as 9 course hours at 11th grade. These courses will be selected from the elective courses table, the elective vocational courses table, field/branch vocational courses or other

field/branch vocational courses in the direction of the decisions published in Journal of Announcements of Board of Education.

13. Anatolian vocational program students will select 7 lesson hours from the table of elective vocational courses in the curriculum framework in the 12th grade.
14. It is possible to get more than one certificate on field and branch by attending elective vocational courses.
15. Learning unit durations that belong to the course in course information forms are determined by the group teachers' board without changing the duration of course hours indicated in the weekly course schedule of vocational courses.
16. Course information forms will be referred with curriculum framework taken as a basis while education and training about vocational courses are planned.
    a. So as to achieve the outcomes of vocational courses in the curriculum framework, subjects (content) in the course information forms, outcome explanations and application activities / practices will be referred.
    b. Application activities / practices in the course information forms are selected by the vocational field group teachers' board so as to practise the utmost implementation activities by taking the physical capacity and equipment of the school, number of students into consideration in accordance with the learning outcome. In addition, different application activities / practices can be performed.
17. The content of the on-site vocational course is prepared by the group teachers' board considering the learning outcome including all knowledge and skill necessary for each branch and requiring mainly the performing and practicing of work, project, experiment and services.
18. Internship is applied in order to ensure the students develop their vocational knowledge, skill, attitude and behaviour, comply with the production and service environment and working life by being acquainted with thefacilities and instruments that are not available at school. The content of the internship program is prepared by the group teachers' board so as to provide the implementation of practicing, work, project, experiment or service by grounding on the outcomes of relevant grade/grades.
19. Occupational health and safety measurements should be taken while applying the course and learning unit outcomes. The measurements that need to be taken in accordance with the occupational health and safety legislation stated in the reference documents are included by taking the features of the fields and branches in course information forms into account. Accordingly, occupational health and safety issues within the course information forms and the curriculum framework are negotiated at group teachers' board in order to raise individuals who make necessary skills and information related to occupational health and safety a habit.

5.6.COMPULSORY (*) VOCATIONAL COURSES TABLE

Branches	Grade	Anatolıan vocatıonal program	Anatolıan technıcal program
Renewable Energy Technologıes	**9**	Workshop	Workshop
	10	Workshop	Workshop
	11	Workshop	Workshop
	12	On-Sıte Vocatıonal Traınıng	-

6. COURSES

6.1. COMMON COURSES

Common courses are the courses that each student takes until they graduate from secondary education, which provide a minimum common general culture, aim to ensure awareness and power about being sensitive towards social problems, contribute to the economic, social and cultural development of the country, and prepare the students for higher education programs.

In the common courses in the weekly course schedule, the courses, course hours and programs determined by the Board of Education are applied.

6.2. VOCATIONAL COURSES

Vocational courses are the courses that orient the students to the higher education programs and / or the occupation and working areas that they aim and enable them to develop in this direction.

9TH GRADE VOCATIONAL COURSES AND OUTCOMES

WORKSHOP COURSE

Course Objectives : In this course, it is aimed to provide the students with knowledge and skills about performing basic applications of renewable energy systems under occupational health and safety measures.

Grade : 9

Weekly Course Hour : 9

Learning Unit	**Renewable Energy Resources**
Learning Outcomes	**1.** Students will be able to explain renewable energy resources. **2.** Students will be able to explain the types of renewable energy resources with their advantages and disadvantages to the environment.
Learning Unit	**Physical and Electrical Quantities**
Learning Outcomes	**1.** Students will be able to measure physical quantities (length, temperature, speed, cycle, pressure, humidity, light, sound). **2.** Students will be able to measure electrical quantities (resistance, inductance, capacity, current, voltage, frequency).
Learning Unit	**Basic Mechanical Procedures**

Learning Outcomes	**1.** Students will be able to measure length and diameter and control surface and angle using calliper, micrometer and miter. **2.** Students will be able to cut the workpiece according to the construction drawing using simple cutting and shaping tools. **3.** Students will be able to mark out drawings to the workpiece according to construction drawing. **4.** Students will be able to file workpieces in order to convert into the desired size. **5.** Students will be able to select the drill bit appropriate to the workpiece. **6.** Students will be able to make screw assembly of workpieces threading with tap and die according to the construction drawing.
Learning Unit	**Basic Electrical Wiring Installation and Connection**
Learning Outcomes	**1.** Students will be able to connect conductive coupling using appropriate hand tools to the work. **2.** Students will be able to lay, wire,bind electrical conduits,pull box,junction boxes and test operation of the system for lighting installation. **3.** Students will be able to lay, wire,bind electrical conduits,pull box,junction boxes and test operation of the system for plug socket wiring. **4.** Students will be able to install distribution boards and connect cables.
Learning Unit	**Brazing and Printed Circuit**
Learning Outcomes	**1.** Students will be able to braze appropriately using different brazing methods. **2.** Students will be able to mark out the printed circuit pattern in accordance with the printed circuit process steps.
Learning Unit	**Electrical Wiring Installation with Analog Circuit Components**
Learning Outcomes	**1.** Students will be able to calculate and measure the values of resistances. **2.** Students will be able to read capacitor values and check its durability. **3.** Students will be able to read and measure the inductance value according to the number and color codes on the coil. **4.** Students will be able to determine the ends of the diode and check its integrity. **5.** Students will be able to check the integrity of the transistor determining its ends and type. **6.** Students will be able to install electrical wiring with analog circuit components.
Learning Unit	**Rectifier, Filter and Regulated Circuits**
Learning Outcomes	**1.** Students will be able to install rectifier and filter circuits. **2.** Students will be able to install and analyse Regulated circuits. **3.** Students will be able to install voltage multiplexing circuits.
Learning Unit	**Preparing of Measurement Station Installation Site**
Learning Outcomes	**1.** Students will be able to make the conformity assessment of the site the station to be installed. **2.** Students will be able to install the anchorage iron opening the foundation pit to the determined place. **3.** Students will be able to pour concrete into the prepared mold. **4.** Students will be able to drive measurement post piles by grounding.
Learning Unit	**Measurement Station Installation**

Learning Outcomes	**1.** Students will be able to assemble guy wires before installation. **2.** Students will be able to construct the measurement station post. **3.** Students will be able to assemble measurement components on measurement posts. **4.** Students will be able to make the data logger sensor and ground cable connections.
Learning Unit	**Maintenance and Check of Measurement Post**
Learning Outcomes	**1.** Students will be able to carry out mechanical maintenance of measurement posts. **2.** Students will be able to carry out electrical- electronic maintenance of measurement posts. **3.** Students will be able to test the system.

10TH, 11THGRADE VOCATIONAL COURSES AND OUTCOMES

RENEWABLE ENERGY TECHNOLOGIES BRANCH

TECHNICAL AND VOCATIONAL DRAWING COURSE

Course Objectives : In this course, it is aimed to provide the students with knowledge and skills about composing technical and vocational drawing according to TS EN ISO Standards and technical drawing rules under occupational health and safety measures.

Grade : 10

Weekly Course Hour :2

Learning Unit	**Technical Drawing**
Learning Outcomes	**1.** Students will be able to explain technical drawing components according to technical drawing rules. **2.** Students will be able to make lettering and basic drawing applications according to technical drawing rules. **3.** Students will be able to make basic geometrical drawing applications according to technical drawing rules. **4.** Students will be able to draw the projection of the given shape in accordance with the technical drawing rules. **5.** Students will be able to draw the views of the perspectives in accordance with the technical drawing rules. **6.** Students will be able to dimension the given shapes according to the technical drawing rules.
Learning Unit	**Vocational Drawing**
Learning Outcomes	**1.** Students will be able to draw the symbols used in wind and solar installations in accordance with the technical drawing rules. **2.** Students will be able to draw electric power project circuits and wiring connections of solar energy. **3.** Students will be able to draw electric power project circuits and wiring connections of hybrid systems. **4.** Students will be able to draw the schematic connections of the inverter circuit.. **5.** Students will be able to draw the schematic connections of the battery charge circuit.

VOCATIONAL ELECTRIC-ELECTRONIC COURSE

Course Objectives **:** In this course, it is aimed to provide the students with knowledge and skills about performing vocational electric-electronic applications according to the rules of installing electric-electronic circuits.

Grade **: 10**

Weekly Course Hour **: 3**

Learning Unit	**Fundamentals of Electrical Energy**
Learning Outcomes	**1.** Students will be able to explain the structure of the atom and electrons. **2.** Students will be able to calculate electric charges and electric fields. **3.** Students will be able to explain the features and effects of electric current. **4.** Students will be able to explain the features of electrical voltage.. **5.** Students will be able to explain static electricity and electrification methods.
Learning Unit	**Fundamentals of Direct Current Produced in Solar Cells (Photovoltaic Cells)**
Learning Outcomes	**1.** Students will be able to explain the features and applications of direct current. **2.** Students will be able to explain direct current source types and connections. **3.** Students will be able to calculate direct current circuits with formulas. **4.** Students will be able to do experiments by calculating the Ohm's Law with formulas.. **5.** Students will be able to do experiments by calculating Kirchhoff's Law with formulas. **6.** Students will be able to calculate capacitor connections. **7.** Students will be able to calculate coil connections. **8.** Students will be able to explain the definition, structure, operation and connections of solar cells (photovoltaic cells).
Learning Unit	**Fundamentals of Alternating Current Generated in Wind Turbines**
Learning ~~Unit~~ Outcomes	**1.** Students will be able to explain the definition, properties, terms and generation of alternating current. **2.** Students will be able to calculate alternating current components with examples making vectoral notation. **3.** Students will be able to explain features, types of coil and current-voltage equation in alternating current. **4.** Students will be able to explain capacitor features, types and current-voltage equations in alternating current. **5.** Students will be able to calculate R-L-C circuits in alternating current. **6.** Students will be able to explain the characteristics and types of transformers. **7.** Students will be able to explain the definition of wind energy, its structure, operation, wind energy conversion.
Learning Unit	**Converter and Inverter Circuits**
Learning ~~Unit~~ Outcomes	**1.** Students will be able to explain a general description of the converter,its operation and applications. **2.** Students will be able to explain a general description of the inverter,its operation and applications.

	3. Students will be able to explain PWM (Pulse-width modulation) control techniques.

WORKSHOP COURSE

Course Objectives : In this course, it is aimed to provide the students with knowledge and skills about installing renewable energy-based santrals under occupational health and safety measures.

Grade : 10

Weekly Course Hour : 9

Learning Unit	**Preparing of Solar Power Plant Installation Site**
Learning Outcomes	**1.** Students will be able to measure ground resistance of solar power plants. **2.** Students will be able to installSite Ground System. **3.** Students will be able to lay underground cable system.Yer altı kablo sistemini yapar.
Learning Unit	**Solar Energy (Photovoltaic) Panel Systems Installation**
Learning Outcomes	**1.** Students will be able to determine the best place of radiation with the compass and goniometer **2.** Students will be able to fix the determined photovoltaic panels on the metal carrier (construction). **3.** Students will be able to connect all components of solar energy (photovoltaic) panels in series and parallel appropriate to the project.. **4.** Students will be able to ground the metal carrier (construction), solar energy (photovoltaic) panels and perform all other grounding operations.
Learning Unit	**Electric-Electronic Assembly of Solar Energy (Photovoltaic) Power Plant**
Learning Outcomes	**1.** Students will be able to perform inverter, circuit breaker, surge protector and distribution board grounding. **2.** Students will be able to make the busbar, circuit breaker and ground connection of the distribution board. **3.** Students will be able to assemble post insulators, connect busbars to the panels and make the grounding connection to the ground. **4.** Students will be able to wire the transition cables to the distribution boards and connect the distribution board and the LV (low voltage) distribution panel. **5.** Students will be able to connect data cables between the units and distribution board. **6.** Students will be able to wire the cables to the inverter with the appropriate socket by sticking a label to each cable coming from the solar energy (photovoltaic) panel group.
Learning Unit	**Control and Test Production of Grid and Data Connection**

Learning Outcomes	**1.** Students will be able to start up power cabinets controlling power control cards. **2.** Students will be able to start up an inverter. **3.** Students will be able to lay cables between units. **4.** Students will be able to control the generated power measuring voltage and current at breaker connections **5.** Students will be able to control bearings in the motion system, cables in connection points, wrist pins and anchor connection bolts. **6.** Students will be able to produce the inverter (inverter), disconnector and circuit breaker maneuvers, and control the monitoring of this process through SCADA..
Learning Unit	**Wind Turbine Installation**
Learning Outcomes	**1.** Students will be able to dig the foundation suitable for the turbine pole and embed the fixing plate into the foundation by concreting . **2.** Students will be able to wire the turbine tower with the signpost. **3.** Students will be able to connect the turbine tower to the post head by wiring the turbine cables. **4.** Students will be able to connect the turbine blades, the hub and the tail of the turbine. **5.** Students will be able to perform lightning protection and grounding of the wind turbine. **6.** Students will be able to carry out the erecting the post process in a careful and controlled manner by connecting the guy wires..
Learning Unit	**Power and Control Unit Installation**
Learning Outcomes	**1.** Students will be able to connect the inverter and battery appropriate to the project. **2.** Students will be able to assemble the control unit.
Learning Unit	**Supply Line Installation Between Receiver and Turbine**
Learning Outcomes	**1.** Students will be able to wire the cables appropriate to the project in the supply line channel between the turbine tower and the receiver. **2.** Students will be able to make the terminal assembly appropriate to the project.
Learning Unit	**Maintenance of Small Wind Turbines**
Learning Outcomes	**1.** Students will be able to separate the turbine from the mast lowering the turbine mast. **2.** Students will be able to replace the defective components of the wind turbine and the parts that need to be changed. **3.** Students will be able to check the electrical connections of the wind turbine manually, visually and with a measuring device and repair damaged connections.
Learning Unit	**Hybrid(Solar-Wind) System Installation**
Learning Outcomes	**1.** Students will be able to connect, placing the elements suitable for the project on the control panel. **2.** Students will be able to perform the process of connecting the supply cable to the control panel. **3.** Students will be able to assemble the inverter preparing the installation site. **4.** Students will be able to connect the control panel and inverter. **5.** Students will be able to place batteries according to the project and perform serial and parallel connection operations.

MODELLING AND ASSEMBLY COURSE

Course Objectives **:** In this course, it is aimed to provide the students with knowledge and skills about making simulation by combining the solid modeled partson the computer in the assembly environment under occupational health and safety .

Grade **: 11**

Weekly Course Hour **: 2**

Learning Unit	**Modeling Machine Parts**
Learning Outcomes	**1.** Students will be able to make two dimensional drawing applications. **2.** Students will be able to make three dimensional drawing applications. **3.** Students will be able to create construction drawings of machine parts.
Learning Unit	**Computer Assembly**
Learning Outcomes	**1.** Students will be able to create various mechanisms to assemble the solid modeled elements. **2.** Students will be able to perform motion and crash tests of various assembled mechanisms in a simulation environment.

OPERATING A POWER PLANT COURSE

Course Objectives **:** In this course, it is aimed to provide the students with knowledge and skills about implementing basic applications during the operation of renewable energy-based power plants under occupational health and safety measures.

Grade **: 11**

Weekly Course Hour **: 6**

Learning Unit	**Production Estimation**
Learning Outcomes	**1.** Students will be able to compare wind and solar meteorological data with data measured by themselves. **2.** Students will be able to estimate production based on the data obtained.
Learning Unit	**SCADA Monitoring**
Learning Outcomes	**1.** Students will be able to monitor the production report in the shift log. **2.** Students will be able to monitor a malfunction that has occurred in the power plant via SCADA. **3.** Students will be able to monitor energy production. **4.** Students will be able to monitor turbine bearing temperatures. **5.** Students will be able to monitor oil temperatures. **6.** Students will be able to record control room data.
Learning Unit	**Stock Monitoring**
Learning Outcomes	**1.** Students will be able to check the stocks in the warehouses monitoring the amount of material to be used in the service at regular intervals. **2.** Students will be able to check whether the amount of material in the warehouses is reached at the time to order level.

	3. Students will be able to replenish out-of- stock items with re-ordered items.
Learning Unit	**Communication with the Load Dispatch Center**
Learning Outcomes	**1.** Students will be able to prepare energy production reports in the production system. **2.** Students will be able to de-energize according to procedure order . **3.** Students will be able to re-energize according to procedure order.
Learning Unit	**Switchgear Operations**
Learning Outcomes	**1.** Students will be able to perform power plant breaker procedures. **2.** Students will be able to perform power plant separator procedures **3.** Students will be able to perform power plant ground separator procedures.
Learning Unit	**Maintenance of Switchyard and Energy Transmission Line**
Learning Outcomes	**1.** Students will be able to maintain substation equipment. **2.** Students will be able to maintain controller elements and protection systems. **3.** Students will be able to maintain the equipment of the post and the maintenance of the lines **4.** Students will be able to maintain panels and measurement systems.
Learning Unit	**Maintenance of Photovoltaic Panels**
Learning Outcomes	**1.** Students will be able to check the photovoltaic panel assembly bolts. **2.** Students will be able to clean the dirt on the surface of the photovoltaic panel. **3.** Students will be able to check the cable connections between photovoltaic panels.
Learning Unit	**Charging Unit Maintenance**
Learning Outcomes	**1.** Students will be able to measure the output current of the charge controller. **2.** Students will be able to test the batteries in the group. **3.** Students will be able to compare the measured value with the value at the input of the device. **4.** Students will be able to measure the battery voltage and the voltage on the charge controller.. **5.** Students will be able to test the current and voltage values of the batteries. **6.** Students will be able to connect the battery group to the inverter.
Learning Unit	**Maintenance of the Production Unit**
Learning Outcomes	**1.** Students will be able to control panel pass connections (sockets). **2.** Students will be able to test the surge arrester of the unit of the solar (photovoltaic) power plant.. **3.** Students will be able to check for slack of metal construction. connections. **4.** Students will be able to check the inverter cable connections. **5.** Students will be able to retrieve the information (data) in the inverter. **6.** Students will be able to compare the received information with the screen information on the inverter.
Learning Unit	**Wind Turbine Maintenance**
Learning Outcomes	**1.** Students will be able to maintain turbine hubs and blade. **2.** Students will be able to maintain the tower. **3.** Students will be able to maintain power units.

Learning Unit	**Maintenance of Boards**
Learning Outcomes	**1.** Students will be able to maintain the distribution (transfer) boards. **2.** Students will be able to maintain LV / MV boards. **3.** Students will be able to maintain grounding.
Learning Unit	**Solar (Photovoltaic) Energy Generation Field Faults**
Learning Outcomes	**1.** Students will be able to replace burnt, scorched solar panel cables. **2.** Students will be able to replace damaged solar panels. **3.** Students will be able to maintain protection and control elements.

WORKSHOP COURSE

Course Objectives **:** In this course, it is aimed to provide the students with knowledge and skills about implementing power plant control applications under occupational health and safety measures.

Grade **: 11**

Weekly Course Hour **: 9**

Learning Unit	**Numerical Procedures**
Learning Outcomes	**1.** Students will be able to explain the features of number systems and perform conversion operations.. **2.** Students will be able to make logic circuits with logic gates.
Learning Unit	**Programming Microcontroller**
Learning Outcomes	**1.** Students will be able to choose microcontroller hardware and peripherals. **2.** Students will be able to set up and adjust the microcontroller program editor. **3.** Students will be able to install software following programming the microcontroller.
Learning Unit	**Digital and Analog Applications**
Learning Outcomes	**1.** Students will be able to make applications with microcontrollers. **2.** Students will be able to perform digital input and output operations in microcontrollers.. **3.** Students will be able to explain the concept of ports in microcontrollers. **4.** Students will be able to perform serial communication, analog input and output operations on microcontrollers. **5.** Students will be able to convert ADC to DAC, DAC to ADC with microcontroller.
Learning Unit	**Microcontroller Project Applications**
Learning Outcomes	**1.** Students will be able to make motor control applications with microcontrollers. **2.** Students will be able to perform applications of measuring physical quantities (heat, light, temperature, pressure, humidity, force, weight, etc.) with microdenters. **3.** Students will be able to perform motion control of power plants with microcontrollers.
Learning Unit	**Basic Control and Power Circuits**
Learning Outcomes	**1.** Students will be able to explain control and power circuit components. **2.** Students will be able to make applications of control and power

	circuits.
Learning Unit	**PLC (Programmable Logic Controller)Selection**
Learning Outcomes	**1.** Students will be able to select a PLC according to the structure and working principle of the PLC. **2.** Students will be able to connect input and output and peripheral units according to the structure and working principle of the PLC. **3.** Students will be able to set up the PLC programming editor.
Learning Unit	**PLC Programming Applications**
Learning Outcomes	**1.** Students will be able to make programming using basic level PLC commands. **2.** Students will be able to make applications with touchscreen (HMI). **3.** Students will be able to perform induction motor control with PLC using a contactor inverter. **4.** Students will be able to perform servo motor control with PLC.
Learning Unit	**Electrical and Motion Systems of Power Plants**
Learning Outcomes	**1.** Students will be able to perform power plant electricity and switchyard monitoring procedures. **2.** Students will be able to perform the procedures of monitoring the movement system centered on the solar course and radiation. **3.** Students will be able to control the turbine blade and its direction.
Learning Unit	**SCADA**
Learning Outcomes	**1.** Students will be able to control the movement system centered on the solar course and radiation. **2.** Students will be able to control the angle of the turbine blades and the rotation of the engine room according to the wind direction from the monitoring system user interface. **3.** Students will be able to control temperature detection, pressure and humidity of the power plant from the user interface of the monitoring program. **4.** Students will be able to control the power transformer, breaker and disconnector from the monitoring system user interface.

6.3. ON-SITE VOCATIONAL TRAINING

Students carry out on-site vocational training in the enterprises which operate on the branch that students are educated in accordance with Regulation on Secondary Education Institutions of the Ministry of National Education. The course content of on-site vocational training is determined by the coordinator teachers, field teachers in the school and the authorities of the enterprise, taking into account the regional needs and the vocational area in which the enterprise operates. The students of the program types which do not involve on-site vocational training attend job trainings in accordance with the related legislation.

6.4. ACADEMIC SUPPORT COURSES

The courses within the scope of academic support in the 12th grade of Anatolian Technical Program are courses that allow students to progress in line with their target higher education programs.

6.5. ELECTIVE VOCATIONAL COURSES

Elective Vocational Courses are courses that enable students to develop themselves in various programs in accordance with their interests and desires, and to improve their personal abilities in the field they aim and tend to. Elective vocational courses make up an occupation or an important part of an occupation. For this reason, elective vocational courses should be chosen by paying attention to the prerequisite learnings and the connections between the courses in accordance with the principle of horizontal and vertical coherence of their acquisitions.

6.5.1. CERTIFICATE COURSES TABLE

Branch Name	Certificate Name	Courses	Course Hour
Renewable Energy Technologies	Solar Energy Systems	PhotovoltaicPower System	2
		Photovoltaic System Projects	5
	Wind Energy Systems	Advanced PLC Applications	3
		Wind Power Systems	4
	Digital Skills	Programming	3
		Digital Design	2
		Social Media	2

6.5.2. ELECTIVE VOCATIONAL COURSES TABLE

Course	Grade	Course Hour
Photovoltaıc Vehıcles and Energy Storage Systems	11-12	7
PhotovoltaicPower System	11-12	2
Photovoltaic System Projects	11-12	5
Advanced PLC Applications	11-12	3
Wind Power Systems	11-12	4
Programming	11-12	3
Digital Design	11-12	2
Social Media	11-12	2

PHOTOVOLTAIC VEHICLES AND ENERGY STORAGE SYSTEMS COURSE

Course Objectives **:** In this course, it is aimed to provide the students with knowledge and skills about assembly of essential components of photovoltaic vehicles, types and connections of electric motors used in photovoltaic vehicles;storage of electrical energy and installation of battery systems under occupational health and safety measures.

Grade **: 11-12**

Weekly Course Hour **: 7**

Learning Unit	**Assembly of Photovoltaic Vehicle Basic Components**
Learning Outcomes	**1.** Students will be able to assemble vehicle body and mechanical parts. **2.** Students will be able to assemble photovoltaic panels. **3.** Students will be able to assemble the maximum power point tracking device.
Learning Unit	**Electric Motor Connections in Photovoltaic Vehicle**
Learning Outcomes	**1.** Students will be able to explain direct current motors. **2.** Students will be able to explain the induction motor. **3.** Students will be able to explain permanent magnet brushless motors. **4.** Students will be able to explain switched reluctance motors. **5.** Students will be able to explain outer rotor permanent magnet vernier motors.
Learning Unit	**Installation of Electrical Energy Storage Systems**
Learning Outcomes	**1.** Students will be able to explain the types of batteries used in photovoltaic vehicles. **2.** Students will be able to install the battery charging system. **3.** Students will be able to install the battery management system.

PHOTOVOLTAIC POWER SYSTEM COURSE

Course Objectives **:** In this course, it is aimed to provide the students with knowledge and skills about advanced solar applications under occupational health and safety measures.

Grade **: 11-12**

Weekly Course Hour **: 2**

Learning Unit	**Photovoltaic Lighting Systems**
Learning Outcomes	**1.** Students will be able to calculate materials used in Photovoltaic Lighting Systems and select appropriate materials. **4.** Students will be able to set up the photovoltaic lighting system. **5.** Students will be able to connect to the electrical system.
Learning Unit	**Solar (Photovoltaic) Tracking System**
Learning Outcomes	**1.** Students will be able to explain the tracking systems in solar (photovoltaic) power plants. **6.** Students will be able to calculate the materials used in tracking systems in solar (photovoltaic) power plants and select them.. **7.** Students will be able to install the tracking system in solar (photovoltaic) power plants. **8.** Students will be able to make the electrical connection of the tracking system.

Learning Unit	Photovoltaic Water Supply Systems
Learning Outcomes	**1.** Students will be able to choose the water supply system pump motor. **9.** Students will be able to determine the photovoltaic panels and construction needed for the water supply system. **10.** Students will be able to install a water supply system. **11.** Students will be able to connect the drive system of the project. **12.** Students will be able to make the connections of the project.

PHOTOVOLTAIC SYSTEM PROJECTS COURSE

Course Objectives : In this course, it is aimed to provide the students with knowledge and skills about searching current photovoltaic system projects,mechanical, electrical-electronic, software designing, reporting, poster and presentation preparation required for project preparation in photovoltaic energy systems under occupational health and safety measures.

Grade : 11-12

Weekly Course Hour : 5

Learning Unit	Project Preparation
Learning Outcomes	**1.** Students will be able to make literature reviews while determining the project. **2.** Students will be able to make the analysis of the project.
Learning Unit	**Electronic and Mechanical Systems**
Learning Outcomes	**1.** Students will be able to design the clear scheme of the electronic circuit and PCB printing scheme in accordance with the project. **2.** Students will be able to design the appropriate mechanical system for their project.
Learning Unit	**Software Development and Tests**
Learning Outcomes	**1.** Students will be able to decide the program language to be used in the screen interface design. **2.** Students will be able to communicate with electronic circuits with software.
Learning Unit	**Report, Poster and Presentation**
Learning Outcomes	**1.** Students will be able to understand the importance of making posters in projects. **2.** Students will be able to make a presentation.

ADVANCED PLC APPLICATIONS COURSE

Course Objectives : In this course,it is aimed to provide the students with knowledge and skills about selecting PLC elements,performing DC, servo and stepper motor control,selecting PLC and input and output elements to connect,loading the PLC program of the system,programming the operator panel according to the system and commanding the system from the panel and controlling the units with PLunder occupational health and safety measures.

Grade : 11-12

Weekly Course Hour : 3

Learning Unit	**Operational Functions**
Learning Outcomes	**1.** Students will be able to perform data types, analog and comparison operations. **2.** Students will be able to perform logical operators, mathematical and conversion operations. **3.** Students will be able to perform shifting, rotating, moving, program control operations.
Learning Unit	**Functions, Function Blocks, Communication**
Learning Outcomes	**1.** Students will be able to explain the organization and function blocks. **2.** Students will be able to explain functions and data blocks. **3.** Students will be able to perform communication withPLC and TCP / IP protocol.
Learning Unit	**Motor Control Applications**
Learning Outcomes	**1.** Students will be able to control direct current motor and stepper motor. **2.** Students will be able to control the servo motor. **3.** Students will be able to make panel programming.

WIND POWER SYSTEM COURSE

Course Objectives : In this course, it is aimed to provide the students with knowledge and skills aboutlarge, powerful wind turbines under occupational health and safety measures.

Grade : 11-12

Weekly Course Hour : 4

Learning Unit	**Foundations of Giant, Powerful Wind Turbines**
Learning Outcomes	**1.** Students will be able to check whether the site is in conformity with wind turbine installation using wind measurement post data. **2.** Students will be able to calculate the foundation grounding of the wind turbine. **3.** Students will be able to check the balance and length of wind turbine anchors. **4.** Students will be able to embed wind turbine foundation ground rods / plates.
Learning Unit	**Wind Turbine Wiring**
Learning Outcomes	**1.** Students will be able to control LV / MV cable transmission trenches. **2.** Students will be able to perform troubleshooting procedures in cable transmission trenches.
Learning Unit	**Wind Turbine Power and Control Unit Assembly**
Learning Outcomes	**1.** Students will be able to assemble inverters and the battery on the platform. **2.** Students will be able to assemble the control unit. **3.** Students will be able to assemble the communication system between the power plants.
Learning Unit	**Assembly of Tower and Tower Elevator**
Learning Outcomes	**1.** Students will be able to make the tower assembly of the big powerful wind turbine. **2.** Students will be able to make connections from the inner tower.

	3. Students will be able to assemble the tower elevator. **4.** Students will be able to make the electrical-electronic assembly of the elevator. **5.** Students will be able to perform overload tests activating the elevator. **6.** Students will be able to repair the tower paint damage.
Learning Unit	**Assembly of Turbine Engine Room (Nacelle)**
Learning Outcomes	**1.** Students will be able to assemble the engine room to the tower. **2.** Students will be able to connect generators and gear systems. **3.** Students will be able to make machine room panel assembly, internal and external connections . **4.** Students will be able to assemble machine room sensors. **5.** Students will be able to assemble machine room direction motors. **6.** Students will be able to control the gearbox.
Learning Unit	**Hub and Blade Assembly**
Learning Outcomes	**1.** Students will be able to connect the hub to the engine room.. **2.** Students will be able to assemble hydraulic pipelines. **3.** Students will be able to connect blades to the hub. **4.** Students will be able to make the grounding connection of the blades. **5.** Students will be able to make lightning rod assembly and connections. **6.** Students will be able to make pitch system assembly.

PROGRAMMING COURSE

Course Objectives : In this course, it is aimed to provide the student with the knowledge and skills about basic algorithms, visual block programming, programming of devices that can form communication networks and game programming.

Grade : 11-12

Weekly Course Hours : 3

Learning Unit	**Block-Based Programming**
Learning Outcomes	**1.** Students will be able to describe the functions of a program presented in a block-based programming tool. **2.** Students will be able to plan basic algorithms using suitable techniques in block-based programming tools. **3.** Students will be able to debug a program presented in a block-based programming tool. **4.** Students will be able to develop and arrange a program presented in the block-based programming tool according to the given criteria. **5.** Students will be able to choose the most suitable decision structures to adapt an algorithm. **6.** Students will be able to create an original project that includes all programming structures.
Learning Unit	**Internet of Things**
Learning Outcomes	**1.** Students will be able to describe the functions of the circuit elements. **2.** Students will be able to make applications with block-based

	programming tools. **3.** Students will be able to write a program for the Internet of Things in programming language. **4.** Students will be able to use software language on microcontroller board hardware. **5.** Students will be able to design a system using Packet Tracer.
Learning Unit	**Game Programming**
Learning Outcomes	**1.** Students will be able to perform basic coding and user interaction processes. **2.** Students will be able to arrange character and environment. **3.** Students will be able to perform animation and simulation processes. **4.** Students will be able to publish the created game after the test.

DIGITAL DESIGN COURSE

Course Objectives : In this course, it is aimed to provide the student with the knowledge and skills about making drawings in accordance with the rules of technical drawing, printing the designs prepared by making three-dimensional designs on the computer, creating and managing a web site using ready-made web contents, and preparing animation under occupational health and safety precautions,

Grade : 11-12

Weekly Course Hours : 2

Learning Unit	**Digital Design**
Learning Outcomes	**1.** Students will be able to use design aids. **2.** Students will be able to add shape to the working plane. **3.** Students will be able to create new shapes by grouping shapes. **4.** Students will be able to create a new shape by subtracting another shape from one shape. **5.** Students will be able to create original shapes using import. **6.** Students will be able to export the design for other applications or for a 3d printer.
Learning Unit	**Ready Web Page**
Learning Outcomes	**1.** Students will be able to set up the content management software and its plug-in. **2.** Students will be able to make the settings related to the website in the administration panel. **3.** Students will be able to make content and category processes. **4.** Students will be able to make the menu and page process.
Learning Unit	**Preparing Animation**
Learning Outcomes	**1.** Students will be able to adapt the working screen to themselves. **2.** Students will be able to add standard shapes to the working plane. **3.** Students will be able to perform processes on objects with design tools. **4.** Students will be able to change the parametric properties of the inserted shape. **5.** Students will be able to develop added shapes using modification tools. **6.** Students will be able to add texture to designed objects using the Material Editor. **7.** Students will be able to add a camera to the project being worked

	on to be used in animation. **8.** Students will be able to develop animations using keyframes. **9.** Students will be able to get the work as a render. **10.** Students will be able to explain the rendering tools used as plug-ins.

SOCIAL MEDIA COURSE

Course Objectives : In this course, it is aimed to provide the student with the knowledge and skills about collecting news messages in the media, collecting news about an institution and conducting a public relations campaign, e-commerce applications, analysis of data and graphics.

Grade : 11-12

Weekly Course Hours : 2

Learning Unit	**E-Commerce**
Learning Outcomes	**1.** Students will be able to explain the basic concepts of e-commerce. **2.** Students will be able to explain the types of e-commerce. **3.** Students will be able to list the marketing stages in e-commerce. **4.** Students will be able to explain the technical infrastructure and security elements required for e-commerce. **5.** Students will be able to follow the legal regulations related to e-commerce.
Learning Unit	**Social media**
Learning Outcomes	**1.** Students will be able to share the fundamental rights and freedoms **2.** in accordance with ethical rules while using social media. **3.** Students will be able to use social media by taking the responsibilities of legal rules without spoofing. **4.** Students will be able to protect themselves against cyberbullying while using social media. **5.** Students will be able to explain the digital brand management and the necessity of digital transformation. **6.** Students will be able to explain the social media devices. **7.** Students will be able to create a content plan for social media platforms. **8.** Students will be able to analyze and report social media. **9.** Students will be able to plan crisis communication campaigns and implement in social media.
Learning Unit	**Data Analysis and Graphics**
Learning Outcomes	**1.** Students will be able to explain the concepts of data and information. **2.** Students will be able to explain the types of data and their surrounding data sources. **3.** Students will be able to collect data with data collection devices and create a data set. **4.** Students will be able to prepare data in the form of tables. **5.** Students will be able to recognize the graphic types and make the graphic selection suitable for the purpose. **6.** Students will be able to create data-driven graphs using data visualization devices.

6.6. ELECTIVE COURSES

Elective courses that enable students to develop themselves in various programs in accordance with their interests and desires, improve their personal abilities in the field they aim and tend to.

While selecting an elective course, other schedules which belong to the course, if there is any, follow an order and the courses which are required to be taken previously are considered.