



VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL  
ANATOLIAN VOCATIONAL AND ANATOLIAN TECHNICAL PROGRAM

# INDUSTRIAL AUTOMATION TECHNOLOGIES FIELD

The Curriculum Framework

Ankara, 2021

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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 labour market 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 intercultural competencies; 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 or an 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. INDUSTRIAL AUTOMATION TECHNOLOGIES FIELD**

#### **5.1. CURRICULUM OBJECTIVES**

The importance of automation systems in the industry, which has entered a rapid development process in recent years, has begun to be understood better day by day and the need for qualified workforce in this field has increased. Educational activities for this sector are increasing in developed countries. In our country, the share of industrial systems in exportation continues to increase rapidly.

While these types of training activities come to the fore in the world, importance is attached to training activities for this sector in our country. As a result of the above-mentioned determinations and analyses, the Industrial Automation Technologies field has a great role in meeting the need for qualified workforce trained in the field of automation technologies. Software and hardware education is very important in order to train a qualified labor force for the industry, which is one of the main objectives of vocational and technical education. Especially learning new generation technological features and programming languages which support multiple platforms, image processing, artificial intelligence algorithms, microcontrollers, PLC, power and control elements and robot arm applications will keep the employment areas quite wide.

For this reason, it seems important that existing programs in education for new professions should be included in the new curriculum with an interdisciplinary perspective in order to increase the readiness level of young people to business life and make sense of the transformation in the world as well as for competencies such as decision-making with big data, basic concepts and applications of artificial intelligence.

In the Industrial Automation Technologies Field Curriculum Framework, Industrial Automation Technologies Branch is included.



In this direction, a formal curriculum has been prepared in accordance with national and international standards in the field of Industrial Automation Technologies and professions under this field.

It is aimed to provide the students who complete this programme with the knowledge, skills and competencies about:

- Acquiring skills that will provide professional development in “professional ethics and Ahi Brotherhood, 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,
- Measuring and calculating the electrical magnitudes of basic electrical circuit elements, series and parallel circuits, selecting passive and semiconductor circuit elements by taking occupational health and safety measures,
- Measuring basic electrical-electronic circuit elements and electrical quantities, basic mechanical work and operations by taking occupational health and safety measures,
- Making a simulation by combining the computer solid modeled parts in the assembly environment by taking occupational health and safety measures,
- Explaining sensor and transducer concepts, measurable physical quantities and selecting sensors that detect these quantities by taking occupational health and safety measures,
- Making digital operations, basic control and power circuits, PLC connections, electropneumatic circuits and microcontroller applications by taking occupational health and safety measures,
- Performing assembly, disassembly, maintenance and repair in mechatronic systems by taking occupational health and safety measures,
- Making production and robot arm programming applications in CNC milling, CNC lathe by taking occupational health and safety measures,
- Basic programming, port control, SQLite database applications and mobile programming applications by using visual programming language by taking 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 Extensions
- Regulation on the Use of Personal Protective Equipment in Workplaces
- Mechatronics System Operator 4th Level National Occupational Standard published in the Official Gazette dated 06.12.2018 and numbered 30617
- 4th Level National Occupational Standard for Automation Systems Installer published in the Official Gazette dated 06.12.2018 and numbered 30617

#### 5.4. ANATOLIAN VOCATIONAL AND ANATOLIAN TECHNICAL PROGRAM WEEKLY COURSE SCHEDULE

##### VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL ANATOLIAN VOCATIONAL AND ANATOLIAN TECHNICAL PROGRAM INDUSTRIAL AUTOMATION TECHNOLOGIES FIELD (INDUSTRIAL AUTOMATION TECHNOLOGIES BRANCH) WEEKLY COURSE SCHEDULE

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	-	
<b>TOTAL</b>		<b>30</b>	<b>28</b>	<b>16</b>	<b>11</b>	
VOCATIONAL COURSES	VOCATIONAL DEVELOPMENT WORKSHOP	2	-	-	-	Academic support courses
	ELECTROTECHNICS	2	-	-		
	MODELING AND ASSEMBLY	-	2	-		
	SENSORS	-	2	-		
	MECHATRONIC SYSTEMS	-	-	3		
	AUTOMATIC PRODUCTION	-	-	4		
	WORKSHOP (*)	7	10	10		
	ON-SITE VOCATIONAL TRAINING (*)	-	-	-	24	
<b>TOTAL ACADEMIC SUPPORT COURSE HOURS</b>	-	-	-	-	<b>31</b>	
<b>TOTAL VOCATIONAL COURSE HOURS</b>	<b>11</b>	<b>14</b>	<b>17</b>	<b>24</b>	-	
<b>TOTAL ELECTIVE VOCATIONAL COURSE HOURS (**)</b>	-	-	<b>9</b>	<b>7</b>	-	
<b>TOTAL ELECTIVE COURSE HOURS (**)</b>	<b>2</b>	-		-		
<b>GUIDANCE AND ORIENTATION</b>	-	<b>1</b>	<b>1</b>	<b>1</b>		
<b>TOTAL COURSE HOURS</b>	<b>43</b>	<b>43</b>	<b>43</b>	<b>43</b>		

**NOTES:**

(\*) Courses which cannot be regarded as achieved with the year-end grade point average according to the Regulation on Secondary Education Institutions of the Ministry of National Education.

(\*\*) 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 9<sup>th</sup> grade whereas the courses that comprise vocational skills of the branch are involved in the 10<sup>th</sup> and 11<sup>th</sup> grades. At 12<sup>th</sup> 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, 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 12<sup>th</sup> 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 11<sup>th</sup> 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 12<sup>th</sup> grade.
- 8.** The students at Anatolian Technical Program will select one of the course tables which encompass the academic support courses at 12<sup>th</sup> 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 9<sup>th</sup> 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 have been planned as 9 course hours at 11<sup>th</sup> 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 12<sup>th</sup> 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 the facilities 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

Branch	Grade	Anatolian Vocational Program	Anatolian Technical Program
Industrial Automation Technologies	9	Workshop	Workshop
	10	Workshop	Workshop
	11	Workshop	Workshop
	12	On-Site Vocational Training	-

## 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.

### 9<sup>TH</sup> GRADE VOCATIONAL COURSES AND OUTCOMES

#### ELECTROTECHNICS COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about measuring and calculating basic electrical circuit elements, electrical quantities, series and parallel circuits, and selecting passive and semiconductor circuit elements under occupational health and safety measures.

**Grade** : 9

**Weekly Course Hours** : 2

Learning Unit	Direct Current Circuit
Learning Outcomes	<ol style="list-style-type: none"><li>1. Students will be able to explain electrical quantities, properties of multimeter and measurement methods.</li><li>2. Students will be able to explain the symbols of passive circuit elements and the properties of direct current.</li><li>3. Students will be able to explain the relationship between current, voltage and resistance with Ohm's Law.</li><li>4. Students will be able to explain the current-voltage relationships in electrical circuits with Kirchoff's Laws.</li></ol>

<b>Learning Unit</b>	<b>Alternating Current Circuit</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties of alternating current and the relationships between frequency, period and alternans.</li> <li>2. Students will be able to explain the properties of the oscilloscope and the AA signal measurement process.</li> <li>3. Students will be able to explain the relationship between current, voltage and electrical power.</li> <li>4. Students will be able to explain the structure of the coil and capacitor.</li> <li>5. Students will be able to explain the phase difference, active, reactive and apparent powers in alternating current.</li> </ol>
<b>Learning Unit</b>	<b>Semiconductor Elements</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties of diode, relay and transistor, semiconductor circuit elements and relay control processes.</li> <li>2. Students will be able to explain the structure of photo diode and photo transistor, operation of LDR and optocoupler.</li> <li>3. Students will be able to explain the properties of thermistor, operation methods and properties of the mosfet (metal oxide semiconductor field-effect transistor).</li> <li>4. Students will be able to explain the properties of thyristor, triac and diac.</li> </ol>

## WORKSHOP COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about measurement of basic electrical-electronic circuit elements and electrical quantities, basic mechanical work and operations under occupational health and safety measures.

**Grade** : 9

**Weekly Course Hours** : 7

<b>Learning Unit</b>	<b>Basic Machining</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to prepare production drawings.</li> <li>2. Students will be able to do the basic leveling operations according to the production drawings.</li> <li>3. Students will be able to do the basic turning operations according to the production drawing.</li> <li>4. Students will be able to do the basic milling operations according to the production drawing.</li> </ol>
<b>Learning Unit</b>	<b>Electronic Drawing Program</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to do filing in the electronic drawing program.</li> <li>2. Students will be able to draw electrical and electronic circuit diagrams with the electronic drawing program.</li> <li>3. Students will be able to measure electrical quantities on a circuit drawn in an electronic drawing program.</li> </ol>
<b>Learning Unit</b>	<b>Electric and Electronics Measuring</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to perform measurement procedures in electrical and electronic circuits.</li> <li>2. Students will be able to perform solidity checks of semiconductor circuit elements.</li> </ol>
<b>Learning Unit</b>	<b>Conductor Connections, Soldering and PCB</b>

<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the features of hand tools used in electrical and electronics.</li> <li>2. Students will be able to make basic conductor connections.</li> <li>3. Students will be able to perform the soldering procedures.</li> <li>4. Students will be able to produce printed circuits.</li> </ol>
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## 10<sup>TH</sup>, 11<sup>TH</sup> GRADE VOCATIONAL COURSES AND OUTCOMES

### INDUSTRIAL AUTOMATION TECHNOLOGIES BRANCH

#### MODELING AND ASSEMBLY COURSE

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

**Grade** : 10

**Weekly Course Hours** : 2

<b>Learning Unit</b>	<b>Modeling Machine Parts</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to perform two dimensional drawing applications.</li> <li>2. Students will be able to perform three dimensional modeling applications.</li> <li>3. Students will be able to create production drawings of machine parts.</li> </ol>
<b>Learning Unit</b>	<b>Assembly on the Computer</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to construct various mechanisms by assembling the solid modeled elements.</li> <li>2. Students will be able to conduct motion and impact tests of various assembled mechanisms in a simulation environment.</li> </ol>

#### SENSORS COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge about explaining the concepts of sensor and transducer, physical quantities that can be measured, and selecting sensors that detect these quantities under occupational health and safety measures.

**Grade** : 10

**Weekly Course Hours** : 2

<b>Learning Unit</b>	<b>Structural Properties of Sensors</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties of sensors and transducers, their usage areas and the points to be considered in their selection.</li> <li>2. Students will be able to explain the operation principles of sensors.</li> </ol>
<b>Learning Unit</b>	<b>Sensors According to Usage Areas</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties and usage areas of mechanical, thermal, electrical sensors and transducers.</li> <li>2. Students will be able to explain the properties and usage areas of magnetic, radiative and chemical sensors.</li> </ol>



## WORKSHOP COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about digital operations, basic control and power circuits, PLC connections, electropneumatic circuits and microcontroller applications under occupational health and safety measures.

**Grade** : 10

**Weekly Course Hours** : 10

<b>Learning Unit</b>	<b>Digital Operations</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties of number systems and make their conversion to each other.</li> <li>2. Students will be able to make circuit drawings of the basic logic gates.</li> </ol>
<b>Learning Unit</b>	<b>Basic Control and Power Circuits</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties of asynchronous motors.</li> <li>2. Students will be able to explain the control and power circuit elements.</li> <li>3. Students will be able to perform drawings and applications of the control and power circuits.</li> </ol>
<b>Learning Unit</b>	<b>PLC Applications</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to select the suitable PLC for the job by explaining the features of PLCs.</li> <li>2. Students will be able to do basic programming with PLC.</li> <li>3. Students will be able to control asynchronous motors with PLC by using a contactor and inverter.</li> <li>4. Students will be able to control servo motors with PLC.</li> </ol>
<b>Learning Unit</b>	<b>Electropneumatic Applications</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties and types of electropneumatic elements.</li> <li>2. Students will be able to draw the electropneumatic system circuit design in accordance with the rules of the vocational drawing and make a circuit design in the simulation program.</li> <li>3. Students will be able to set up and operate electropneumatic system circuits.</li> </ol>
<b>Learning Unit</b>	<b>Microcontroller Applications</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the features, types, structures, selection processes and programming software of microcontrollers.</li> <li>2. Students will be able to perform serial communication, digital input and digital output operations in microcontrollers.</li> <li>3. Students will be able to explain the concepts of ADC and PWM.</li> <li>4. Students will be able to do motor control applications with microcontrollers.</li> <li>5. Students will be able to practice measuring physical quantities (heat, light, temperature, pressure, humidity, force, weight, etc.) with microcontrollers.</li> </ol>

## MECHATRONIC SYSTEMS COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about assembly, disassembly, maintenance and repair in mechatronic systems under occupational health and safety measures.

**Grade** : 11

**Weekly Course Hours** : 3

<b>Learning Unit</b>	<b>Mechatronics System Disassembly</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to disassemble the control part of the mechatronic system.</li><li>2. Students will be able to disassemble the mechanical part of the mechatronic system.</li><li>3. Students will be able to explain the transportation methods of the mechatronics system.</li></ol>
<b>Learning Unit</b>	<b>Mechatronic System Assembly</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to assemble the mechanical part of the mechatronic system.</li><li>2. Students will be able to assemble the control elements of the mechatronic system to the panel.</li></ol>
<b>Learning Unit</b>	<b>Mechatronics Systems Implementation</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to conduct non-energized system tests of mechatronic systems.</li><li>2. Students will be able to conduct energized system tests of mechatronic systems.</li></ol>
<b>Learning Unit</b>	<b>Mechatronics Systems Maintenance and Repairs</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to conduct the maintenance of mechatronic systems.</li><li>2. Students will be able to conduct the repairs of mechatronic systems.</li></ol>

## AUTOMATIC PRODUCTION COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about making production and robot arm programming applications in CNC milling, CNC lathe under occupational health and safety measures.

**Grade** : 11

**Weekly Course Hours** : 4

<b>Learning Unit</b>	<b>Production with CNC Milling</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to adjust the workpiece and tool settings for CNC milling.</li><li>2. Students will be able to write a processing program for CNC milling with G and M codes.</li><li>3. Students will be able to determine the toolpaths in the CAM program for CNC milling.</li></ol>
<b>Learning Unit</b>	<b>Production with CNC Lathe</b>

<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to adjust the workpiece and tool settings for CNC lathe.</li> <li>2. Students will be able to write a processing program for CNC lathe with G and M codes.</li> <li>3. Students will be able to determine the toolpaths in the CAM program for CNC lathe.</li> </ol>
<b>Learning Unit</b>	<b>Programming the Robot System</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to create the robot arm position list.</li> <li>2. Students will be able to write the robot software and transfer it to the robot.</li> </ol>
<b>Learning Unit</b>	<b>Production with Robot</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to make input and output unit connections to communicate the robot with peripherals.</li> <li>2. Students will be able to write programs to communicate the robot with tools such as PLC and CNC and transfer them to the robot and PLC.</li> </ol>

## WORKSHOP COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about basic programming, port control, SQLite database and mobile programming applications by using visual programming language under occupational health and safety measures.

**Grade** : 11

**Weekly Course Hours** : 10

<b>Learning Unit</b>	<b>Visual Programming Environment</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to create interfaces using the editor and compiler environment.</li> <li>2. Students will be able to create interfaces using the properties and events of the components of the visual programming language.</li> </ol>
<b>Learning Unit</b>	<b>Basic Programming</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to do basic programming with variables, constants and basic data types.</li> <li>2. Students will be able to use arithmetic and logical operators, conditional expressions, and loop structures in basic programming.</li> </ol>
<b>Learning Unit</b>	<b>Port Control</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to make serial and USB port control applications.</li> <li>2. Students will be able to make ethernet port control applications.</li> <li>3. Students will be able to make Bluetooth port control applications.</li> <li>4. Students will be able to make applications of SQLite database.</li> </ol>
<b>Learning Unit</b>	<b>Mobile Programming</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to prepare the infrastructure of Android operating system programming.</li> <li>2. Students will be able to design a mobile interface.</li> </ol>

### 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	Certificate	Courses	Course Hours
All Field Branches	Digital Skills	Programming	3
		Digital Design	2
		Social Media	2

#### 6.5.2. ELECTIVE VOCATIONAL COURSES TABLE

Course	Grade	Course Hours
Control Systems	11-12	2
Electrohydraulic Applications	11-12	2
Industrial Visual Programming	11-12	7
Industrial Project	11-12	4
Advanced PLC Applications	11-12	3
Advanced Robot Arm Applications	11-12	3
Modeling Of Mechanisms	11-12	3
Vocational Foreign Language	11-12	2

Programming	11-12	3
Digital Design	11-12	2
Social Media	11-12	2

### CONTROL SYSTEMS COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about performing open loop control, performing closed loop control and performing PID control by understanding the basic concepts of PID (Proportional Integral Derivative) under occupational health and safety measures

**Grade** : 11-12

**Weekly Course Hours** : 2

<b>Learning Unit</b>	<b>Open Loop Control</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the operation principles and elements of open loop control systems and explain the types of automatic production control.</li> <li>2. Students will be able to read and explain the open loop block diagram, explaining the open loop methods.</li> </ol>
<b>Learning Unit</b>	<b>Closed Loop Control</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the concepts of closed loop control system.</li> <li>2. Students will be able to explain closed loop methods and block diagram.</li> </ol>
<b>Learning Unit</b>	<b>PID Control</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain PID control methods and properties of P, I, D coefficients.</li> <li>2. Students will be able to explain the output information, the concept of error, the properties of controlling and controlled elements in PID control systems.</li> </ol>

### ELECTROHYDRAULIC APPLICATIONS COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about the competencies of building basic hydraulic and electhydraulic circuits under occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 2

<b>Learning Unit</b>	<b>Building a Basic Hydraulic Circuit</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties and types of basic hydraulic elements.</li> <li>2. Students will be able to design the hydraulic system circuit in the simulation program on the computer.</li> <li>3. Students will be able to set up and operate hydraulic circuits.</li> </ol>
<b>Learning Unit</b>	<b>Building an Electro-Hydraulic Circuit</b>

<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the properties and types of electrohydraulic elements.</li> <li>2. Students will be able to design the electrohydraulic system circuit in the simulation program on the computer.</li> <li>3. Students will be able to set up and operate electrohydraulic circuits.</li> </ol>
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## INDUSTRIAL VISUAL PROGRAMMING COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about image processing, artificial intelligence applications, Internet of Things applications and direct access to PLCs under occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 7

<b>Learning Unit</b>	<b>Image Processing</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to perform image processing, plate recognition and barcode applications.</li> <li>2. Students will be able to practice facial recognition techniques.</li> </ol>
<b>Learning Unit</b>	<b>Artificial Intelligence</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to have the knowledge about artificial intelligence algorithms.</li> <li>2. Students will be able to explain different artificial intelligence applications suitable for purpose.</li> </ol>
<b>Learning Unit</b>	<b>Internet of Things</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to control the units in buildings such as schools, houses and institutions etc.</li> <li>2. Students will be able to send the collected data to the database on the internet via microcontrollers.</li> </ol>
<b>Learning Unit</b>	<b>Direct Access to PLCs</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to communicate with PLCs without any software in the visual programming language.</li> <li>2. Students will be able to make direct access codings to PLCs with visual programming language.</li> </ol>

## INDUSTRIAL PROJECT COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about project scanning, project determination, mechanical and electronic designs, software development stages, reporting, and preparing posters and presentations under occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 4

<b>Learning Unit</b>	<b>Project Preparation</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to search the literature while determining the project.</li> <li>2. Students will be able to make analysis of their project.</li> </ol>

<b>Learning Unit</b>	<b>Electronic and Mechanical Systems</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to design the open diagram and PCB printing scheme of the electronic circuit suitable for their project.</li> <li>2. Students will be able to design the mechanical system suitable for their project.</li> </ol>
<b>Learning Unit</b>	<b>Software Development and Tests</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to decide on the program language to be used in the display interface design.</li> <li>2. Students will be able to communicate the electronic circuit with the software.</li> </ol>
<b>Learning Unit</b>	<b>Report, Poster and Presentation</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the importance of making posters in projects.</li> <li>2. Students will be able to make presentations.</li> </ol>

### ADVANCED PLC APPLICATIONS COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the competencies of selecting PLC elements, controlling DA, AA servo and step-motor, connecting by selecting PLC and input-output elements, loading the PLC program of the system, programming the operator panel in accordance with the system and controlling the system from the panel, controlling motors and units with PLC under occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 3

<b>Learning Unit</b>	<b>Operational Functions</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to do data types, analog and comparison operations.</li> <li>2. Students will be able to do logical operators, mathematical and translation operations.</li> <li>3. Students will be able to do the scrolling, rotating, moving, program control operations.</li> </ol>
<b>Learning Unit</b>	<b>Functions, Function Blocks, Communication</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain organization blocks and function blocks.</li> <li>2. Students will be able to explain function and data blocks.</li> <li>3. Students will be able to communicate with PLC using TCP / IP protocol.</li> </ol>
<b>Learning Unit</b>	<b>Motor Control Applications</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to make control of direct current motor and step motor.</li> <li>2. Students will be able to make control of the AA servo motor.</li> <li>3. Students will be able to program the operator panel.</li> </ol>

## ADVANCED ROBOT ARM APPLICATIONS COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about welding and painting applications with industrial robots under occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 3

<b>Learning Unit</b>	<b>Welding Applications with Robot Arm</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to prepare the robot arm for welding.</li> <li>2. Students will be able to write the welding code with the robot.</li> </ol>
<b>Learning Unit</b>	<b>Painting Applications with Robot Arm</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to prepare the robot arm for painting.</li> <li>2. Students will be able to write the painting code with the robot.</li> </ol>

## MODELING OF MECHANISMS

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about producing in 3D printer by modeling mechanisms under occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 3

<b>Learning Unit</b>	<b>Crank- Connecting Rod Mechanism Modeling</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to make solid models of the elements that make up the crank-connecting rod mechanism.</li> <li>2. Students will be able to perform their assemblies by giving mates to the parts that make up the mechanism.</li> <li>3. Students will be able to produce the parts that make up the crank-connecting rod mechanism with a 3D printer.</li> </ol>
<b>Learning Unit</b>	<b>Scottish Mechanism Modeling</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to make solid models of the elements that make up the Scottish mechanism.</li> <li>2. Students will be able to perform their assemblies by giving mates to the parts that make up the mechanism.</li> <li>3. Students will be able to produce the parts that make up the Scottish mechanism on a 3D printer.</li> </ol>
<b>Learning Unit</b>	<b>Genova Mechanism Modeling</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to make solid models of the elements that make up the Genova mechanism.</li> <li>2. Students will be able to perform their assemblies by giving mates to the parts that make up the mechanism.</li> <li>3. Students will be able to produce the parts that make up the Genova mechanism on a 3D printer.</li> </ol>
<b>Learning Unit</b>	<b>Gear Wheel Mechanism Modeling</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to make solid models of the elements that make up the gear wheel mechanism.</li> <li>2. Students will be able to perform their assemblies by giving mates to the parts that make up the mechanism.</li> <li>3. Students will be able to produce the parts that make up the gear wheel mechanism with a 3D printer.</li> </ol>



## VOCATIONAL FOREIGN LANGUAGE COURSE

**Course Objectives** : In this course, it is aimed to provide the student with the knowledge and skills about reading and translating technical documents under occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 2

<b>Learning Unit</b>	<b>Industrial Automation Terminology in Foreign Language</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to explain technical units in a foreign language.</li><li>2. Students will be able to explain technical drawing terms in a foreign language.</li><li>3. Students will be able to explain simple hand tools and their operations in a foreign language.</li><li>4. Students will be able to explain the material terms in a foreign language.</li><li>5. Students will be able to explain the electrical and electronics terms in a foreign language.</li><li>6. Students will be able to explain terms related to electrical and electronic measuring instruments in a foreign language.</li></ol>
<b>Learning Unit</b>	<b>Automation Knowledge in Foreign Language</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to explain the terms related to mechanisms in a foreign language.</li><li>2. Students will be able to explain the terms related to the PLC in a foreign language.</li><li>3. Students will be able to explain the terms of servo motor in a foreign language.</li><li>4. Students will be able to explain the use of maintenance manuals in a foreign language.</li></ol>

## PROGRAMMING COURSE

**Course Objective** : In this course, it is aimed to provide the students with knowledge and skills about basic algorithm, visual block programming, programming of devices which can create a communication network and game programming.

**Grade** : 11-12

**Weekly Course Hours** : 3

<b>Learning Unit</b>	<b>Block-Based Programming</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Students will be able to explain the functions of a program presented in a block-based programming tool.</li><li>2. Students will be able to plan basic algorithms by using appropriate techniques in a block-based programming tool.</li><li>3. Students will be able to debug a program presented in a block-based programming tool.</li><li>4. Students will be able to develop and arrange a program presented in a block-based programming tool according to the given criteria.</li><li>5. Students will be able to choose the most appropriate decision structures to adapt an algorithm.</li><li>6. Students will be able to create an original project that includes all programming structures.</li></ol>

<b>Learning Unit</b>	<b>Internet of Things</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the functions of circuit elements.</li> <li>2. Students will be able to make applications with block-based programming tools.</li> <li>3. Students will be able to write a program for the Internet of Things with programming language.</li> <li>4. Students will be able to use the software language on the microcontroller board hardware.</li> <li>5. Students will be able to design a system by using a simulation device (Packet Tracer).</li> </ol>
<b>Learning Unit</b>	<b>Game Programming</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to carry out basic coding and user interaction processes.</li> <li>2. Students will be able to edit characters and environment.</li> <li>3. Students will be able to carry out animation and simulation processes.</li> <li>4. Students will be able to publish the created game after testing it.</li> </ol>

### DIGITAL DESIGN COURSE

**Course Objective** : In this course it is aimed to provide the students with the knowledge and the skills related to carrying out drawings in compliance with the drafting principles, printing out the designs which are prepared by making three dimensional designs on computer, designing and administrating a web site by using template web contents, and preparing animation under the occupational health and safety measures.

**Grade** : 11-12

**Weekly Course Hours** : 2

<b>Learning Unit</b>	<b>Digital Design</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to use design supporting tools.</li> <li>2. Students will be able to insert shapes to the working plane.</li> <li>3. Students will be able to create new shapes by grouping the shapes.</li> <li>4. Students will be able to create a new shape by extracting another shape from a shape.</li> <li>5. Students will be able to create original shapes by using importing.</li> <li>6. Students will be able to export a design for other applications or 3D printers.</li> </ol>
<b>Learning Unit</b>	<b>Ready-made Web Pages</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to install the content manager software and its add-ons.</li> <li>3. Students will be able to carry out the adjustments of web site on control panel.</li> <li>5. Students will be able to carry out content and category processes.</li> <li>6. Students will be able to carry out menu and page processes.</li> </ol>
<b>Learning Unit</b>	<b>Preparing Animation</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to adapt the working screen.</li> <li>2. Students will be able to insert standard shapes to the working plane.</li> <li>3. Students will be able to carry out processes on objects with designing tools.</li> <li>4. Students will be able to change the parametric features of the inserted</li> </ol>

	<p>shapes.</p> <ol style="list-style-type: none"> <li>5. Students will be able to develop the inserted shapes using modification tools.</li> <li>6. Students will be able to add texture to the designed objects by using the Material Editor.</li> <li>7. Students will be able to add a camera to the present project to be used in an animation.</li> <li>8. Students will be able to develop animations by using keyframes.</li> <li>9. Students will be able to render the project.</li> <li>10. Students will be able to explain the render tools.</li> </ol>
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## SOCIAL MEDIA COURSE

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

**Grade** : 11-12

**Weekly Course Hours** : 2

<b>Learning Unit</b>	<b>E-commerce</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the basic concepts of e-commerce.</li> <li>2. Students will be able to explain the types of e-commerce.</li> <li>3. Students will be able to list e-commerce marketing stages.</li> <li>4. Students will be able to explain the technical background and</li> <li>5. security factors required for e-commerce.</li> <li>6. Students will be able to follow legal regulations related to e commerce.</li> </ol>
<b>Learning Unit</b>	<b>Social Media</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to share contents which are in compliance with ethical principles and fundamental rights and freedom, while using social media.</li> <li>2. Students will be able to use social media by taking the responsibilities of legal rules without concealing identity.</li> <li>3. Students will be able to protect themselves against cyber violence while using social media.</li> <li>4. Students will be able to explain the digital brand management and the necessity of digital transformation.</li> <li>5. Students will be able to explain the social media devices.</li> <li>6. Students will be able to create a content plan for social media platforms.</li> <li>7. Students will be able to perform social media analysis and reporting.</li> <li>8. Students will be able to plan and apply crisis communication campaign on social media.</li> </ol>
<b>Learning Unit</b>	<b>Data Analysis and Graphics</b>
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Students will be able to explain the concepts of data and information.</li> <li>2. Students will be able to explain the types of data and data sources around.</li> <li>3. Students will be able to collect data with data collection tools and create a data set.</li> <li>4. Students will be able to prepare data in the form of tables.</li> <li>5. Students will be able to understand the graphic types and make graphic selection according to the purpose.</li> <li>6. Students will be able to create data based graphs using data visualization tools.</li> </ol>

## **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.

