

**NATIONAL QUALIFICATIONS FRAMEWORK
FOR HIGHER EDUCATION IN TURKEY
BASIC FIELD QUALIFICATIONS**

**LIFE SCIENCES, NATURAL SCIENCES,
MATHEMATICS AND STATISTICS**

BASIC FIELD CODE: 42, 44, 46

ANKARA 13 JANUARY 2011

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Basic Field	Name	LIFE SCIENCES, NATURAL SCIENCES, MATHEMATICS AND STATISTICS 42, 44, 46
	Code	
Resource for Basic Field codes (two-figured)		ISCED 97 (UNESCO)
Resource for Sub-field codes (three-figured)		FOET 99 (EUROSTAT-CEDEFOP)

CHAPTER 1: TEACHING FIELDS AND STUDY METHOD

1.1. ISCED 97 (FOET 99) Education Sub-fields

42	LIFE SCIENCES	421	Biology and biochemistry
		422	Environmental Science
44	NATURAL SCIENCES	441	Physics
		442	Chemistry
		443	Earth Science
46	MATHEMATICS AND STATISTICS	461	Mathematics
		462	Statistics

1.1.1. International Standard Classification of Education (ISCED)

NO	ISCED (UNESCO) BROAD FIELD CODE	ISCED (UNESCO) BASIL FIELD CODE	BASIC EDUCATIONAL SCIENCES
1	1	14	Teacher training and education science
2	2	21	Arts
3	2	22	Humanities
4	3	31	Social and Behavioral Sciences
5	3	32	Journalism and Information
6	3	34	Business and Administration
7	3	38	Law
8	4	42	Life Sciences
9	4	44	Natural Sciences
10	4	46	Mathematics and Statistics
11	4	48	Computer
12	5	52	Engineering
13	5	54	Manufacturing
14	5	58	Architecture and Building
15	6	62	Agriculture, forestry and fishery
16	6	64	Veterinary
17	7	72	Health
18	7	76	Social Services
19	8	81	Personal Services
20	8	84	Transport Services
21	8	85	Environmental protection
22	8	86	Security services

1.2. Basic Field Educational Programs in Turkey

1.2.1. Vocational School and Associate Degree Programs

Related ISCED Fields	Program Name
58,44	Geographical Information Sciences
58,44	Geotechnics
58,44	Cartography and cadastral survey
58,44	Vocational School of Land Registry and Cadastre
81,42	Hunting and Wildlife

1.2.2. Faculty and Vocational School Undergraduate Degrees

Related ISCED Fields	Program Name
42	Biology
42	Molecular Biology and Genetics
44	Astronomy and Space Sciences
44	Physics
44,84, 52	Deck
44	Chemistry
44,62	Soil Science and Plant Nutritioning
46,34	Actuary
46,34	Actuarial Sciences
46,34	Finance Mathematics
46	Statistics
46	Statistics and Computer Sciences
46	Mathematics
46,48	Mathematics and Computer Sciences
46,48	Mathematics - Computer
46	Applied Mathematics
46,48	Applied Mathematics and Computer
14,42	Biology Teaching
14,42	Natural Sciences Teaching
14,44	Physics Teaching
14,46	Primary Education Mathematics Teaching
14,46	Mathematics Teaching
52,42, 72	Biomedical Engineering
52,42,62	Bioengineering
52,42,62	Biosystem Engineering
52,44	Physics Engineering
52,42	Genetics and Bioengineering
52,58,44	Geomatics Engineering
52,58,44	Map Engineering
52,44, 84	Aviation Electrics and Electronics
52,44	Aviation and Space Engineering
52,44	Hydrogeology Engineering
52,44	Geodesy and Photogrammetry Engineering
52,44	Geophysics Engineering
52,44	Geology Engineering
52,44	Meteorology Engineering
52,44	Engineering and Natural Sciences Programs
52,62,42	Agricultural Biotechnology
52,44	Space Engineering

Related ISCED Fields	Program Name
54,42	Biochemistry

1.3. Work Group

	Title	Name, Surname	Institution
1	Prof. Dr.	İsmail Naci Cangül	Uludağ University
2	Prof. Dr.	Hatice Kandamar	Adnan Menderes University
3	Prof. Dr.	Muammer Canel	Ankara University
4	Prof. Dr.	Cüneyt Can	Middle East Technical University
5	Prof. Dr.	Hayri Duman	Gazi University
6	Prof. Dr.	Atabay Düzenli	Çukurova University
7	Prof. Dr.	Ahmet İnce	Yeditepe University
8	Prof. Dr.	Reşat Kasap	Gazi University

1.4. Working Method

The group basically stayed in touch by means of telephone and e-mail communication. The departments were decided under which basic sciences to be placed based on the Frascati guide. The proposal of holding a meeting in Bursa was not possible as a result of the group being unable to find a common date. The group met with the presence of all members in Gazi University on 9 June 2010 hosted by Prof. Dr. Hayri Duman, the Dean of the, Faculty of Arts and Sciences, Gazi University.

In this meeting, the conditions in which the basic fields show diversity were put forward in associate degree, undergraduate, master's and doctoral levels based on the Turkish Higher Education Qualifications Framework. Most diversity was noted at undergraduate level. Turkish Higher Education Qualifications Framework was regarded as sufficient in associate degrees.

1.5. Stakeholders' Views

First, the Chemists' Association offered support. The head of the association, Prof. Dr. Çetin GÜLER, was met in a Bursa visit of his and a conversation on the matter was held with him.

Then, the views that emerged in meetings with Uludağ University Faculty of Arts and Sciences Employers' Advisory Boards were examined.

Yeditepe University Faculty of Arts and Sciences and Ankara University Faculty of Science departments gathered and studied the program and field qualifications. They found that the field qualifications match the National Qualifications Framework. The stakeholder experience of all group members was discussed and the results have been reflected on this report.

A briefing on Qualifications Framework was held in the Deans' Council in Trabzon creating an environment for discussion.

The common view before the meeting in Gazi University was that no matter there would be differences for each basic field, it would be sufficient and appropriate to use general expressions without referring to the differences in Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field Qualifications Framework which is under the National Qualifications Framework and over the program qualifications. This was the idea of the group members from the start. However, diversities were noted in undergraduate, master's and doctoral levels and they were specified in the tables below.

CHAPTER 2: BASIC FIELD QUALIFICATIONS (Academic Weighted & Vocational Weighted)

2.1. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field Qualifications (Academic Weighted)

2.1.1. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field ASSOCIATE DEGREE Qualifications (Academic Weighted) ¹						
TURKISH HIGHER EDUCATION QUALIFICATIONS FRAMEWORK LEVEL	KNOWLEDGE -Theoretical -Factual	SKILLS -Cognitive -Practical	COMPETENCIES			
			Competency of Self-Study and Taking Responsibility	Competency of Learning	Communication and Social Competence	Field-Specific Competence
5 ASSOCIATE DEGREE EQF-LLL: 5. Level QF-EHEA: Short Cycle	1. Having basic theoretical and practical knowledge supported by course books, practice tools and other resources based on the qualifications acquired in secondary education.	1. Having the skills to use the acquired field knowledge in the same field in an upper level of education or in a field in the same level. 2. Commenting on and assessing data using the basic knowledge and skills acquired in the field; defining, analyzing and bring solutions to the problems based on evidence.	1. Running a basic level study independently in the field. 2. Taking responsibility as a group member to solve unpredicted complicated problems occurring in field practices. 3. Managing the activities for the improvement of the workers under one's responsibility within a project framework.	1. Critically evaluating the basic knowledge and skills acquired in the field, determining and achieving the learning requirements. 2. Redirecting education to an upper level in the field or a profession on the same level. 3. Acquiring the awareness of lifelong learning.	1. Expressing thoughts orally and in a written way on the basic field knowledge and skills. 2. Sharing the opinions and solutions to problems on subjects related to the field with experts and others. 3. Keeping track of the developments in the field and communicating with colleagues by speaking a foreign language at least on European Language Portfolio A2 level. 4. Using informatics and communication technologies together with computer software required by the field at least at European Computer Driving License basic level.	1. Having social, scientific, cultural and ethical values in gathering, commenting on and applying data in the field and announcing the results. 2. Having awareness on universality of social rights, social justice, quality, cultural values, protection of environment, occupational health and security.

¹ Turkish Higher Education Qualifications Framework Level 5th Level (associate degree) Higher Education Profile will be defined if available.

2.1.2. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field GRADUATE Qualifications (Academic Weighted)²

TURKISH HIGHER EDUCATION QUALIFICATIONS FRAMEWORK LEVEL	KNOWLEDGE -Theoretical -Factual	SKILLS -Cognitive -Practical	COMPETENCIES			
			Competency of Self-Study and Taking Responsibility	Competency of Learning	Communication and Social Competence	Field-Specific Competence
6 GRADUATE EQF-LLL: 6th Level QF-EHEA: 1st Level	<p>1. Having advanced theoretical and practical knowledge that emphasizes scientific approach supported by course books, practice tools and other resources.</p>	<p>1. Adapting and transferring the field knowledge to secondary education.</p> <p>2. Using advanced theoretical and practical knowledge in the field.</p> <p>3. Renewing the knowledge depending on the actual circumstances.</p> <p>4. Commenting on and assessing data using the advanced knowledge and skills acquired in the field; defining, analyzing and bring solutions to the problems parallel to the actual technologic developments based on evidence.</p> <p>5. Having the skills to conceptualize the events and facts in the field; examining them with scientific methods and technics.</p> <p>6. Designing and realizing experiments, gathering data, analyzing and commenting on the results.</p>	<p>1. Running an upper level study independently in the field.</p> <p>2. Taking responsibility individually and as a group member to solve unpredicted complicated problems occurring in field practices.</p> <p>3. Planning and managing the activities for the improvement of the workers under one's responsibility within a project framework.</p> <p>4. Taking part in decision making processes for problems in different discipline areas.</p> <p>5. Using time effectively in achieving results through analytic thinking skills.</p>	<p>1. Critically evaluating the advanced knowledge and skills acquired in the field.</p> <p>2. Determining learning needs and redirecting education.</p> <p>3. Developing positive attitude towards lifelong learning.</p> <p>4. Having the awareness for the necessity of lifelong learning and constantly developing professional knowledge and skills.</p>	<p>1. Informing the related persons and organizations in subjects regarding the field and expressing opinions and proposals for solutions to the problems orally and in a written way.</p> <p>2. Sharing the opinions and solutions to problems supported by quantitative and qualitative data on subjects related to the field with experts and others.</p> <p>3. Arranging and implementing projects and activities for the society with respect to social responsibility awareness.</p> <p>4. Keeping track of the developments in the field and communicating with colleagues by speaking a foreign language at least on European Language Portfolio B1 general level.</p> <p>5. Using informatics and communication technologies together with computer software required by the field at least at European Computer Driving License advanced level.</p> <p>6. Using the field knowledge on human health and environmental awareness for the benefit of the society.</p>	<p>1. Following social, scientific, cultural and ethical values in gathering, commenting on and applying data in the field and announcing the results.</p> <p>2. Having sufficient awareness on universality of social rights, social justice, complying with and participating in quality management and processes (instead of quality culture), protecting cultural values and environment, occupational health and security..</p>

² Turkish Higher Education Qualifications Framework Level 6th Level (graduate) Higher Education Profile will be defined if available.

2.1.3. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field MASTER'S Qualifications (Academic Weighted)³

TURKISH HIGHER EDUCATION QUALIFICATIONS FRAMEWORK LEVEL	KNOWLEDGE -Theoretical -Factual	SKILLS -Cognitive -Practical	COMPETENCIES			
			Competency of Self-Study and Taking Responsibility	Competency of Learning	Communication and Social Competence	Field-Specific Competence
<p>7 MASTER'S</p> <p>EQF-LLL: 7th Level</p> <p>QF-EHEA: 2nd Level</p>	<p>1. Improving, deepening, statistically analyzing and commenting on the knowledge in the same or a different field to expertise level based on undergraduate qualifications..</p> <p>2. Diagnosing interdisciplinary interaction related to the field.</p>	<p>1. Using theoretical and practical knowledge at expertise level in the field.</p> <p>2. Commenting on the knowledge by integrating with those acquired from different discipline areas and creating new ones.</p> <p>3. Solving the problems in the field using research methods.</p>	<p>1. Running a study demanding expertise independently in the field.</p> <p>2. Developing new strategic approaches and taking responsibility to solve unpredicted complicated problems occurring in field practices.</p> <p>3. Leadership for the solution of problems in the field.</p>	<p>1. Critically evaluating the expertise level knowledge and skills acquired in the field, and redirecting learning.</p>	<p>1. Informing the groups within or outside the field systematically orally and in a written way of the recent developments and own studies in the field supported by quantitative and qualitative data.</p> <p>2. Critical analyzing and developing of social relations and the norms directing those relations and taking action to change them if necessary.</p> <p>3. Communicating orally and in a written way by speaking a foreign language at least on European Language Portfolio B2 general level.</p> <p>4. Using informatics and communication technologies together with computer software required by the field at advanced level.</p>	<p>1. Monitoring, assessing and teaching social, scientific, cultural and ethical values in gathering, commenting on and applying data in the field and announcing the results.</p> <p>2. Developing strategies, policies and application plans in the field and assessing the results within the framework of quality processes.</p> <p>3. Using the knowledge, problem solving and/or application skills acquired in the field in interdisciplinary studies.</p> <p>4. Assessing the persons, events and facts important for the development of the field with regard to the effects on the applications in the field.</p>

³ Turkish Higher Education Qualifications Framework Level 7th Level (master's) Higher Education Profile will be defined if available.

2.1.4. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field DOCTORATE Qualifications (Academic Weighted)⁴

TURKISH HIGHER EDUCATION QUALIFICATIONS FRAMEWORK LEVEL	KNOWLEDGE -Theoretical -Factual	SKILLS -Cognitive -Practical	COMPETENCIES			
			Competency of Self-Study and Taking Responsibility	Competency of Learning	Communication and Social Competence	Field-Specific Competence
<p>8</p> <p>DOKTORA</p> <p>EQF-LLL: 8th Level</p> <p>QF-EHEA: 3rd Level</p>	<p>1. Improving and deepening actual and advanced field knowledge to expertise level by means of original thoughts and/or research and reaching original definitions that will provide renewal to the field.</p> <p>2. Comprehending the interdisciplinary interaction related to the field; reaching original results using expertise level knowledge in analyzing, synthesizing and evaluating new and complicated opinions.</p>	<p>1. Evaluating, using and transferring new field knowledge in a systematic approach.</p> <p>2. Developing a new idea, method, design and/or application that will provide renewal to the field or applying an existing idea, method, design and/or application to another field; researching, comprehending, designing, adapting and applying an original subject.</p> <p>3. Critically analyzing, synthesizing and evaluating new and complicated opinions.</p> <p>4. Acquiring top level skills to use research methods for the studies in the field.</p>	<p>1. Contributing to advancement by independently realizing an original study that will develop a new idea, method, design and/or application providing renewal to the field or that will apply an existing idea, method, design and/or application to another field.</p> <p>2. Expanding the borders of field knowledge by publishing at least one article in national/international peer-reviewed journals and/or producing or commenting on original work.</p> <p>3. Assuming leadership in circumstances that require the solution of original and interdisciplinary problems.</p>	<p>1. Developing new ideas and methods in the field using top level intellectual processes such as creative and critical thinking, problem solving and decision making.</p>	<p>1. Critical analyzing and developing of social relations and the norms directing those relations and leading actions to change them if necessary.</p> <p>2. Defending original ideas in the discussions on field-related subjects with experts and establishing an effective communication that reflects the competency in the field.</p> <p>3. Communicating and discussing at advanced level orally and in a written and visual way by speaking a foreign language at least on European Language Portfolio C1 general level..</p> <p>4. Using computer software required by the field effectively in research to solve problems by keeping track of the developments in informatics and communication technologies.</p> <p>5. Carrying out scientific research in national and international scientific research groups.</p>	<p>1. Contributing to the society's process of becoming and maintaining the state of being a society of information by presenting the scientific, technological, social or cultural advancements in the field..</p> <p>2. Establishing functional interaction using strategic decision making processes for the solution of field-related problems..</p> <p>3. Contributing to the solution of social, scientific, cultural and ethical problems in the field and supporting the development of these values.</p>

⁴ Turkish Higher Education Qualifications Framework Level 8th Level (doctorate) Higher Education Profile will be defined if available.

2.2. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field Qualifications (Vocational Weighted)

2.2.1. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field ASSOCIATE DEGREE Qualifications (Vocational Weighted) ⁵						
TURKISH HIGHER EDUCATION QUALIFICATIONS FRAMEWORK LEVEL	KNOWLEDGE -Theoretical -Factual	SKILLS -Cognitive -Practical	COMPETENCIES			
			Competency of Self-Study and Taking Responsibility	Competency of Learning	Communication and Social Competence	Field-Specific Competence
5 ASSOCIATE DEGREE						
EQF-LLL: 5 th Level						
QF-EHEA: Short Cycle						

⁵ Turkish Higher Education Qualifications Framework Level 5th Level (associate degree) Vocational Education Profile will be defined if available.

2.2.2. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field GRADUATE Qualifications (Vocational Weighted)⁶

TURKISH HIGHER EDUCATION QUALIFICA TIONS FRAMEWOR K LEVEL	KNOWLEDGE -Theoretical -Factual	SKILLS -Cognitive -Practical	COMPETENCIES			
			Competency of Self-Study and Taking Responsibility	Competency of Learning	Communication and Social Competence	Field-Specific Competence
6 LİSANS						
EQF-LLL: 6 th Level						
QF-EHEA: 1 st Level						

⁶ Turkish Higher Education Qualifications Framework Level 6th Level (graduate) Vocational Education Profile will be defined if available.

2.2.3. Life Sciences, Natural Sciences, Mathematics and Statistics Basic Field MASTER'S Qualifications (Vocational Weighted)⁷

TURKISH HIGHER EDUCATION QUALIFICATIONS FRAMEWORK LEVEL	KNOWLEDGE -Theoretical -Factual	SKILLS -Cognitive -Practical	COMPETENCIES			
			Competency of Self-Study and Taking Responsibility	Competency of Learning	Communication and Social Competence	Field-Specific Competence
7 MASTER'S						
EQF-LLL: 1 st Level						
QF-EHEA: 2 nd Level						

⁷ Turkish Higher Education Qualifications Framework Level 6th Level (master's) Vocational Education Profile will be defined if available.