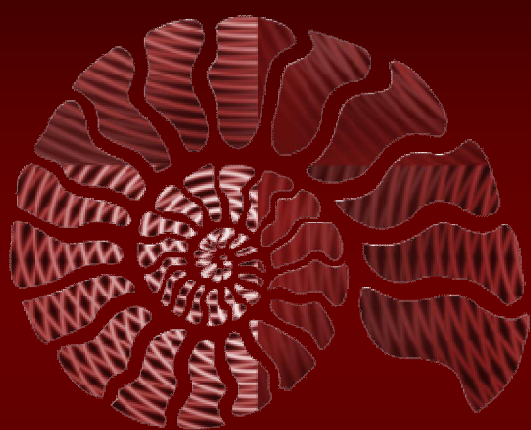


*GEOschools*

# GEOSCIENCES TEACHING in Greece



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2011



# Greek curriculum report

## Geosciences teaching in Greece

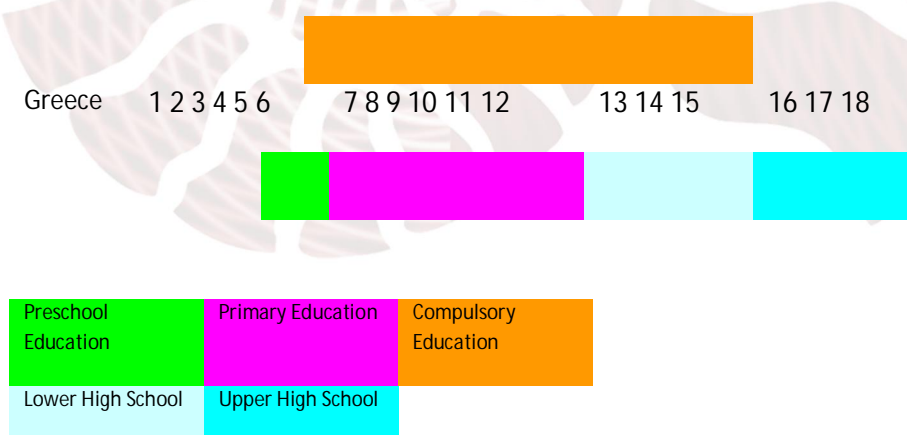
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### 1. Introduction

The Greek educational system display very similar parameters with other partners of the project in age intervals. A Pre-scholar interval starting at different age and lasting until 6 years. Children aged 4 years may attend public or private kindergartens. Kindergarten attendance is compulsory for all 5 year olds; it remains optional, however, for four year olds. Administratively, Kindergartens are considered part of primary education.

A Primary school interval lasting until 12 years and a Secondary school interval lasting until 18 years. Within it, a lower cycle encompassing 13 to 15 years old period, and an upper cycle, which ranges from 16 years old period until the access to University. Compulsory education period is covering the Primary and the lower cycle of Secondary Education (see table 1).

Table 1 - The organization of Preschool, Primary and Secondary Education in Greece



### 2. A brief presentation of geosciences teaching in Greek educational system

#### 2.1. From 1932 to 2000

Geology was taught in Greece for the first time, during the school year 1932-33, as a part of a subject called "Natural History". A second effort took place during 1941-42, Geology being again a part of the same subject. In 1961 Geology was re-included in all Secondary School programmes as a "clear Geology" subject, remaining more or less unchanged for eighteen years, with only some minor changes in its content. In the year 1979-80, the "Geology" programmes were enlarged, including more specific aims and goals.

In 1997 the subject Geology was suppressed from Upper High Schools teaching programmes, and so this was the most negative year for the geological education in Greece.

## 2.2. From 2001 to present

Educational systems evolve dynamically and must reflect the changes in the Society. During 2001-2003, the Greek Pedagogical Institute in order to reconstruct compulsory education (Primary and Lower High School) applied a long-term educational planning strategy, which has been expanded further so as to apply to kindergarten too.

The Greek educational system has been founded on the basis of ten-year-long compulsory education (5-6 years Kindergarten, 6-15 years in Primary and Lower Secondary School, (see table 1). For this reason, permanent structure and effective function of the system are not only matters of lower High School, but also constitute preconditions of upgrading upper High School, Secondary Technical and Vocational Institutions.

In this context, compulsory education is the determining factor for the development of students' personality, citizenship awareness and positive attitude towards life-long learning (GP: 1366/v.B'/18-10-2001, 1375 /v.B'/18-10-2001).

In the present curriculum, traditional school subjects are maintained but their content is organized around disciplinary and cross-disciplinary concepts in two axes: a vertical (integral) and a horizontal (cross-thematic) axe. The final aim of this distribution is to achieve school knowledge cohesion at the most. A special emphasis is also put on processes able to transform academic knowledge into school knowledge as well as on the values and attitudes associated with academic learning and thinking.

## 3. Aspects of the present Curriculum

The national curricula for primary and secondary education are developed by the Pedagogical Institute and approved by the Ministry of Education.

Teachers are required to follow the national curriculum and to use the approved textbook for each subject; taking into account, however, the particular needs and features of their classes as far as teaching methods are concerned. At the beginning of each school year, the Pedagogical Institute issues directions for teachers on teaching approaches and aims according to subject area. The school textbooks, written according to the criteria set in Cross-Thematic Curricular Framework, are evaluated by the Pedagogical Institute and recommended to the Ministry of Education for final approval.

Through the new approach to the operation of primary and secondary education, the ministry of Education encourages Pupils among the others to acquire respective knowledge and skills in sciences.

### 3.1. Geosciences in Primary School

In the present Greek national curriculum, in the Primary school, geosciences are taught sporadically through the subjects: "Study the environment" and "Geography".

Specifically, in the first 4 Grades of Primary School is included a subject called "Study the Environment" in which the contents is mainly taken from biology, geography and geology. In 5<sup>th</sup> and 6<sup>th</sup> Grades is included the subject "Sciences" where the content is mainly taken from chemistry and physics and "Geography" in which exists some geological aspects.

### 3.2. Geosciences in Lower High school - Gymnasium

In Lower High School, Geology is proposed to be a part of a lesson under the title "Geology-Geography", which is taught 2 hours per week in 1<sup>st</sup> and 2<sup>nd</sup> Grade (see table 2).

Table 2 - Distribution of teaching hours of Natural sciences in Lower High School. Numbers referred correspond to weekly teaching hours on an annual basis.

Lower High School (Gymnasium) /(12 to 15 years old)																
Grade	Biology				Geology & Geography				Physics			Chemistry				
A	2				2				-			-				
B	-				2				2			1				
C	2				-				2			1				
Total	4				4				4			2				
Upper High School (Lyceum) /(16 to 18 years old)																
Grade	Biology				Geology	Physics				Chemistry					OTHER RELATIVE OPTIONAL COURSES	
	G	S	T1	O		G	S	T1	T2	G	S	T1	T2	O	NRM	IES
A	-				-	2/3				2						
B	1			2	-	2	2	2		1	2	-		2	2	2
C	1	2			-	1	3	2*	3	-	2	3**				
Total	2	2		2	0	5/6	5	4	3	3	4	3		2	2	2
TOTAL	6				0	17/18				12					2	2
In total, there are 36 hours for natural sciences: Biology 6, Geology 0, Physics 18, Chemistry 12.																
<u>Legend</u>										<p>* In addition there is the course "Electrology", 2 hours per week.</p> <p>** Chemistry (1 hour per week) as well as Biochemistry 2 hours per week (= 3 hours per week)</p> <p>NRM= NATURAL RESOURCES MANAGEMENT (NRM)</p> <p>IES= ISSUES OF ENVIRONMENTAL STUDIES</p>						
G: General Education courses																
S: Division sciences																
T1: Technological division																
T2: Technological division (field of Computer sciences and services)/ only in the 3 <sup>rd</sup> Grade of Upper High school. O: Optional courses																

### 3.2.1. Integral curriculum

In this curriculum, emphasis is put on processes able to transform academic knowledge into school knowledge as well as on the values and attitudes associated to academic learning and thinking. Learning process is approached in a holistic manner, by promoting cross-disciplinary connections and relationships.

Generally, we can say that the philosophy and the content of preview curriculum (GP: 241, A'/20-09-1996) remain in the current curriculum (GP: 303, v. B'/13-3-2003). However, there is a considerable increase of the teaching hours on geological subjects. Specifically, in the 1<sup>st</sup> grade they increase from 5 to 15 hours, composing a total of 48 hours per year, and in the 2<sup>nd</sup> grade they increase from 2 to 5 hours, composing a total of 49 hours per year (see table 3). In other words there is a share of 33% of Geology, which will be proposed in the integral-curriculum for 1<sup>st</sup> Grade and a 10% in second grade of the High school (GP: 304, v.B'/13-03-2003). This change has greatly enhanced the geological education in Greece.

Table 3 - Comparison of features/elements of geological content of curriculum of "Geography" to that of "Geology-Geography".

Geography	Geology- Geography
GP: 241, A'/20-09-1996	GP: 1375B'/18-10-2001, article 5 GP: 303τ. B'/13-3-2003
1st Grade of Lower High School	
2nd General Unit: Natural environment (Europe and Greece)	2nd General Unit: Natural environment
Secondary units/Basic content elements	Thematic units (Time)
	The planet Earth. The internal structure of the Earth. Movements of the Earth and relevant phenomena. Thermal zones. (3 hours)
Lithosphere Description of the internal part of Earth. Forces forming the landscape of the Earth A brief reference to them Earthquakes and volcanoes. Geographical distribution. Plate tectonics. The great mountain ranges of the planet. The great plains of the planet. Mountainous and plain Greece. (Total 6 hours)	Lithosphere Plate tectonics –relevant movement-consequences. Internal forces (volcanoes, earthquakes) and external ones (erosion and deposition). Geological time. General landscape of the Earth, general description of the continents, great mountains ranges.  (Total 15 hours)
2nd grade of Lower High School	
2nd General Unit: Natural environment (Europe and Greece)	2nd General Unit: Natural environment of Europe
Secondary units/Basic content elements	Thematic units (Time)
1. A brief geological history of Europe. Brief presentation of the geological history of Europe. Baltic shield, Caledonian, Hercynian and Alps Orogeny.  Different geological regions of Europe. Relation of geological history to landscape. Height and form of mountains, plains and so on.  2. Landscape, volcanic and seismic activity of Greece. Development of Greek landscape. Confines of Euro-Asian and African tectonic plate. Tectonic plates movement and its role in earthquakes and the volcanoes of South Europe. The Aegean volcanic arc. (Total 2 hours)	1. Geological history of Europe The seismic activity in Europe The seismic activity in Greece.          (Total 5 hours)

### 3.2.2. Cross-thematic curriculum

The current Cross-Thematic Curricular Framework for compulsory education reflects a more inter-disciplinary approach to knowledge.

It includes the guiding principles contents and cross-thematic key words. The Geology-Geography cross-thematic curriculum is structured into four units in both grades: (a) Location-Geographical positioning (b) Means of recording and representing geographical features (c) Natural environment (d) Man-made environment. The geological cross-

thematic content guiding principles are included in the unit “natural environment” (GP: 1196 /v. B'/26-8-2003) (see table 4).

The distribution of the cross-thematic geological issues in the textbooks is supported by cross-curricular key words (concepts), which constitute the main rings for the horizontal connection of the different disciplines. According to the Geology-Geography cross-thematic curriculum the following key words are proposed: Space, Time, System, Interdependence, Interaction and Change (see table 4).

This is a challenge for geoscientists to illustrate an attractive way to transform the scientific knowledge and methodology into school knowledge in order to make geology comprehensive and attractive for the students.

Table 4 - Cross-thematic curriculum, unit Natural environment (Geological issues and cross-thematic key-words)	
1st Grade of Lower High School	2nd Grade of Lower High School
Natural environment. Lithosphere: Internal structure of the Earth. Continental drift and plate tectonics. Internal forces and their results (volcanoes, earthquakes). External forces (erosion, deposition). Geological time.	Natural environment. Geological aeons. A brief geological history and tectonic areas of Europe and Greece. Internal forces-Volcanoes and seismic activity in Europe and Greece. Landscape and phytogeographical areas of Europe and Greece. Seas and coasts of Europe and Greece. The Mediterranean Sea. Geographical distribution of climatic types in Europe and Greece. Rivers and lakes in Europe and Greece. Vegetation distribution in Europe and Greece.
Cross-curriculum Key-words: Space, Time, System, Interaction.	Cross-curriculum Key-words: Space, Time, System, Interdependence, Interaction, Change.

### 3.3. Geosciences in Environmental Education curriculum of compulsory education

The curriculum of Environmental Education for compulsory education includes nine main cognitive axes: 1) Air-atmosphere- climatic change; 2)Water; 3) Soil; 4) Forests; 5) Biodiversity and extinction of organisms; 6) Energy; 7) Waste management; 8) anthropogenic activities and 9) Human relationships and values

Geosciences issues are included mainly in the axe Soil and less in the axes water, biodiversity and extinction of organisms, energy, waste management and anthropogenic activities. The following characteristic geosciences issues are incorporated: different types of rocks and soils, soils pollution, geodiversity, geotopes, geological heritage, geoconservation, erosion, desertification, underground water pollution, mass extinction, natural and mining resources, geothermal energy.

### 3.4. Geosciences in Upper High School - Lyceum

In the Upper High school – Lyceum (see table 2) curriculum are included two subjects: “Issues of Environmental studies” and the “Natural resources management”, related with geosciences. The first subject is optional in both directions of Upper High School (General and Technological) and the second subject is also optional but it is taught only in the technological direction. Both subjects are taught 2 hours per week during the whole year (Ypepth-PI, 1998; GP: 1540 v. A' 1999; Ypepth-PI, 1999).

#### 3.4.1. Issues of Environmental studies

According to the curriculum the content of “Issues of Environmental Studies” are divided into seven chapters (see table 5).

Some geosciences issues (like geological cycle, soil, air, water, fossil fuels and renewable energy sources) are included mainly the 3<sup>rd</sup> and 6<sup>th</sup> chapter (see table 5).

### 3.4.2. Natural resources management

In this subject are included geosciences issues (like: erosion, landslides, rocks and minerals, Exploitation and protection of underground wealth, underground water, Management of water resources, World heritage sites, Geothermal energy) mainly in the 4<sup>th</sup> and 8<sup>th</sup> chapter (see table 6).

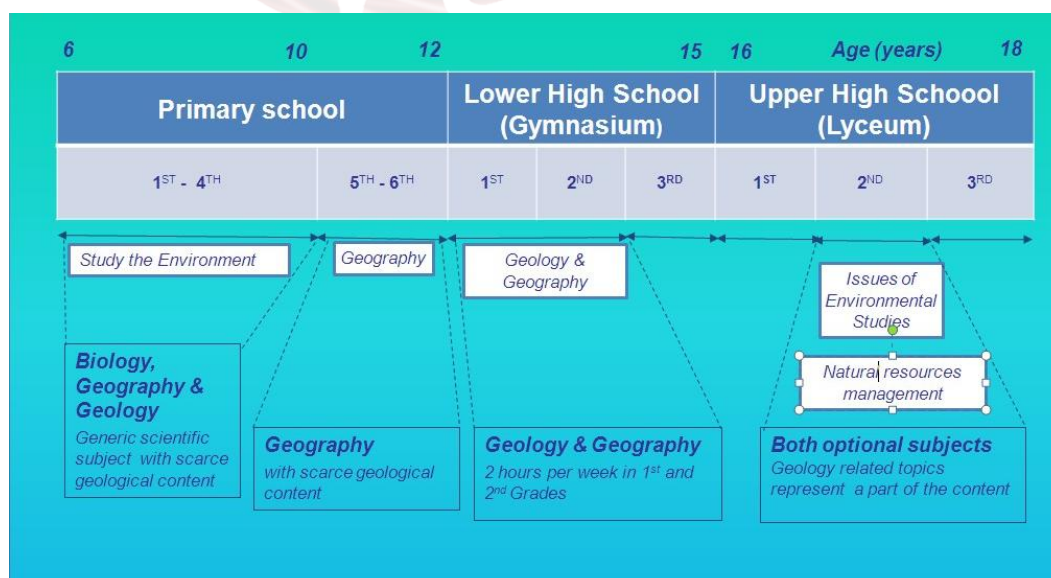
Table 5 - Issues of Environmental studies Curriculum contents
1. Environmental sciences 2. Basic terms and issues of environmental elements 3. Ecosystems management 4. Humans and ecosystems 5. Anthropogenic reactions in environment 6. Man and Ecology 7. Environment, Development and quality of life

Table 6 - Natural resources management curriculum content
1. Management of natural resources 2. Humans relation with Earth 3. Flora and Fauna 4. Soil resources 5. Water resources 6. Forest resources 7. Natural and protected areas 8. Meadows and scrublands 9. Forms of energy 10. Waste management

## 4. Conclusions

Geology is no longer an independent topic/subject; in secondary schools in many European countries. Specifically, in Greece, Geology does not exist, from 1997, as an independent discipline.

Table7- Geosciences in Greek educational system



Nowadays, geosciences are taught in the Greek educational system in the Primary school sporadically through the "Study the environment" (from 1<sup>st</sup> to 4<sup>th</sup> Grade) and "Geography" from 5<sup>th</sup> to 6<sup>th</sup> Grade' as well as in the "Flexible zone" in which primary school teachers develop optional cross-curricular projects dealing with a variety of subjects.

In secondary school, geological subjects included in curriculum of "Geology-Geography" subject in 1<sup>st</sup> and 2<sup>nd</sup> grades of Lower High School and in optional subjects "Issues of Environmental studies" and "Natural resources management" in the 2<sup>nd</sup> grade of Upper High School -Lyceum.

Finally, geosciences are incorporated in optional Environmental education projects both in primary and secondary education.

#### Remark

During the current academic year (2010-11), the Greek Ministry of Education Lifelong Learning and Religious Affairs seeking to confront problems related to the operation of schools and to the education offered to pupils suggests measures according to the 'pupil first' principle. The Ministry having incorporated the European Commission priorities on the Improvement of Competences for the 21st century (July 2008), and having taken into account the Primary and Secondary Education Council conclusions (November 2009) as well as the evaluation studies conducted by the Pedagogical Institute aims at creating "The New School", so that new generations to be able to: 1. Firmly step upon values and principles, 2. Continue their effort to learn throughout their lives, 3. Participate successfully in economic life and to have opportunities to upward social mobility, 4. Act as responsible citizens and 5. Be active citizens (Euridyce network, 2010).

In the framework of "New School" the Ministry developed new curricula for Primary and Secondary education which is not yet announced in details. The authors will include the new elements as soon as the Ministry publishes the new curricula.

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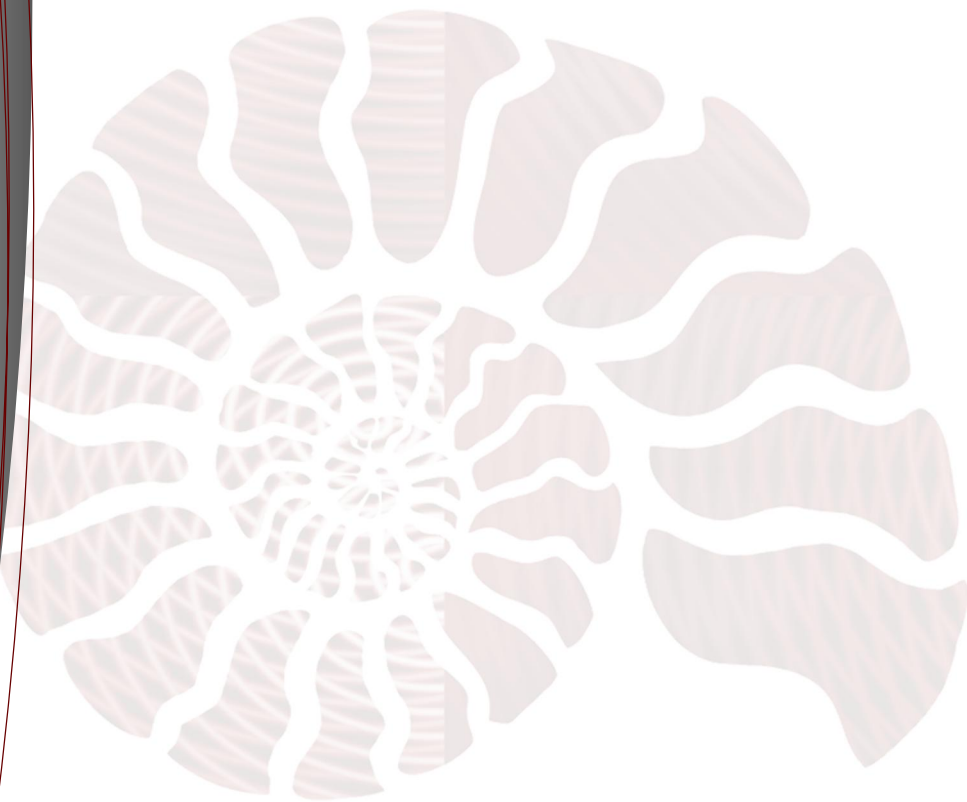
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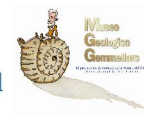
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