

Corso di Laurea Specialistica in  
**Scienze e tecnologie per l'ambiente e il territorio**  
aa 2010/2011

*Course:*

**Environmental mineralogy**

CFU 8

*Aims:*

The course will introduce the fundamental concepts of the mineralogy and the petrology of Earth's crust materials, as a base to characterize and interpret natural and anthropogenic processes having environmental implications.

The program will encompass several case-studies. Each case will be discussed under the point of view of the analytical and instrumental problems, of the physico-chemical mechanisms, and of the interpretative methodologies of the processes.

*Programme:*

Natural solid materials: basic concepts of mineralogy and petrology.

Natural processes. Introduction on the distribution of the chemical elements on the Earth's crust, on the geological processes, on the geochemical cycles. Processes and fluid-solid interactions at the mineral surfaces. Experimental techniques to study materials surfaces.

Case studies:

- (1) Hazardous minerals in nature and in working places: asbestos, free silica. Environmental monitoring, assessment, mineral quantification, disposal.
- (2) Microporous minerals: clays, zeolites. Crystal structure, crystal chemistry, absorption properties, ionic exchange properties, catalysis. Their use in environmental and industrial applications.
- (3) Mineral dust. Origin, characterization. Implications for the palaeoclimatic and environmental reconstructions of the investigations of mineral dust entrapped in polar ice.
- (4) Metals and the environment. Dispersion and re-mobilization of toxic elements during mineral deposits exploitation. Acid mine drainage. The case of arsenic dispersion: inorganic vs bio-controlled processes.

The topics will be shown and discussed with the aid of specific scientific literature.

The final examination will include:

- An oral colloquium on the course programme
- A student's seminar on a specific topic selected among those discussed during the course, and integrated by specific readings

Teaching aids:

- web notes and material (<http://www.geoscienze.unipd.it/studenti/artioli/HTC/index.html>)
- volume: D. Vaughan, R.A. Wogelius "*Environmental mineralogy*" EMU Notes in Mineralogy, Vol. 2, 2000
- issues of the journal "*Elements*" (<http://www.elementsmagazine.org/index.htm>)