## Prices

### Short Course and Workshop

| | | |
|---|---|---|
| Normal | 180€ | 220€ * |
| Graduate Students | 120€ | 160€ * |
| Undergraduate students | 50€ | 75€ * |

### Field Trips

| | | |
|---|---|---|
| Normal | 100€ | 150€ * |
| Graduate Students | 75€ | 100€ * |
| Undergraduate students | 75€ | 100€ * |

* Prices after March 15th, 2008

## Organizing Committee

**Maria do Rosário Pereira**
*(Universidade de Trás-os-Montes e Alto Douro)*
**Iuliu Bobos**
*(Universidade do Porto)*
**Eduardo Anselmo Ferreira da Silva**
*(Universidade de Aveiro)*
**Joaquim Esteves da Silva**
*(Universidade do Porto)*
**Ricardo Santos**
*(Instituto Superior Técnico)*
**Nuno Durães**
*(Universidade do Porto)*

## Scientific Committee

**Darrell Kirk Nordstrom** (USGS, Boulder, Colorado)

**Eduardo Ferreira da Silva** (Universidade de Aveiro)

**Antonio Romero Baena** (Universidad de Sevilla)

## Secretary

Drª Sandra Santos

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# Geochemistry of Arsenic

## April 28th – May 3rd, 2008

Short Course: April 28th – 30th, 2008

Workshop: May 1st, 2008

Field Trips: May 2nd – 3rd, 2008

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utad Universidade de Trás-os-Montes e Alto Douro

universidade de aveiro

Photo: S. Domingos Mine – Iberian Pyrite Belt

## Scope and Purpose

The main goal of this Workshop is to share recent information about the geochemistry of arsenic, the behaviour of arsenic species and their relationship with other trace elements in the environment. The scientific topics will include environmental impacts, arsenic speciation, geomicrobiology, toxicological consequences to arsenic and others toxic metals exposures.

## Curriculum Vitae

*Darrell Kirk Nordstrom*

Darrell Kirk Nordstrom, PhD, of the U.S. Geological Survey, directs the Chemical Modeling of Acid Waters Project. His main research has focused on processes affecting water quality from the mining of metals in the western United States. He has studied pyrite oxidation, reported on acid mine waters having negative pH, developed and applied geochemical models to acid mine waters, studied microbial reactions in acid mine waters, and demonstrated the deleterious consequences of mine plugging. He has also worked on research related to radioactive waste disposal. He has published over 160 scientific reports and papers, given hundreds of lectures, and consulted for numerous state, federal, and foreign government agencies. He holds a B.A. in chemistry from Southern Illinois University, a M.S. in geology from University of Colorado, and a Ph.D. in applied earth sciences from Stanford University.

## Arsenic Geochemistry Short Course

*D. Kirk Nordstrom, Instructor*

### Day: April 28th, 2008

**I. Overview: Occurrence of Arsenic**
1. Natural occurrences in water, rock, sediments
2. Unnatural occurrences (anthropogenic)

**II. Solid Speciation**
1. Mineralogy
2. Thermodynamic data
3. Eh-pH and activity-activity diagrams
4. Selective extractions
5. Other methods of detection (Microprobe, Synchrotron, ALS, etc.)

**III. Aqueous Speciation**
1. Forms of dissolved species
2. Thermodynamic data
3. Eh-pH and activity-activity diagrams
4. Analytical considerations

### Day: April 29th, 2008

**IV. Toxicological Considerations**
1. Historical background
2. Dose-response
3. Epidemiology
4. Biochemical mechanisms

**V. Microbiology**
1. Microbial mechanisms of arsenic transformations
2. Microbial species that interact with arsenic
3. Microbial effects on oxidation and reduction reactions

**VI. Arsenic and Surface-Water Geochemistry**
1. Acid mine drainage
2. Arsenic redox reactions in surface waters
3. Examples

### Day: April 30th, 2008

**VII. Arsenic and Ground-Water Geochemistry**
1. Acid ground waters, examples
2. Circumneutral-pH ground waters, examples
3. Factors affecting solubility and mobility, examples
4. Case histories: Bengal Deltas, Taiwan, Argentina, China, Alaska, …

**VII. Future Directions**

## Workshop

### Day: May 1st, 2008

This day is dedicated to the oral and poster presentations. Invited comunications will be presented throughout the day. The participants will present and debate some case studies and will exchange their experiences. The rules for abstract submission are described in the web page (www.fc.up.pt/geo_arsenic2008).

The template for abstracts submission is available for download in the web page and they must be send by e-mail in word format to: geo_arsenic2008@fc.up.pt.

### *Topics for Oral or Poster Presentation*

Geochemistry, Hydrogeochemistry and Biogeochemistry of Arsenic

Arsenic and Human Health

Attenuation and Remediation

**Deadline for abstract submissions: March 15th, 2008**

## Field Trips

### Day: May 2nd, 2008

Castromil Gold Mine (*Paredes County*)

Freixeda Gold Mine (*Mirandela County*)

### Day: May 3rd, 2008

Ervedosa Sn, As Mine (*Vinhais County*)

Photo: Jales Gold Mine – North Portugal