UNESCO-SPONSORED
POST-GRADUATE TRAINING COURSES
IN THE EARTH SCIENCES
2000-2001

Division of Earth Sciences
Science Sector
UNESCO
1, rue Miollis
75732 Paris Cedex 15
France
Published and printed by the UNESCO Montevideo Office.
May 2000.
© UNESCO, 2000

Layout: María Noel Pereyra
Printer: Andrés Barreiro
INDEX

PREFACE .................................................................................................................. 5

APPLICATION OF GEOINFORMATION TO EARTH
RESOURCES SURVEYS AND ENVIRONMENTAL GEO SCIENCES.
SPECIALIZATION: COASTAL ZONE STUDIES
(Enschede, The Netherlands) .................................................................................... 7

CERTIFICATE IN ANALYSIS AND
MANAGEMENT OF GEOLOGICAL RISKS
(Geneva, Switzerland) .................................................................................................. 9

COMPUTER ASSISTED TRAINING
IN MINERAL RESOURCES DEVELOPMENT
(Fontainebleau, France) ............................................................................................... 11

ENVIRONMENTAL AND SAFETY CONCERNS
IN MINING ACTIVITIES
(Aix-en-Provence, France) ............................................................................................. 13

ENVIRONMENTAL GEOLOGY AND GEO-CHEMISTRY
SOIL CONTAMINATION AND RECLAMATION
(Madrid, Spain) .............................................................................................................. 15

EXPLORATION FOR AND EVALUATION OF MINERAL
DEPOSITS (PM AND MSC. COURSES, FORMERLY
NAMED MEX3 AND MEX2 COURSES)
(Delft, The Netherlands) ............................................................................................... 19

GEOCHIM
(Prague, Dlouhe Rozinka, Czech Republic) .................................................................... 21

GEOPHYSICAL SIGNAL ANALYSIS
(Trieste, Italy) .................................................................................................................. 23

GEOTHERMICS
(Pisa, Italy) ...................................................................................................................... 25

INTERNATIONAL COURSE ON VOLCANOLOGY
AND VOLCANIC GEOPHYSICS
(Lanzarote and Tenerife, Canary Islands, Spain) ............................................................ 27
INTERNATIONAL POSTGRADUATE COURSE ON METALLOGENY (Quito, Ecuador) ........................................................................... 29
INTRODUCTION TO DIGITAL IMAGE PROCESSING (DIP.5) (Enschede, The Netherlands) .......................................................... 31
MASTER IN GEOLOGICAL ENGINEERING (Madrid, Spain) .............................................................................................. 33
MATHEMATICS AND INFORMATICS IN THE EARTH SCIENCES (Havana, Cuba) .............................................................. 35
MINERAL EXPLORATION (Delft, The Netherlands) ........................................................................................................... 37
REGIONAL COURSE ON METHODOLOGIES USED IN VOLCANIC ACTIVITY MONITORING (San José, Costa Rica) ................................................................................................................... 39
REMOTE SENSING APPLICATIONS FOR EARTH SCIENCES (Ensched, The Netherlands) .................................................. 41
SEISMOLOGY AND SEISMIC HAZARD ASSESSMENT (Postdam, Germany) ....................................................................... 43
STRUCTURAL ANALYSIS AND FUNCTIONAL MORPHOLOGY OF BENTHIC FORAMINIFERA (Basel, Switzerland) .................................................................................................................. 47
The geosciences (Earth Sciences), like other sciences, are constantly evolving in response to new discoveries, concepts or threats, and to a changing emphasis in regard to the needs of Society.

In response to this and taking into account the principal components defined in the United Nations Conference on Environment and Development (UNCED), Rio de Janeiro 1992 as well as the recommendations of the World Conference on Science, Budapest 1999, the UNESCO Division of Earth Sciences oriented its programmes to promote actions leading to a better understanding of the geological, mineralogical, geophysical and geochemical factors influencing the environment, and to communicate key findings to scientists of other disciplines, development planners and decision-makers.

As UNESCO's priorities are capacity building as well as knowledge and technology transfer, it is obvious that training activities in the Earth Sciences will continue and certainly be reinforced in the future, responding to the demand of Member States.

UNESCO's training programme in the geosciences is at the postgraduate level and is thus restricted to specialists who already have some practical experience. All the curricula are being regularly updated in order to make full use of the most recent scientific developments and respond adequately to present concerns.

These activities consist of the organization of (or the contribution to):

* **Postgraduate training courses**: given on a regular basis by well-known universities or institutions, which are usually in a position to offer fellowships to participants from developing countries and to put high-level scientific infrastructure and facilities at their disposal;

* **Ad hoc postgraduate seminars**: of shorter duration, on specific topics, organized upon request by Member States according to the level of funding obtained for this purpose.

In order to prepare fully efficient specialists, we grant our sponsorship only to training programmes with a high scientific level and which meet certain prerequisites. One of these is that the programme must share the time allowed between theoretical teaching and practical
exercises (or field work) and to use field or laboratory work to develop in the participants a sound interest in solving specific problems.

The above aims at linking the proposed solutions or methods to their potential adverse environmental impact.

One could also emphasize here the multiplying effect of training activities. Due to the level of our courses we try to train specialists who should be able to transfer the technologies or methods that they have acquired to their colleagues.

Finally, I underscore here the importance of the type of training we are trying to develop in the sense that it helps create and reinforce links between the scientific community, exchange of information and transfer of technology not only between North and South but also within the southern hemisphere.

This brochure is geared to provide you with initial information on UNESCO sponsored training activities in the field of Earth Sciences. If you should need additional information you may contact the Division of Earth Sciences at UNESCO, Paris.

F. Wolfgang Eder
Director
Division of Earth Sciences
Organized by the International Institute for Aerial Survey and Earth Sciences (ITC), Enschede, The Netherlands, with the support of UNESCO.

Aims

The aim of the new specialization in Coastal Zone Studies is to achieve competence in:

- The use of Remote Sensing techniques in the collection of relevant input data for coastal zone management and the monitoring of coastal processes;
- The management of multidisciplinary data sets with emphasis on geo-environmental data using Geographic Information Systems;
- The integration of geo-environmental data with other types of data to derive at an integrated coastal zone management.

Content

- Introduction module: Application of Geoinformation to Earth Resources Surveys and Environmental Geosciences
- Core modules: Introduction to GIS and Remote Sensing
- Programme modules: Geological, geomorphological and pedological image interpretation.
- Specialization modules: application of RS and GIS to coastal zone studies
- Elective modules: a wide range of specialization modules can be selected
- Fieldwork modules
- Individual Final Assignment
To whom is the training addressed

The course is designed for earth scientists (geologists, geomorphologists, civil engineers, geographers and other specialists in related disciplines) with a university background. This includes University staff members engaged in teaching and research in these fields, as well as managers and professionals in government survey organisations, planning agencies or the private sector (consulting firms) dealing with projects of natural hazard assessment.

Language English
Deadline for application 1 August
Frequency Annual
Duration 12 months, starting in September
Place Enschede, The Netherlands

For further information and application, please contact

ITC Student Registration Office
P.O. Box 6
7500 AA Enschede
The Netherlands
Tel. (53) 487 44 44
Fax (53) 487 44 00
Cables AESUR, Enschede, The Netherlands
e-mail: education@itc.nl
http://www.itc.nl/homepage.html
Organized by the University of Geneva, Section Sciences de la Terre, Faculty of Sciences, in association with the Swiss Federal Institute of Technology in Lausanne (EPFL), the Swiss Seismological Service (SSS) at the Swiss Federal Institute of Technology Zurich (EPFZ), the Division of Humanitarian Aid and Swiss Disaster Relief Unit (SDR) – Federal Department of Foreign Affairs – and other hosting institutions, with the support of the University of the United Nations in Tokyo (UNU), the Swiss Agency for Development and Cooperation, the Office for the Coordination of Humanitarian Affairs at the United Nations (OCHA) in Geneva (former DHA), the Ousseimi Foundation and UNESCO.

**Direction**

Prof. Jean-Jacques Wagner

**Aims**

The objective of the course is to develop an expertise in the field of natural risk mitigation, by integrating it in the planning of sustainable development. To offer a multidisciplinary approach in the search for solutions for a society confronted with natural risks. To form experts who can advise the public and private sectors to take preventive measures which can reduce the impact of natural disasters.

**Contents**

- Multi-risk assessment related to earthquake, floods, volcanic eruptions and landslides
- Practice of natural disaster mitigation
- Strategy of mitigation management

The post-graduate certificate in the study of geological risks is made up of two parts: an intensive 7 and a half weeks full-time teaching period during which the lectures include theoretical subjects, laboratory exercise and field work. Two weeks are spent on interdisciplinary field work in Italy in regions with a potential risk (volcanic eruption and floods, landslides). This teaching period is followed by a 4 to 6 weeks personal project in the candidate's home country where she/he can apply the acquired knowledge.
To whom is the training addressed

Geologists, geographers, geotechnicians, civil engineers and land planners and any person who can justify equivalent professional experience.

Selection upon dossiers

Language English

Deadline for application Three months before opening the course

Application form duly filled with cv, copies of diplomas and certificates, 2 letters of recommendation.

Frequency Annual (April-May-June)

Duration 7 1/2 weeks

Place University of Geneva, Switzerland

Information and application

Francoise Grondahl
CERG – Secretariat
Section de Sciences de la Terre
13, rue des Maralchers
CH-1211 Genève
Switzerland
Tel 41 22 702 6602
Fax 41 22 320 5732
E-mail: Cerg@sc2a.unige.ch
http://www.unige.ch/hazards/cerg

Other information

Successful participants will be awarded a “Certificat de spécialisation en Études des Risques Géologiques”

Teaching fees for the training, university taxes, insurance, courses and field work amount to approx. CH 2'800. Costs of living in Geneva (Chf 2'600) and travel costs are not included.

Foreign candidates needing visas for Switzerland, Italy or France are requested to make all the arrangements before arriving to Geneva.
Organized by the Ecole des Mines de Paris, Centre de Géotechnique et d'Exploitation du Sous-Sol (CGES), under the sponsorship of UNESCO.

**Aims and content of the Course**

Through a computer assisted method of simulation, the trainees (in teams of three) are able to live a practical experience on a realistic model of mineral exploration development; first they receive more or less complete geological, technical and socio-economical data from which they can elaborate a research strategy depending upon a budget; next, they establish an exploration programme (appraisal of the various prospecting methods, choice of a strategy...). Subsequently, they carry out and manage their geochemical prospecting, various types of drilling, sample analysis, etc. Results and costs are provided by the computer. As prospecting progresses and new results are obtained, the exploration strategy is to be adjusted step by step. Tonnage reserves are worked out by each team at the end of the workshop.

Simulation plays the role of an experimental laboratory allowing time to be shortened, costs to be optimized and strategies to be multiplied and diversified. At the end of the workshop, the results can be compared with the computerized geological model. From this comparison, it is possible to assess the success factor of mineral prospecting, which usually remains largely unknown in a true exploration programme.

**Application addressed to**

E. Sauzay  
Ecoles des Mines de Paris  
CGES-CLAIM  
35, rue Saint-Honoré  
77305 Fontainebleau Cedex  
France

**Language** French and English

**Deadline for application** 1 March
**Frequency**
Annual

**Duration**
Four weeks in April

**Place**
Fontainebleau (France), 65 Km South of Paris

For further information, please contact
as above, or:

**Tel:** (33.1) 64 69 49 30 (or 64 69 49 21)
**Fax:** (33.1) 64 69 47 11
**Telex:** 694 736 F
Organized by the Centre of Advanced Studies for Safety and Environmental Concerns in Mining (CESSEM), Alès School of Mines, and the Centre d'Études Supérieures des Matières Premières (CESMAT) with the support of UNESCO.

**Aims**

This course aims at integrating concerns of safety and environment in the design, management and rehabilitation of a mine or of a quarry or first transformation plants for raw material. Its target are geologists and engineers, already having acquired at least five-year experience in extracting activities.

**Content**

The tuition is divided into three parts:

- general training or refresher course in the fields of statistics, and environment bases.
- specific techniques in the fields of security and environmental sciences in relation with mining activities i.e. hygiene and security in mining exploitations, environmental impact of mining activities, clean technology and quality control, site rehabilitation and follow up, etc. the third part consists of personal work directed towards the solution of projects related to the realization of impact and feasibility studies concerning open pit or underground mines in ecologically difficult conditions.

Impact studies will embark on the evaluation of technical solutions that could best preserve the environment; feasibility projects will take into account technical possibilities reducing risk factors as well as noise, vibrations, emission of dust and every kind of pollution, and also additional costs induced by the various modifications to the initial project.

Successful participants will be awarded a specialization diploma. Candidates are requested to send a letter of application together with a curriculum vitae to the address herebelow.
Application addressed to

CESSEM
Ecole Nationale Supérieure des Techniques Industrielles et des Mines d'Ales
6, Avenue de Clavières
30319 Ales Cedex - France

Language

French

Deadline for application

20 December -1 for main list
1 June for complementary list if available
(in this case it is necessary to allow for subsistance fees at the same time)

Frequency

Annual

Duration

October to June (yearly) 9 months plus two months of French language course.

Place

Ales, France

For further information please contact

Dr Gérard Verraes
Responsable CESSEM
Ecole Nationale supérieure des techniques industrielles et des mines d’Alès
6, avenue de Clavières
30319 Ales Cedex
France
Tel. (33) 4 66 78 51 96
Fax (33) 4 66 78 51 50

Other information

Training is free for the students (offered by the French government), but it is necessary to obtain subsistance fees in order to live in Ales for the whole duration of the training (800 to 1000$ per month). These fees are not available at the School of Mines.
Aims and contents of the course

The latest reports on the repercussions of soil contamination particularly affecting the European and American continents are truly alarming.

Soil contamination which is understood as the chemical element or compound, from which negative effects are produced leading to the loss of aptitude in use, is currently a problem which goes beyond scientific circles and is now reaching the realms of public opinion.

At the moment, there are many cases of soil contamination caused by a diversity of actions, such as: heavy metal contamination, atmospheric contamination and uncontrolled dumping, etc. All of these actions have created large contaminated areas that must be recuperated, if we want to continue using them as a natural resource.

This course is focused precisely on the recognition of this environmental problem, as well as the different types, causes and effects of this contamination.

Based on the above outline, the course will deal with the following subjects:

1. The soil as a body and natural resource. Basic concepts in soil genesis, degradation and contamination.
2. Soil characteristics in tropical and mediterranean climatic conditions.
3. General aspects of both natural and anthropic degradation and contamination.
4. Contamination by heavy metals. The relevance of speciation: bioavailability and toxicity.
6. The role played by clays and oxides (Fe and Mn) in the retention of heavy metals.
7. Soil contamination by organic products.
10. Methodologies in soil genesis, contamination and reclamation.

Information and Application addressed to

Course Director: Dr. R. Jiménez Ballesta
Department of Agrochemistry, Geology and Geochemistry
Facultad de Ciencias
Universidad Autónoma de Madrid
Cantoblanco, 28049 Madrid, Spain

Tel: (341) 397 4800 / 397 4810
Fax: (341) 397 4900

Language of the course: Spanish
Deadline for application: 17 May
Frequency: Annual
Duration: Three weeks (June)
Place: Departamento de Química Agrícola, Geología y Geoquímica
Universidad Autónoma de Madrid
Cantoblanco, 28049 Madrid, Spain
Complementary information

Due to its specialization and the language involved, this course is aimed at Latin American Portuguese and Spanish postgraduate students. The course consists of 35 hours of theoretical classes and 40 hours of practical classes, with one field trip to identify areas of contaminated soils in the Central Region of Spain.

Students who fully complete the course will receive the corresponding "diploma" from the Autonomous University of Madrid.
Organized by the International Institute for Aerospace Survey and Earth Sciences (ITC) in co-operation with the sub-Faculty of Technical Earth Sciences (formerly the Faculty of Mining and Petroleum Engineering) of the Technical University of Delft, under the sponsorship of UNESCO.

**Aims**

Sustainable development of a country's mineral resources is generally seen as a key-factor in the stimulation of economic growth. The search for these mineral resources needs to bring together current thinking in metallogenesis, both on a local and regional scale (the concepts), the application of modern prospecting technologies (the tools) and appropriate GIS programmes to optimally extract information from ever growing geo-referenced databases. Evaluation of known deposits calls for an understanding of local methods of grade and tonnage estimation, mining and mineral processing methods, and the implications of mineral development for the environment.

**Content**

- Applied geo-sciences studies:
  - Prospecting technology (exploration geochemistry, heavy mineral surveys, exploration geophysics, aerospace surveys).
  - Economic geology (regional metallogeny, deposit modeling, industrial rocks and minerals, exploration design).
  - Ore evaluation (reserve estimation, mining and mineral processing, environmental impact studies, financial evaluation).
- GIS for mineral resource management
  * Exploration project.
  * Mineral resources data management/GIS.
  * Research.
To whom is the training addressed

Two programmes are offered. The first programme (12 months) leads to the award of a Professional Masters (or PM) Diploma. It is reserved to participants holding at least a B.Sc. in geology or related topic and having several years postgraduate experience in mineral exploration.

For admission to the second programme (18 months) candidates must demonstrate ability to perform independent research and submit an acceptable research proposal. It leads to the award of a MSc.

Language English

Deadline for application 1 March

Frequency Annual

Duration 12 months (start in September) for PM courses.
18 months for MSc courses

Place Delft, The Netherlands

For further information and application, please contact

ITC Student Registration Office
P.O. Box 6
7500 AA Enschede
The Netherlands
Tel. (53) 487 44 44
Fax (53) 487 44 00
Cables AESUR, Enschede, The Netherlands
e-mail: education@itc.nl
http://www.itc.nl/homepage.html
Organized by the Czech Geological Survey, Prague in co-operation with IGCP 429

Aims

The course aims at providing knowledge of important geochemical methods widely used in the prospecting for ore deposits and at showing their applications in the solution of environmental problems. Individual lectures covering various geochemical methods will be accompanied by practical field and also computer training. The course will be followed by a 2 day field trip visiting ongoing open and underground mining operations and processing plants as well as abandoned mining sites with the aim to demonstrate possible ways of effective usage of geochemical methods in both exploration and environmental issues.

Content

Principles of exploration and environmental geochemistry, exploration and environmental applications of soil geochemistry, stream sediments, heavy minerals, biogeochemical, lithogeochemical, hydrogeochemical, geophysical and radiometric studies with practical field and computer training.

To whom is the training addressed

Applicants must have a good knowledge of English and the fundamentals of geochemistry. A BSc degree or equivalent is the minimum requirement.

Language: English
Deadline for application: April 15
Frequency: Annual
Duration: 14 days
Place: Prague, Dolni Rozinka, Czech Republic
For further information and application, please contact

Jan Pasava
B. Kribek
Geological Survey
Klarov 3
118 21 Praha 1
Czech Republic
E-mail: pasava@cgu.cz – kribek@cgu.cz

Other information

For technical reasons, the number of participants has to be restricted to 15 persons. Tuition fees including the cost of printed handouts is US$ 100 for university postgraduate students, US$ 200 for personnel from state agencies such as geological surveys and US$ 400 for staff members of private companies. Accommodation, travelling and meals during the course will be covered by the organizer. International travel to Prague is not included. A diploma is awarded to each successful participant.
Organized by the Experimental Geophysical Observatory (O.G.S.) in Trieste, Italy, under the auspices of UNESCO.

**Aims and programme of the course**

The main objective of the course is to present state-of-the-art in modern geophysical signal analysis related to the search for oil, gas and mineral resources.

The programme will include the following topics:

1. Wave Phenomena in Earth
2. Basic Knowledge about Signals
3. Velocity Analysis
4. Seismic Imagery
5. Signal processing in potential and electromagnetic data
6. Special Topics.

**Language of the course** English

**Deadline for application** January

**Duration** 5 weeks starting March (tentative)

**Information and application**

Dr. S. Persoglia  
Department of Geophysics of the Lithosphere  
O.G.S. - P.O. Box 2011  
24016 Trieste, Italy  
Tel: (0039) 40 2140229  
Fax: (0039) 40 327307  
Telex: 460329 OGS I
Organized by the International School of Geothermics of the Istituto Internazionale per le Ricerche Geotermiche, under the sponsorship of the Consiglio Nazionale delle Ricerche (C.N.R.), Rome, the Italian Ministry of Foreign Affairs and UNESCO.

Aims and programme of the course

This is a multi-disciplinary course aimed at preparing geothermal experts to operate in any of the different phases of a geothermal exploration project, and to coordinate an entire project. It is held at Pisa, in a region rich in hot springs, and at the Larderello geothermal fields, where geothermal energy has been used for more than 80 years. Lectures and seminars deal with the following subjects, in so far as they concern the purpose of the course:

1. Basic concepts of energy
2. Exploitation of geothermal energy: direct uses and electric energy production
3. Basic economic concepts
4. Geology of geothermal fields
5. Hydrogeology of geothermal areas
6. Geochemical research methods
7. Geophysical methods
8. Drilling technology in geothermal areas
9. Reservoir engineering

The first four months are dedicated to theoretical lectures and seminars. The remaining months are devoted to acquiring practical experience in specialized research centres and/or with working groups in areas in which a geothermal exploration programme is being implemented. Trainees are also taken on field trips to the Italian geothermal fields and power plants.

At the end of the Course, these trainees who have shown the best progress and benefit throughout the Course will receive a Diploma of Merit. The others will receive a Certificate of Attendance.
Language of the course English
Deadline for application 30 September
Duration 1 November - 30 June (annually)

Information
International School of Geothermics
Piazza Solferino, 2
56126 Pisa, Italy
Tel: 050-41503 or 46069 or 41327
Telex: 502020 IRGCNR I
Fax: Italy-50-47055
Cable: Geothermico-Pisa-Italy

Applications
To the Italian Embassy of the participant’s country. Applications for scholarships not submitted through the Italian Embassy cannot be considered.

Note
The above course, held from 1979 to 1992 inclusive, has been temporarily suspended.

However, the International School of Geothermics of Pisa continues its UNESCO-sponsored training activity in the form of short courses, organized both in Italy and abroad. Since 1992, these include courses held in Bulgaria, Romania, Vietnam, Italy and El Salvador. The short courses are organized by the School on request of official institutions abroad. Institutions interested in such a course should contact the International School of Geothermics directly in Pisa (see address above), or through UNESCO.
Aims
The course aims at giving a specific training on the theoretical aspects of volcanic eruptions and their results, as well as on risk evaluation and prevention in active volcanic areas both from the geological and physical points of view. It provides participants with a wide and detailed vision of all the topics that form part of volcanology, with special emphasis on the study of active volcanic areas.

Content
a. Eruptive Mechanisms. Physical Modelling
b. Geophysical Instrumentation on Volcanology
c. Volcanic hazards and forecasting
d. Volcanic risk maps. Methodologies

To whom the training is addressed
To professionals in Volcanology who want to improve their knowledge.

Language Spanish
Deadline for application 30 June
Frequency Annual
Duration 4 weeks
Place Lanzarote and Tenerife, Canary Islands, Spain
For further information and application, please contact

Dra. Mar Astiz
Depto. Volcanología
Museo Nacional de Ciencias Naturales, C.S.I.C.
C/José Gutierrez Abascal, 2
28006 Madrid, Spain
Tel 34 91 4111328 (ext. 1186)
Fax 34 91 564 4740
e-mail: civgv@mncn.csic.es
http://www.csic.es/mncn/volcanologia

Other information

This course has been recognized by the IAVCEI (IUGG, Boulder 1995), accepting our request to sponsor it.
This course is organized by the School of Engineering in Geology, Mining and Petroleum of the Universidad Central del Ecuador.

**Aims**

To disseminate recent knowledge acquisitions and progress made in metallogenic studies to be used in research, development and exploitation of deposits, by taking into account aspects of environmental impacts of geological-mining activities.

**Content**

The course is organized in independent modules that cover specific aspects including hydrothermal fluid geochemistry, hydrothermal alteration, metal transport and precipitation, basic studies in metallogeny, metallogenic models of massive volcanogenic sulfure like deposits, skarn, Au and AG epythermals, as well as supergenic processes, usage lead-in-exploration isotopes, metallogeny of Ecuador. Studies of environmental impacts and auditing. This theoretical course is complemented by field practices.

**To whom the training is addressed**

Latin American Earth Sciences engineers and postgraduate students, holding a terminal degree or attending postgraduate courses.

**Language** Spanish

**Deadline for application** -

**Frequency** Annual

**Duration** 15 days

**Place** Quito, Ecuador
For further information please contact
Dr. Jaime Jarrín
Instituto Superior de Postgrado
Facultad de Ingeniería Geología, Minas y Petróleos
Universidad Central del Ecuador
Casilla Postal
17-21-1405
Quito, Ecuador
Tel 593 2 557 892 – 593 9 551 892
Fax 593 2 566 738
E-mail: iinvest@uio.telconet.net

Other information
Up to date, 90 Latin American and 400 Equatorian professionals
have been trained in this course.
INTRODUCTION TO DIGITAL IMAGE PROCESSING (DIP.5)
(Enschede, The Netherlands)

Organized by the International Institute for Aerial Survey and Earth Sciences (ITC), Enschede, The Netherlands, with the support of UNESCO.

Aims

The course aims at updating and extending knowledge on developments in the application of remotely sensed data, image processing and image analysis and the integration into a geoinformatics environment. It is developed for staff who need specialist knowledge on the physical and theoretical aspects of remote sensing and digital image processing such that they can assess the validity of applying the new technology into their own working environment. Besides a brief overview of the physical background of sensing the electro-magnetic spectrum, participants will deepen their knowledge on Image Analysis and the relationship between and the synergy of the information extracted from remotely sensed data and the data from existing geo-data bases.

The course is updated every year in view of the rapid developments in image processing, analysis and database systems applicable to integrated (remote sensing and GIS) data processing.

Content

This course concentrates on numerical analysis of remote sensing data. It is based on the physics of remote sensing and linear algebra and includes such topics as elements of pattern recognition, statistical methods, image processing, decision-making and classification. Applications include Landsat RBV, MSS and TM data, Seasat SAR data and airborne radar. Hands-on experience with digital image processing equipment forms part of the course.

To whom is the training addressed

The course is intended for students, research workers and engineers holding at least a BSc degree who are actively involved in the numerical analysis and application of remote sensing data.
Participants must have a good knowledge of mathematics and the fundamentals of qualitative and quantitative remote sensing. A BSc degree of equivalent is the minimum requirement. It is essential that participants are proficient in English.

**Language**
English

**Deadline for application**
June

**Frequency**
Annual

**Duration**
30 August, 16 weeks

**Place**
Enschede, The Netherlands

*For further information and application, please contact*

ITC Student Registration Office
P.O. Box 6
7500 AA Enschede, The Netherlands
Tel. (53) 487 44 44
Fax (53) 487 44 00
Cables AESUR, Enschede, The Netherlands
e-mail: education@itc.nl
http://www.itc.nl/homepage.html
Organized by the Universidad Complutense, Department of Geodynamics, with the support of UNESCO.

**Aims of the course**

Advanced and Professional Training in Engineering Geology and Geotechnics.

**Content of the course**

500 hours of lecturing, dissertation Dr Thesis, practical work.

Programme:
- Soil mechanics and sediment geological engineering
- Rock mechanics and geomechanical behaviour of rock masses
- Hydrogeology applied to geological engineering
- Geological engineering methods
- Applied geological engineering
- Preventing geological risks

**Language**

Spanish

**Deadline for application**

April

**Frequency**

Every 2 years

**Duration**

2 years

**Place**

Facultad de Ciencias Geológicas, Madrid, Spain

**Application addressed to**

Master de Ingeniería Geológica
Departamento de Geodinámica
Facultad de Ciencias Geológicas
Universidad Complutense
28040 Madrid Spain
For further information, please contact
Prof. Luis González de Vallejo
Director of the Course
Tel: 341 394 48 25
Fax: 341 394 48 83
Organized by the Institute of Geophysics and Astronomy of the Ministry of Science, Technology and Environment, with the support of UNESCO.

Aims of the course

The course is designed for professionals related to the use of mathematics and informatics (geomathematic techniques) for the solution of practical tasks that involve the processing of data obtained through observation. It will include lectures where methods and systems already tested in practical applications will be discussed and thus provide optimal conditions for the exchange of experiences and knowledge between institutes and specialists.

Content of the course

- Introduction to statistics
- Geostatistics
- Database systems
- Pattern Recognition
- Data Explorer Analysis

Language: Spanish

Deadline for application: 1 August

Frequency: every 2 years

Duration: 3 weeks (1996) November

Place: Havana City, Cuba

Application addressed to

Dr. Alberto E. García Rivero
Instituto de Geofísica y Astronomía
Calle 212 No. 2906, La Lisa
Código Postal 13500
Ciudad de La Habana - Cuba
Tel: (537) 218435
For further information please contact

Dr. Alberto E. García Rivero

Note:

Successful participants will be awarded a certificate. Candidates are requested to send a letter of application together with a curriculum vitae to the address mentioned above.
Aims of the course

Sustainable development of a country's mineral resources is generally seen as a key factor in the stimulation of economic growth. The search for these mineral resources needs to bring together current thinking in economic geology and the application of modern prospecting technologies. Evaluation of known deposits calls for an understanding of local methods of grade and tonnage estimation, mining and mineral processing methods, and the implications of mineral development for the environment.

Part I of the programme (9 months) leads to the award of a Postgraduate Diploma. It is reserved to participants holding a BSc in geology or related topic and having several years postgraduate experience in mineral exploration.

For admission to Part II (18 months) candidates must demonstrate ability to perform independent research and submit an acceptable research proposal. It leads to the award of a MSc.

Content of the course

- Applied geosciences studies:
  1. Prospecting technology (exploration geochemistry, heavy mineral surveys, exploration geophysics, aerospace surveys).
  2. Economic geology (regional metallogeny, deposit modelling, industrial rocks and minerals, exploration design).
  3. Ore evaluation (reserve estimation, mining and mineral processing, environmental impact studies, financial evaluation).

- Exploration project
- Mineral resources data management/GIS
- Research
Language: English

Deadline for application: 1 March

Frequency: annual

Duration:
- 9 months (starting September) for standard courses
- 18 months for MSc courses

Place: Delft, The Netherlands

Information and application:
ITC Student Registration
P.O. Box 6
7500 AA Enschede
The Netherlands
Tel: (53) 487 44 44
Fax: (53) 487 44 00
e-mail: education@itc.nl
http://www.itc.nl/homepage.html
REGIONAL COURSE ON METHODOLOGIES USED IN VOLCANIC ACTIVITY MONITORING
(San José, Costa Rica)

Organized by the Volcanology and Seismology Observatory of Costa Rica, National University (OVSICORI-UNA) and UNESCO.

Content of the course

- Introduction to volcanic monitoring
- Tectonic settling of Costa Rica
- Characteristics of the activities of the Volcano Arenal
- Geodesia applied to volcanic deformation
- Seismology applied to volcanic monitoring

It is foreseen to give a special focus on volcanic deformation in the next course.

Language: Spanish

Deadline for application: 30 September

Frequency: Every two years. Next session: 2001

Duration: 10 days, generally in early December

Place: Volcano Arenal, Costa Rica, a volcano which is active since 1968

Information and application

Observatorio Vulcanológico y Sismológico de Costa Rica
Universidad Nacional (OVSICORI-UNA)
Tel: (506) 261 0781 / 261 0611
Fax: (506) 261 0303
e-mail: ovsicori@irazu.una.ac.cr
REMOTE SENSING APPLICATIONS FOR EARTH SCIENCES
(Enschede, The Netherlands)

Organized by the International Institute for Aerial Survey and Earth Sciences (ITC), Enschede, The Netherlands, with the support of UNESCO.

Aims and programme of the course

This is a specific training programme for earth scientists on the applications of modern remote sensing techniques for geomorphological surveying and investigations. The course will emphasize visual interpretation of various types of imagery (Landsat, SLAR/SAR, MSP, etc.). In addition to updating and extending their knowledge of the various aspects of remote sensing systems, the participants will also become acquainted with digital processing techniques for earth science applications.

It is intended for professionals with a sound knowledge of photo-interpretation: the duration is six weeks. Applicants with little photo-interpretation experience wishing to follow the course should apply for a preliminary course, starting in September each year, which includes general training in image interpretation applied to geology or geomorphology.

The course is not included in the Netherlands government fellowships' programme for International Development and Technical Cooperation.

<table>
<thead>
<tr>
<th>Language</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deadline for application</td>
<td>1 August</td>
</tr>
<tr>
<td>Frequency</td>
<td>Annual</td>
</tr>
<tr>
<td>Duration</td>
<td>November to December</td>
</tr>
<tr>
<td>Place</td>
<td>Enschede, The Netherlands</td>
</tr>
</tbody>
</table>
Information and application

ITC Student Registration Office
P.O. Box 6
7500 AA Enschede
The Netherlands

Tel: (53) 487 44 44
Fax: (53) 487 44 00
Cables: AESUR, Enschede, The Netherlands
e-mail: education@itc.nl
http://www.itc.nl/homepage.html
SEISMOLOGY AND SEISMIC HAZARD ASSESSMENT
(Potsdam, Germany)

Organized by Geo ForschungsZentrum Potsdam (GFZ) in collaboration with the Carl Duisberg Gesellschaft (CDG), and—in case of regional courses in developing countries—with the local hosting institution. The courses are sponsored by the German Federal Foreign Office and the Federal Ministry for Economic Co-operation and Development, by UNESCO and IDNDR as well as by other national and international governmental and non-governmental bodies.

Aims

The courses aim at providing the theoretical and methodological fundamentals and at developing the interdisciplinary problem, understanding and skills required in seismological monitoring practice and data analysis, in seismic hazard assessment and risk mitigation. This is achieved through lectures and discussions complemented by extensive practical exercises, workshops, sessions and field excursions.

Content

The main topics covered by the course are as follows

- Causes of geological hazards;
- Fundamentals of seismology, seismometry, data acquisition and analysis;
- Seismological observatory practice at single stations, networks and arrays;
  Seismotectonics, earthquake mechanisms, source parameters and energy release;
- Earthquake statistics, seismic zonation and hazard assessment;
- Local effects (direct and induced) of strong ground motion and seismic microzonation;
- Earthquake prediction research: current status, problems and perspectives;
- Earthquake engineering and management aspects of seismic risk mitigation and disaster reduction.
The content of regional courses may be modified and tailored according to the priority needs and potentials of the regions. Accordingly, aspects of tsunami and volcano monitoring and warnings may be added. In case of regional courses, as many competent people as possible from the hosting institution and the respective region will be integrated into the international team of lecturers.

**To whom the training is addressed**

The training is addressed to postgraduate students, technicians, scientists and lecturers from developing countries in particular, those working in the field of earth sciences, seismological observatory practice, earthquake engineering, seismic hazard and risk assessment and disaster management.

**Language**

English is the only working language in the courses

**Deadline for application**

5 months prior to the commencement of the course

**Frequency**

Annual

**Duration**

5 weeks

**Place**

The course in the year 2000 will be held in Potsdam, Germany and the course in 2001 in a Latin American country. The course will continue to be held alternatingly in Germany and in developing regions. In the latter case, courses will rotate equally between Latin America, Africa and Asia.

**For further information, course programs, circular and application forms, please contact**

Dr. Peter Bormann
GeoForschungsZentrum Potsdam
Telegrafenberg E428
D-11473 Potsdam
Federal Republic of Germany
Tel 49 331 288 1202 or 1201
Fax 49 331 288 1293 or 1204
Other information

While courses in Germany are open to participants from all regions, courses held in developing countries are organized as regional courses only.

For each course a maximum of 20 fellowships will be made available from funds of German and international sponsors to cover the course fee, boarding and lodging of selected participants from developing countries. 5 to 10 more participants may be accepted on the condition that they can cover their travel, course fee and daily allowance themselves or form funds of other sponsoring agencies. Some travel grants may be provided depending on the availability of funds.

The course offers an opportunity for participants to present and discuss at workshop sessions data, software, problems or results pertaining to their countries and their own research work.
Organized by EUCOR-CI ICMIP IARM, with the support of UNESCO.

Aims of the course

The 1996 MICROPAL training course will be focussed on structural analysis of complex, mainly larger foraminifera in order to support correct identification of their sections, as observed in random thin slides of hard rock, on the generic level. Many structures have a functional meaning while their diversity is restricted by biological constraints. Thus, biostratigraphical, biological and ecological aspects of structural pattern generation have to be discussed in order to enhance understanding of the relevant processes involved.

Contents of the course


Language: English
Deadline for application: 15 June
Frequency: Annual
Duration: 2 weeks
Place: Basel, Switzerland
Application addressed to

Professor L. Hottinger
COMETT Training Course
Geologisches Institut
Bernoullistr. 32
CH - 4056 BASEL, Switzerland

For further information, please contact

L. Hottinger

Other information considered relevant to the course

For technical reasons, the number of participants has to be restricted to 20 persons. Applicants are requested to provide a short curriculum with abstracts of one or two of their main publications or reports if they have not participated in earlier courses. Participants are encouraged to take an active part in the course by preparing a personal contribution to structural questions by means of posters or frontal presentations (15 - 30 min. each). The course will be concluded by a certified examination and yields 5 points of merit in the European system of credit transfer.

Tuition fees including the cost of printed handouts US$ 200 for university students, US$ 400 for personnel from state agencies such as geological surveys and US$ 800 for staff members of private companies. Payment, if possible in cash, preferable in Swiss Francs, upon arrival. Rate of exchange 1 US$ = 1.20 SFr. Letters of acceptance with a detailed programme and travel instructions will be sent after June 15th deadline.