



Source : CESSEM



**Centre d'Etudes Supérieures pour la Sécurité et l'Environnement Miniers (CESSEM)**

**One-year professionally oriented Specialized Master's Degree in:**

**Mining Operations and Environment**



Source : KPC - CESSEM



## **Specialized Master's in "Mining Operations and Environment" (2EM)**

**- Further training for managers in the mining sector in the field of mining operations and environment,**

**- 25 years' experience of working for international cooperation.**

### **- Presentation**

Created in 1991 at the French higher engineering institute Ecole des Mines d'Alès, the aim of the Center of Higher Studies for Mining Safety and the Environment (CESSEM) is to train engineers in the field of mining operations and environment (master's-level postgraduate further training diploma). The training program covers the concept of the sustainable management of mineral resources (Responsible Mining), with the evaluation and assessment of the environmental impacts and constraints of a mine during its various phases of activity: from prospection, through design and production, to the rehabilitation of the site. Based on the principle of cooperation–training, the CESSEM establishes and maintains a network of international partnerships with mineral raw material producing countries.

The CESSEM's program was modified in 2014 and accredited as a "Specialized Master's" degree by the *Conférence des Grandes Ecoles* (see: MS CGE, <http://www.cge.asso.fr/nos-labels/ms/785-exploitation-et-environnement-miniers-2em> ; n° de Ms : 958 (in French)). This professionally oriented further training is one of the Ecole des Mines d'Alès specialized programs, attached to its Industrial Environment Engineering Laboratory. In 12 months, it trains specialized engineers for the needs of the mining industry: <http://www.mines-ales.fr/pages/les-formations-specialisees-0> ).

### **- Training Objectives**

The objective of the specialized master's degree "Mining Operations and Environment" is to train managers to deal with the environmental issues linked to the activities of the mining industry (quarried materials, industrial rocks and minerals, ores), by providing them with sound knowledge in the:

- geosciences for engineering,
- methods and techniques for exploiting and processing mineral resources,
- conservation of the environment.

This basic training enables the trainees to acquire the scientific knowledge and technical and operational skills required in the 6 main segments of mining industry activities:

- 1 – Exploring mineral deposits,
- 2 – Modeling and estimating deposits,
- 3 – Feasibility studies, planning, extraction, and production,
- 4 - Processing and enhancing mineral resources,
- 5 - Environmental management and site rehabilitation,
- 6 - Management, economics, hygiene–health–safety, and social responsibility.

The program also includes a complementary managerial component on one function of the engineer, with a choice of one of the following job profiles:

- Unit Manager (UM),
- Commercial Engineer (CE),
- Strategy & Innovation Engineer-Manager (SIEM),
- Head of Complex Projects (HCP),
- International Business Developer (IBD),

### **- General Presentation of the Program**

The program trains twelve to fifteen post-diploma further training students for a period of one year, starting in the last week of August. *The curriculum is organized in 3 periods, each worth 25 ECTS credits:*

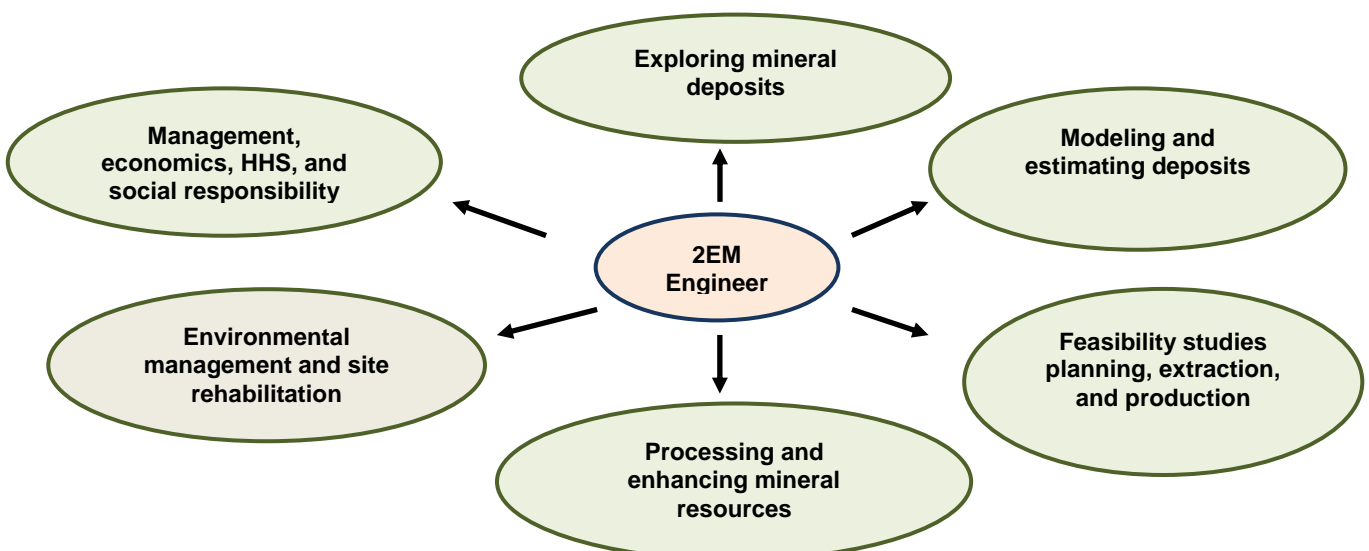
- *Two periods of knowledge and skills acquisition, making 7 months of presential training with classes, tutorials, and simulation exercises enabling trainees to put into practice the training they receive centered on a thematic project developed around the concept of the responsible and wise exploitation of mineral resources.* The training program includes site visits (in France and abroad), and lectures by experts on topical subjects. The training is organized in modules, which include the assessment of trainees,

- *The final period is devoted to putting into practice and developing the skills acquired in the framework of a final internship (professional thesis) of at least 4 months, carried out in a company linked to the trainee's professional orientation.* The defense of the final internship project and graduation take place in September.

*A week of refresher courses is given during the last week of August for trainees without sufficient prerequisites in geosciences and company management/economics.* The training will be given in French. If necessary, non-francophone trainees will attend at least 2 months of intensive French classes before joining the training program at the end of August.

The teaching and guidance of the trainees will be carried out by lecturers and researchers from the Ecole des Mines d'Alès, and by external contributors from the professional field. The program is summarized below:

#### **CESSEM skills covering the 6 segments of mining activity:**



## Organization of the Curriculum

Program length: 12 months											
J	A	S	O	N	D		January	February	March	April to September	
Non-francophone trainees: learn French <sup>1*</sup>  - Basic modules <sup>2*</sup>		<b>Geology for the engineer, mineral resources, deposits, and exploration</b>  - Structural geology: rock mass stability  - Geology of mineral resources/metallogeny  - Exploration methods and techniques  - GIS and geological data management  - Estimation of deposits/geostatics,  - Geological modeling and mine planning  <b>Mining and production</b>  - Process and methods of exploiting surface mineral resources  - Blasting  - Production machinery (transport, loading)  - Mining geotechnics  - Open pit mining: basic concepts and techniques  - Underground mining: methods and techniques  - Processing and enhancement of mineral resources (Metso, Aggflow/Bruno, ore dressing)  - Site visits  <b>- Job Profiles<sup>3*</sup></b>					C h r i s t m a s  V a c a t i o n	<b>Environmental management and rehabilitation of mining sites; mining economics</b>  - Water management  - Mass transfer in porous media  - Storage of residues: tailings dams  - Analysis and management of environmental constraints linked to different phases of mining activity  - Environmental impact assessment: methodology  - Rehabilitation of mining sites: organization, design, methodology and technical management  - Regulations and mining safety: case study  - Mining economics and analysis of project risks  - Site visit	<b>Geological modeling and estimation of resources</b>  - Presentation and modeling of geological data (Surpac)  - Geological information and measurement tools (Coralis)  <b>Hygiene-Health-Safety Management</b>  - Maintenance  - Hygiene-Health-Safety regulations (RGIE)  - Environmental management and environmentally sensitive sites  - Energy management  - Wise and responsible management of mineral resources	<b>Simulation exercise</b>  - Simulation of a mining project: conceptual study of a project	<b>- Field visits to mining sites</b>  <b>- Final project</b>
							Preparatory courses		Period 1		

**1\*- Learning French:** non-francophone trainees are obliged, if necessary, to attend at least 2 months of intensive French classes (from July to the end of August) in a language center in France (at the expense of the trainee or his/her organization/company).

**2\* – Basic modules:** 1 week of refresher courses during the last week of August is required for trainees who do not have sufficient prerequisites in geosciences and company management/economics.

**3\* - Job profiles:** trainees will receive managerial training on one role of the engineer.

### **- Detailed presentation of the program**

<b>Module</b>		<b>Number of hours</b>	<b>Breakdown of coefficients</b>	<b>ECTS credits</b>
<b>UE 0 – Managerial training</b>				
<b>Module 2EM – 0.1</b>	<b>Job profiles:</b> - Unit Manager (UM), - Commercial Engineer (CE), - Strategy & Innovation Engineer-Manager (SIEM), - Head of Complex Projects (HCP), - International Business Developer (IBD),	150h	10	10
<b>UE 1 - Geology for the engineer, mineral resources, deposits, and exploration</b>				
<b>Module 2EM – 1.1</b>	- Structural geology: rock mass stability - Geology of mineral resources - Resource exploration methods and techniques - GIS and geological data management (setup/registration). - Estimation of deposits/geostatics - Mine modeling and planning	16h 16h 18h 12h 16h 16h	1 1 1 1 1 1	6
<b>UE 2 - Mining and production</b>				
<b>Module 2EM – 2.1</b>	- Basic technical concepts concerning the processes and methods of exploiting surface mineral resources - Blasting - Production machinery: transport and loading - Mining geotechnics - Open pit mining: basic concepts and techniques - Underground mining: methods and techniques	24h 21 14h 23h 16h 24h	2 1 1 1 1 2	12
<b>2EM – 2.2</b>	- Processing and enhancement of mineral resources; flow-sheet design tools. - Site visits	65h 8h	4	

<b>UE 3 - Environmental management and rehabilitation of mining sites; mining economics</b>				
<b>Module</b> <b>2EM – 3.1</b>	<ul style="list-style-type: none"> <li>- Water management: calculation of water level rises and hydraulic facilities</li> <li>- Mass transfer in porous media</li> <li>- Storage of residues: tailings dams</li> <li>- Analysis and management of environmental constraints linked to different phases of mining activity</li> <li>- Impact assessment and rehabilitation of mining sites: organization, design, methodology and technical management</li> <li>- Regulations and mining safety: case study</li> <li>- Mining economics</li> <li>- Analysis of economic risks</li> <li>- Site visit</li> </ul>	16h 16H 16h  16H  8h 12h 12h 8h 8h	1 1 1  1  1  1	6
<b>UE 4- Geological modeling and estimation of resources</b>				
<b>Module</b> <b>2EM – 4.1</b>	<ul style="list-style-type: none"> <li>- Presentation and modeling of geological data (Surpac/Geovia).</li> <li>- Geological information and measurement tools (Coralis).</li> </ul>	30h  14h	2  1	3
<b>UE 5 - Hygiene-Health-Safety Management, legislation and mining law, social responsibility</b>				
<b>Module</b> <b>2EM – 5.1</b>	<ul style="list-style-type: none"> <li>- Maintenance.</li> <li>- Hygiene–Health– Safety regulations (RGIE).</li> <li>- Environmental management of high environmental risk sites</li> <li>- Energy management</li> <li>- Wise and responsible management of mineral resources</li> </ul>	7h 8h  23h 15h  15h	 1  2 1  1	5
<b>UE 6 - Simulation exercise</b>				
<b>Module</b> <b>2EM – 6.1</b>	<ul style="list-style-type: none"> <li>- Simulation of a mining project: conceptual study of a project</li> <li>- Field visits to mining sites</li> </ul>	      120h	       Project: 2 Report: 1 Defense: 2  Report: 1	8
	<b>Total periods 1 and 2</b>	<b>785h</b>		<b>50</b>



	<b>EU 7 – Final Project</b>			
<b>Module</b> <b>2EM – 7.1</b>	Professional thesis in-company (Final Project)	4 moths	20	25
	<b>Total Master's 3 periods</b>	<b>12 moths</b>		<b>75</b>

### **- Description and organization of the professional thesis**

The professional thesis is carried out in the context of a company internship of at least 4 months between the beginning of April and the end of September. It deals with either a precise technical issue or a more global subject in the field of mining operations and/or the mining environment, proposed by the internship company. The subject concerned will be examined and validated by the head of the training program in function of its technical and professional nature. Pedagogical guidance will be jointly provided by a company tutor and a lecturer from the Ecole des Mines d'Alès. This study will culminate in the writing of a professional dissertation and an oral thesis defense. The trainee has the possibility to carry out this professional thesis in his or her original establishment (company or administrative body).

### **- Admission and selection**

The program trains twelve to fifteen post-diploma further training students for a period of one year, starting in the last week of August. To be eligible for the program, applicants must have obtained one of the following diplomas:

- *Master's diploma or equivalent (5 years of higher education) in a scientific and technological field,*
- *Engineering diploma or equivalent for managers with experience in the mining industry, geological or environmental consultancies, and national or international administrative bodies / public organizations,*
- *M1 diploma or equivalent (4 years of higher education) for applicants with at least 3 years of proven professional experience in the mining industry sector or in the environment and geosciences,*
- *Applicants holding an M1 diploma or equivalent without professional experience may exceptionally be selected by special dispensation according to the quality of their academic career and professional intentions,*
- *Doctorate diploma or equivalent,*
- *Foreign diploma equivalent to one of the French diplomas mentioned above.*

The first step in the selection process is a written application. The applicants preselected on the basis of their written application will be definitively selected after an interview (direct or by video-conference) and validation by the admissions jury of the master's program, made up of its senior scientific staff.

### **- Diploma:**

On successful completion of the program, the trainee will be granted a *Specialized Master's diploma (level 6 years of higher education) in "Mining Operations and Environment"*, accredited by the *Conférence des Grandes Ecoles (Ms CGE : <http://www.cge.asso.fr/en/cge-labelled-programmes/ms>)* and awarded by the Ecole des Mines d'Alès.

### **- Academic fees:**

- The academic fees are:
  - 6000 € for trainees with student status,
  - 11,000 € for trainees with employee status.

The payment conditions are as follows:

- 30% of the fees on confirmation of selection,
- 70% at the start of the program.

Students may be eligible for grants from organizations in their country of origin or from companies.

### **- Written application:**

The written application for the Specialized Master's "Mining Operations and Environment" should include the following documents:

- a curriculum vitae,
- a letter of application,
- a copy of your most recent diplomas,
- transcripts of your grades for the last two years of higher education,
- 2 reference letters,
- for employee-status applicants, a copy of the employer's attestation that he/she is in their employment,
- a copy of your identity card/passport,
- for foreign applicants, a birth certificate validated by the French Embassy in the applicant's country of origin.

**- Application deadline:** end of April for international applicants and end of June for national applicants.

### **- Training location:**

Ecole des Mines d'Alès  
6 avenue de Clavières  
30100 Alès  
France

### **- Contact:**

Ecole des Mines d'Alès  
Specialized Master's "Mining Operations and Environment"  
6 avenue de Clavières  
F. 30319 Alès Cedex

#### ***Hossein Ahmadzadeh: Head of Program***

Tel: +33 (0)4 66 78 56 60  
Mob: +33 (0)6 16 24 44 28  
[hossein.ahmadzadeh@mines-ales.fr](mailto:hossein.ahmadzadeh@mines-ales.fr)

#### ***Colette Bonnaud: Administrative Assistant***

Tel: +33 (0)4 66 78 56 51  
[colette.bonnaud@mines-ales.fr](mailto:colette.bonnaud@mines-ales.fr)