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# EMERALD: Master in Georesources Engineering

LAUNCH YOUR CAREER

IN RAW MATERIALS





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# Introduction



Our modern lifestyle relies on raw materials. From the iron and steel of our railway infrastructure to the gold and silver in the circuitry of smartphones: raw materials are everywhere. The transition to a climate neutral future requires cobalt for electric vehicles, lithium for rechargeable batteries, silicon for solar panels, and rare earth elements for wind turbines that generate renewable energy.

As the world grows smaller and more hyper-connected, the impact of society on the Earth has never been more visible. It is now clear that we need to shift to a circular economy in order to responsibly use the Earth's finite resources. But what can just one individual do to help? More than you think! Real change requires courage, innovative thinking, and collective action – the same skill set that EIT RawMaterials Academy looks for in prospective students. Are you ready to mine your raw talent, help shape a more circular, green economy, and create sustainable solutions for tomorrow?



# What do we offer students?

EIT RawMaterials Academy offers students a unique opportunity to learn in a dynamic environment, focusing on real-life challenges. Awarded by the EIT (European Institute of Innovation and Technology), a body of the European Union, the EIT Label is a certificate of quality that is granted only to excellent educational programmes at the master's and doctoral level.

As a student of an EIT-Labelled programme from EIT RawMaterials Academy, you'll be part of the largest European raw materials network with more than 300 organisations as partners, including higher education professionals, researchers, and industry experts from over 20 European countries. As an EIT Label student, you will be welcomed into this network and will champion and contribute to the EIT RawMaterials goals of finding new, innovative solutions to secure the sustainable supply of raw materials across the value chain: from exploration, mining and mineral

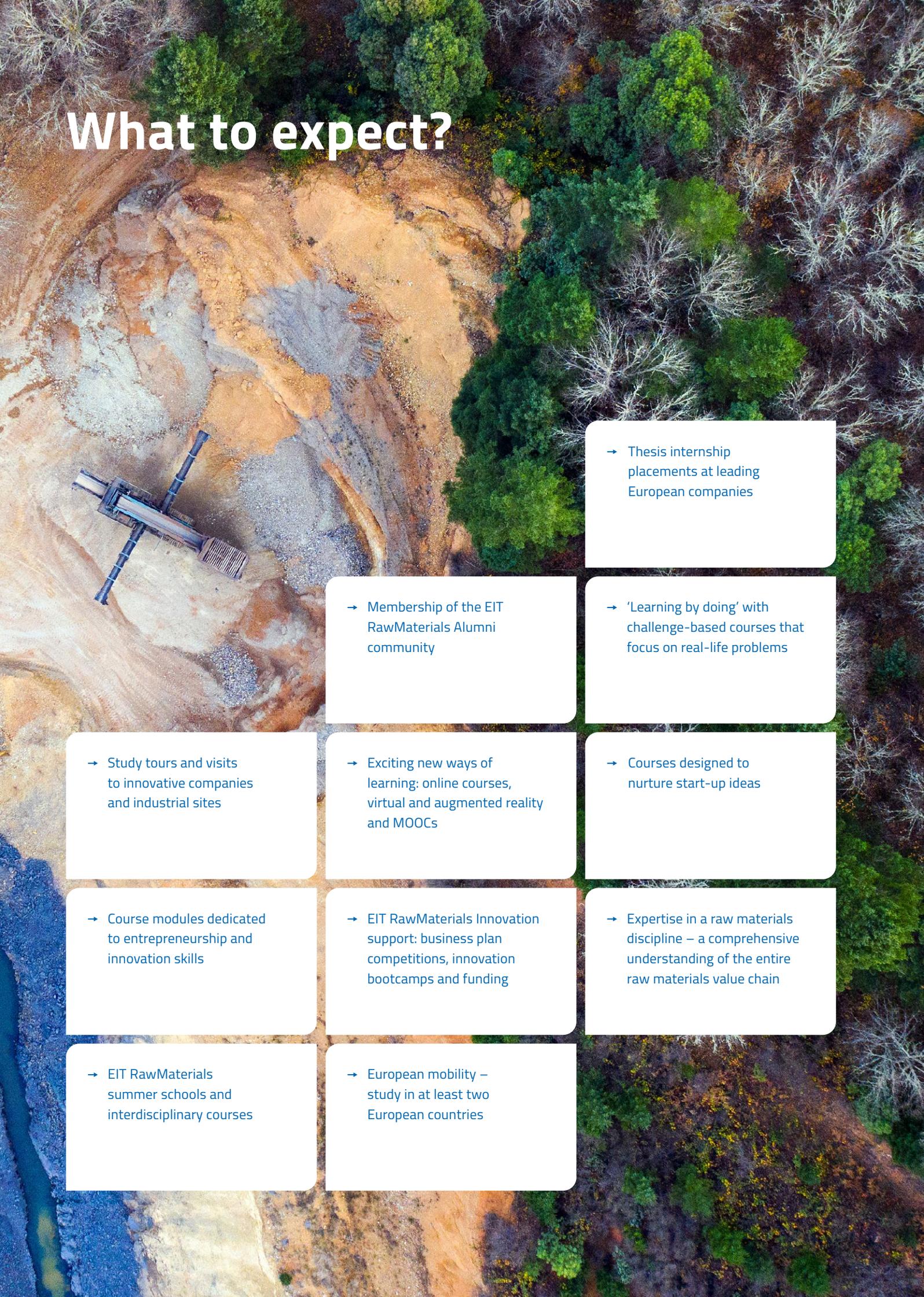
processing to recycling, substitution and a circular economy. EIT RawMaterials aims to equip a new generation of innovators in Europe with the necessary entrepreneurial mind-set for designing and delivering materials solutions. You'll also get the chance to collaborate internationally and develop sustainable solutions to pressing economic, environmental and societal challenges. And long after you graduate, you can stay connected via EIT RawMaterials Alumni.



JOIN AN EIT-LABELLED PROGRAMME AND BECOME A  
GLOBAL GAME-CHANGER, EQUIPPED WITH THE KNOWLEDGE,  
SKILLS AND EXPERIENCE EMPLOYERS SEEK.



# What to expect?

An aerial photograph of a quarry or mining site. The central part of the image shows a large, excavated area of reddish-brown earth and grey rock. A large piece of heavy machinery, possibly a conveyor system or a large drill, is visible in the lower-left quadrant of the quarry. The surrounding area is densely forested with green trees and some bare, greyish branches, suggesting a natural environment adjacent to the industrial site. The overall scene is captured from a high angle, looking down on the quarry.

→ Thesis internship placements at leading European companies

→ Membership of the EIT RawMaterials Alumni community

→ 'Learning by doing' with challenge-based courses that focus on real-life problems

→ Study tours and visits to innovative companies and industrial sites

→ Exciting new ways of learning: online courses, virtual and augmented reality and MOOCs

→ Courses designed to nurture start-up ideas

→ Course modules dedicated to entrepreneurship and innovation skills

→ EIT RawMaterials Innovation support: business plan competitions, innovation bootcamps and funding

→ Expertise in a raw materials discipline – a comprehensive understanding of the entire raw materials value chain

→ EIT RawMaterials summer schools and interdisciplinary courses

→ European mobility – study in at least two European countries

# Exclusive activities and support for EIT-Labelled students

Students on EIT-Labelled master's programmes within the EIT RawMaterials Academy receive a range of additional opportunities to boost their innovation and entrepreneurship skills, grow their network in the raw materials sector and gain the experience they need to thrive.

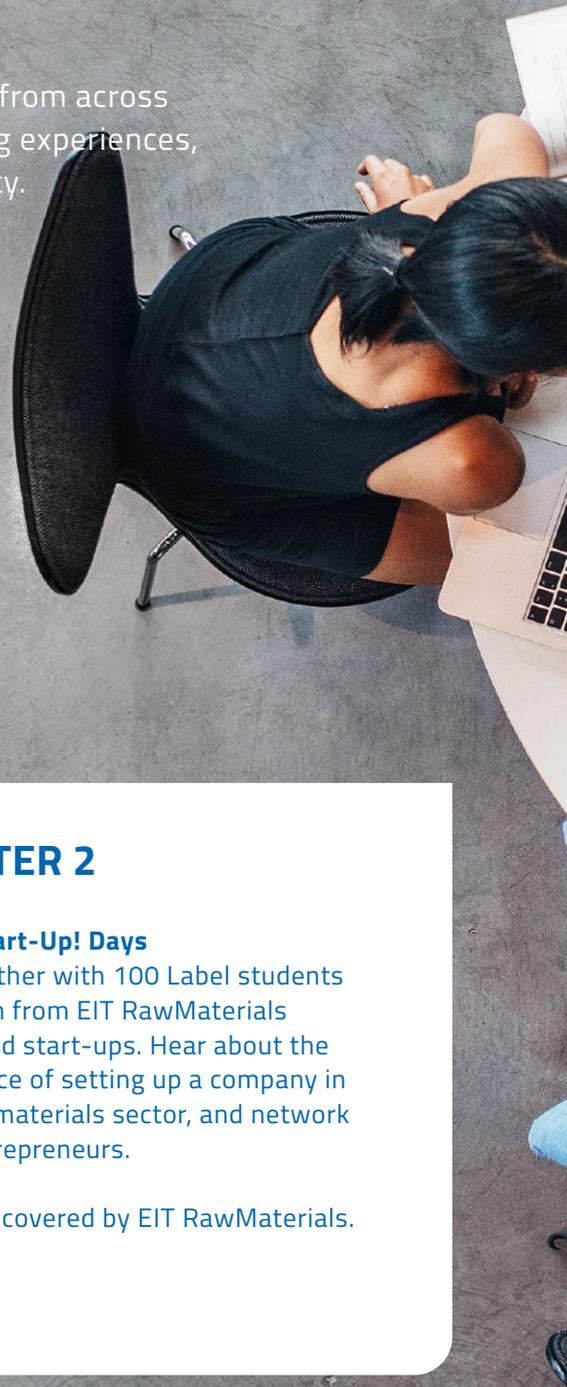
These exclusive events bring together EIT-Labelled students from across the Master School, and form the basis of your shared learning experiences, making you a full member of the EIT RawMaterials community.

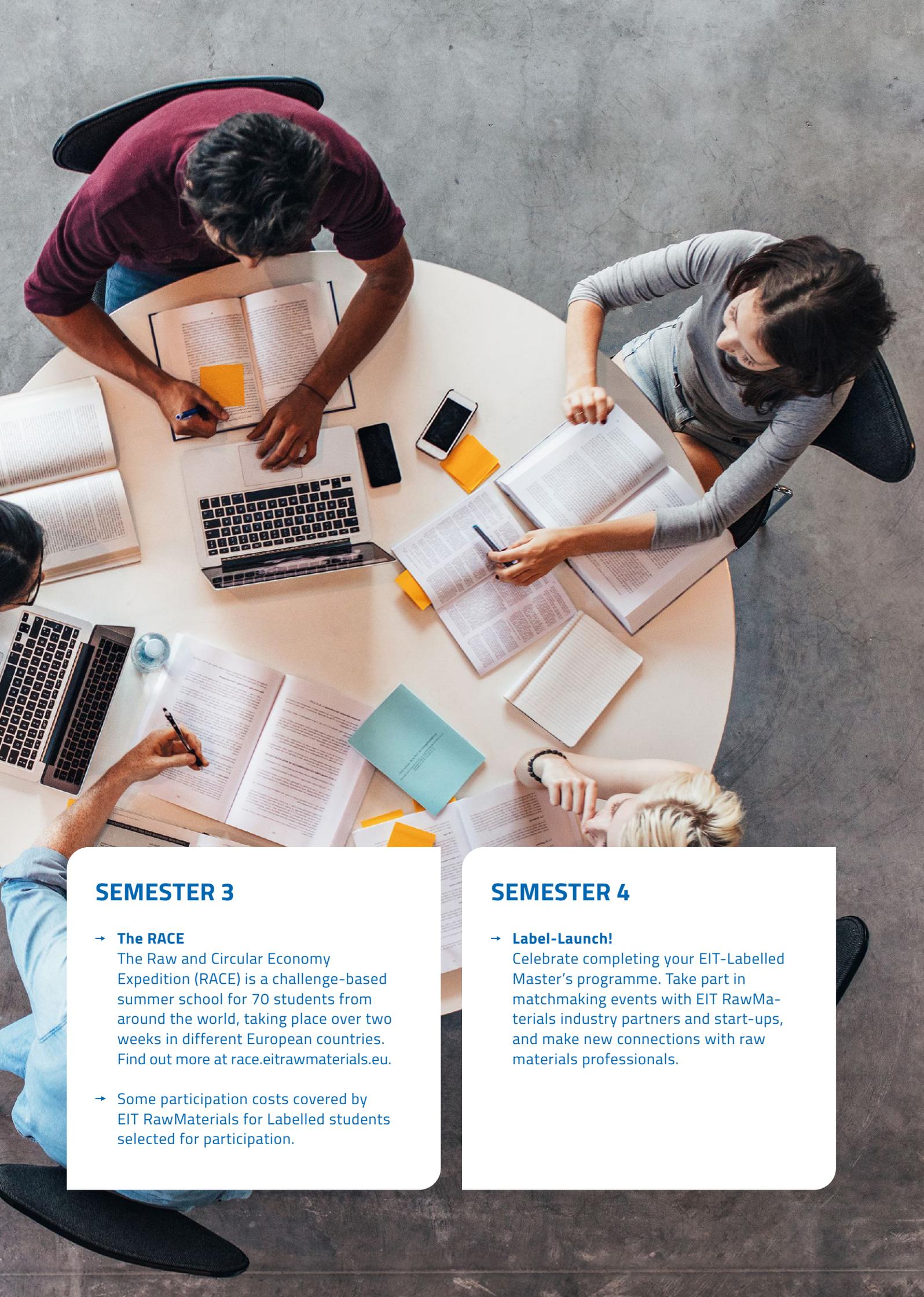
## SEMESTER 1

- **Label Induction Days**  
Meet the EIT RawMaterials Academy and learn how to get involved in our community and access the many opportunities on offer. Sign up for EIT RawMaterials Alumni and start growing your network.
- Vote for your representative on the Label Student Board, or stand for election!

## SEMESTER 2

- **Label Start-Up! Days**  
Get together with 100 Label students and learn from EIT RawMaterials supported start-ups. Hear about the experience of setting up a company in the raw materials sector, and network with entrepreneurs.
- All costs covered by EIT RawMaterials.





## SEMESTER 3

### → The RACE

The Raw and Circular Economy Expedition (RACE) is a challenge-based summer school for 70 students from around the world, taking place over two weeks in different European countries. Find out more at [race.eitrawmaterials.eu](http://race.eitrawmaterials.eu).

- Some participation costs covered by EIT RawMaterials for Labelled students selected for participation.

## SEMESTER 4

### → Label-Launch!

Celebrate completing your EIT-Labelled Master's programme. Take part in matchmaking events with EIT RawMaterials industry partners and start-ups, and make new connections with raw materials professionals.

# Do you have a raw materials business idea?

EIT RawMaterials offers a range of support for individuals and companies with innovative business ideas, including:

## Lab2Market

- A three-term entrepreneurship training programme, exclusively for EIT Label students and graduates. Lab2Market will help you come up with a business idea, create a start-up and connect you with investors and customers. Grants are available for selected participants.

## EIT Jumpstarter

- One of Europe's top pre-accelerator programmes, to help you develop your business idea and understand what's needed to create a successful start-up.

## EIT RawMaterials Accelerator

- A three-stage accelerator programme to help start-ups with a developed product to bring their solution to the market.

## Booster Call

- Financial and network access support for start-ups and SMEs in the raw materials sector.

# EIT RawMaterials Alumni

From the moment you join an EIT-Labelled Master's programme in the EIT RawMaterials Academy, you are eligible to join EIT RawMaterials Alumni. This organisation provides a great opportunity to connect with the EIT RawMaterials ecosystem and varied EIT RawMaterials activities, such as business idea competitions, start-ups, professional development courses and Master's and PhD programmes.

It is run by and for its members, who can take part in events, and develop their careers through internships and job offers, networking activities and much more, forming a hub for a diverse range of raw materials students, academics and professionals. Furthermore, EIT RawMaterials Alumni provides you with a connection to the wider EIT Alumni community and alumni events around Europe.





# Master in Georesources Engineering

(Innovative Education in Geometallurgy and Circular Economy)  
Awarded the EIT Label in 2016

## THE CHALLENGE

The EMerald master's programme was created to answer the urgent need expressed by the European Union to create a resource-efficient Europe. As the EU recognised the importance of mineral and metal resources in our modern economy, it also realised that the raw materials industries were facing a critical skills shortage.

The EMerald master's programme aims to train a new generation of engineers with an entrepreneurial mind-set and a global vision of the value chain, putting the extraction of mineral and metal resources on a circle that continues by collecting end-of-life products and recovering valuable materials out of urban mines (circular economy). Therefore, the master's course focuses on two aspects:

- Bridging the gap between geological exploration and mineral processing by offering innovative education in geometallurgy
- Helping to close the loop in a resource-efficient way by forming professionals who know the processing challenges and the need to meet targets in terms of recyclability

<b>Multiple Diploma</b>	The consortium will deliver a triple diploma (one from each university where the student attended lectures) and a Diploma Supplement from the coordinating university: <ul style="list-style-type: none"> <li>– Ingénieur Civil des Mines et Géologue delivered by University of Liège (ULiège)</li> <li>– Master Sciences de la Terre et des Planètes Environnement delivered by University of Lorraine (UL)</li> <li>– Master of Science – Major: Geosciences delivered by Luleå University of Technology (LTU)</li> <li>– Master in Mechanical and Process Engineering delivered by Technische Universität Bergakademie Freiberg (TUBAF)</li> <li>– EIT Label Certificate</li> </ul>
<b>Credits</b>	120 ECTS, 24 months
<b>Language of Instruction</b>	English
<b>Starts in</b>	September
<b>Requirement</b>	Eligible candidates must have a bachelor's degree in Engineering with basic knowledge in Geology or a bachelor's degree in Minerals Engineering, Mining Engineering, Chemical Engineering, Geological Engineering, Metallurgical Engineering or a master's degree in Geology. At least 22.5 ECTS in Mathematics at university level are required. Candidates must also demonstrate proficiency in the English language.
<b>Tuition fees</b>	EU students 2023: €4,500/year Non-EU students 2023: €9,000/year For up-to-date fee information, visit <a href="http://www.em-georesources.eu">www.em-georesources.eu</a>
<b>Application Period</b>	Applications to the Erasmus Mundus Scholarships for both EU and NON-EU students: from Nov 6 <sup>th</sup> 2023 to March 1 <sup>st</sup> 2024 Applications for non-EU students to partial grants or as self-funded students: From Nov 6 <sup>th</sup> 2023 to March 1 <sup>st</sup> 2024 Applications for EU students to partial grants or as self-funded students: from April 30 <sup>th</sup> to June 30 <sup>th</sup> 2024
<b>Scholarships</b>	Erasmus Mundus scholarships are available for the 2024 intake. Applications must be submitted through the EMerald website. For students beginning in September 2024, EIT Label scholarships from EIT RawMaterials of €15,000 per eligible student are available. For information on how EIT Label scholarships will be awarded and who is eligible, please contact the coordinating university directly at <a href="mailto:emerald@uliege.be">emerald@uliege.be</a> .

#### PARTICIPATING UNIVERSITIES

##### University of Liège

Belgium

##### University of Lorraine, ENSG Nancy

France

##### Luleå University of Technology

Sweden

##### TU Bergakademie Freiberg

Germany

#### FOR MORE INFORMATION

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# Programme Structure

EMerald is organised into four semesters and accounts for 120 ECTS or 30 ECTS per semester.

The first year of the programme aims to harmonise students' knowledge and help them find the right balance between resource characterisation and modelling, and processing and management techniques (multidisciplinarity). The thematic courses offered by the two universities (ULiège and UL) are complemented by a strong programme to develop transversal skills. Industry experts and invited scholars bring in key contributions on corporate social responsibility, economics, life cycle analysis and other essential aspects of modern sustainable engineering operations. All courses offer a blend of theoretical lectures and practical work in the labs. Students often work in groups on a real

case study, discovering possible processing routes for complex ores and waste materials. The third semester offers students the option to specialise more upstream at LTU (primary resources) or downstream at TUBAF (secondary resources). The final semester can be spent in any of the aforementioned institutions depending on the thesis specialisation. Regardless of the location, the master thesis will be completed in close collaboration with an industrial partner or a research centre that will also host the students for an internship. The full catalogue of courses is available on the EMerald website: [www.em-georesources.eu](http://www.em-georesources.eu)



“Being an EMerald student, studying in renowned universities, and having contact with people from all around the world allowed me to grow professionally and mainly, personally. The programme not only opened my mind to new concepts but taught me how to think about our resources with a new approach. It has also offered me the possibility to work nowadays in an environment where I feel useful in building a sustainable world for the next generations.”

— **BARBARA DORNELAS, BRAZIL (EMERALD)**

## YEAR 1

HARMONISATION, TEAM BUILDING, EXPERIENCE EUROPE

### SEMESTER 1 (30 ECTS)

University of Liège

#### Select courses for 30 ECTS between:

- Process Mineralogy (5 ECTS)
- Solid Waste and By-Products Processing (5 ECTS)
- Geostatistics (5 ECTS)
- Seminars on Economical and Societal Issues
- Mining and Recycling (5 ECTS)
- Mineral Resources (5 ECTS)
- Mineral Processing (5 ECTS)
- Numerical Analysis (5 ECTS)
- Exploitation of Mineral Deposits (5 ECTS)

### SEMESTER 2 (30 ECTS)

University of Lorraine

- Advanced Characterisation of Mineral/Water interface (5 ECTS)
- Case Study of Ore Processing (5 ECTS)
- Resources Modelling and Evaluation (5 ECTS)
- Management of Resources (5 ECTS)
- Exploitation of Mineral Raw Materials and Environmental Impact of Mining (2 ECTS)
- Advanced Mineral Processing (8 ECTS)



SUMMER BUSINESS SCHOOL



## YEAR 2

CIRCULAR ECONOMY, SPECIALISATION IN PRIMARY OR SECONDARY RESOURCES

### SEMESTER 3 (30 ECTS)

Luleå University of Technology  
Primary Resources

- Mining Geology (7.5 ECTS)
- Mineral Processing II (7.5 ECTS)
- Geometallurgy (7.5 ECTS)
- Simulation of Mineral Processing (7.5 ECTS)

### SEMESTER 3 (30 ECTS)

TU Bergakademie Freiberg  
Secondary Resources

- Project- Process Design Mineral Processing/ Recycling (8 ECTS)
- Practice of Secondary Raw Materials (4 ECTS)
- Thermodynamics and Heat Transfer (4 ECTS)
- Selective Separation of Strategic Elements (5 ECTS)
- Resource Management (6 ECTS)

#### Elective courses:

- Mineral Liberation Analysis of Mineral Resources (3 ECTS)
- Simulation of Sustainable Metallurgical Process (6 ECTS)

### SEMESTER 4 (30 ECTS)

University of Liège

### SEMESTER 4 (30 ECTS)

University of Lorraine

### SEMESTER 4 (30 ECTS)

Lulea University of Technology

### SEMESTER 4 (30 ECTS)

TU Bergakademie Freiberg

Master thesis



# Master in Georesources Engineering

(Innovative Education in Geometallurgy and Circular Economy)  
Awarded the EIT Label in 2016

## PROFESSIONAL PROFILES AFTER GRADUATION

The knowledge and skills EMerald graduates gain are highly valued in the industry and beyond. Not only are EMerald graduates qualified to work in the fields of mining, building materials (cement, aggregates), non-ferrous metals production and circular economy of metals and mineral chemistry; possible career paths also include working for:

- Geological surveys
- Junior exploration companies
- Investment banks (resources sector)
- Venture capital (resources sector)
- EU Commission (raw materials and industry)
- National/regional governments (mining laws, implementing circular economy, mineral industry)
- EMerald also prepares you for further study (PhD) in mineral processing, geometallurgy, resources/reserves estimation, process development, mineral industry, etc.



## ARE YOU A STUDENT WHO IS:

- Interested in sparking innovation in the raw materials sector?
- Keen to become entrepreneurial and start your own company?
- Interested in bridging the gap between geology and metallurgy?
- Curious to acquire understanding of the whole raw materials value chain?
- Motivated to expand your professional network by studying with at least three European universities?

VISIT [EM-GEORESOURCES.EU](https://em-georesources.eu)  
TO FIND OUT MORE AND APPLY

# Programmes

Nine Master's programmes within the EIT RawMaterials Academy hold the EIT Label. Graduates from all EIT-Labelled programmes are awarded a degree from one or more of the participating universities, with an EIT Label Certificate confirming graduation from an EIT-Labelled programme.



## AMIR

Master in  
Advanced Materials:  
Innovative Recycling



## AMIS

Master in Advanced  
Materials for Innovation  
and Sustainability



## EMerald

Master in Georesources  
Engineering (Innovative  
Education in Geometallurgy  
and Circular Economy)



## MEITIM

Master in Entrepreneurship,  
Innovation and Technology  
Integration in Mining



## RaVeN

Master in  
Mining Engineering



## SINReM

International Master  
of Science in Sustainable  
and Innovative Natural  
Resource Management



## SUMA

Master in  
Sustainable Materials



## TIMREX

Master in  
Mineral Exploration

Labelled by:



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