# Department of Materials Science and Metallurgical Engineering

## Bachelor of Engineering in Metallurgical Engineering

### What does the programme entail?

South Africa is not only blessed with the world's largest deposits of gold, chromium, platinum, vanadium and manganese, but also has extensive reserves of iron, lead, zinc, copper, nickel, coal and diamonds. The minerals industry contributes 50% of South Africa's exports and is one of the largest employers in the country. Metallurgical engineers play a key role in the production of minerals and metals and help to process metals into final products with added value. In this way, the maximum income is generated in local and international markets. Components made from metals and other materials are designed to perform optimally in all aspects of modern life.

**Minerals processing**
Processing the ore to release and concentrate the valuable minerals contained in it.

**Extractive metallurgy**
The processing of mineral concentrates to metals through pyrometallurgy (including smelting) or hydrometallurgy (including leaching) as refining steps.

**The three main fields of specialisation in metallurgical engineering**

**Materials production, performance and integrity**
This field entails the development of new alloys, the production of useful materials and products from raw metals, including forming through casting, 3D printing using lasers and joining through welding. The forensic investigation of failures is also of great importance.

LEARN MORE

### Career opportunities

Metallurgical engineers unlock the riches of deposits of metal ores and minerals and optimise the manufacture and performance of metallic components. You will find metallurgical engineers where valuable minerals are recovered from ore, where metals are produced from the minerals and where the metals are converted into useful materials, as well as into high-performance products. Areas of specialisation include minerals processing, extractive metallurgy, materials engineering and performance, advanced manufacturing processes, including laser-assisted additive manufacturing and welding, as well as failure analysis and forensic engineering.

Careers include production engineers, plant managers, consultants, forensic engineers and researchers.

### What makes this programme unique?

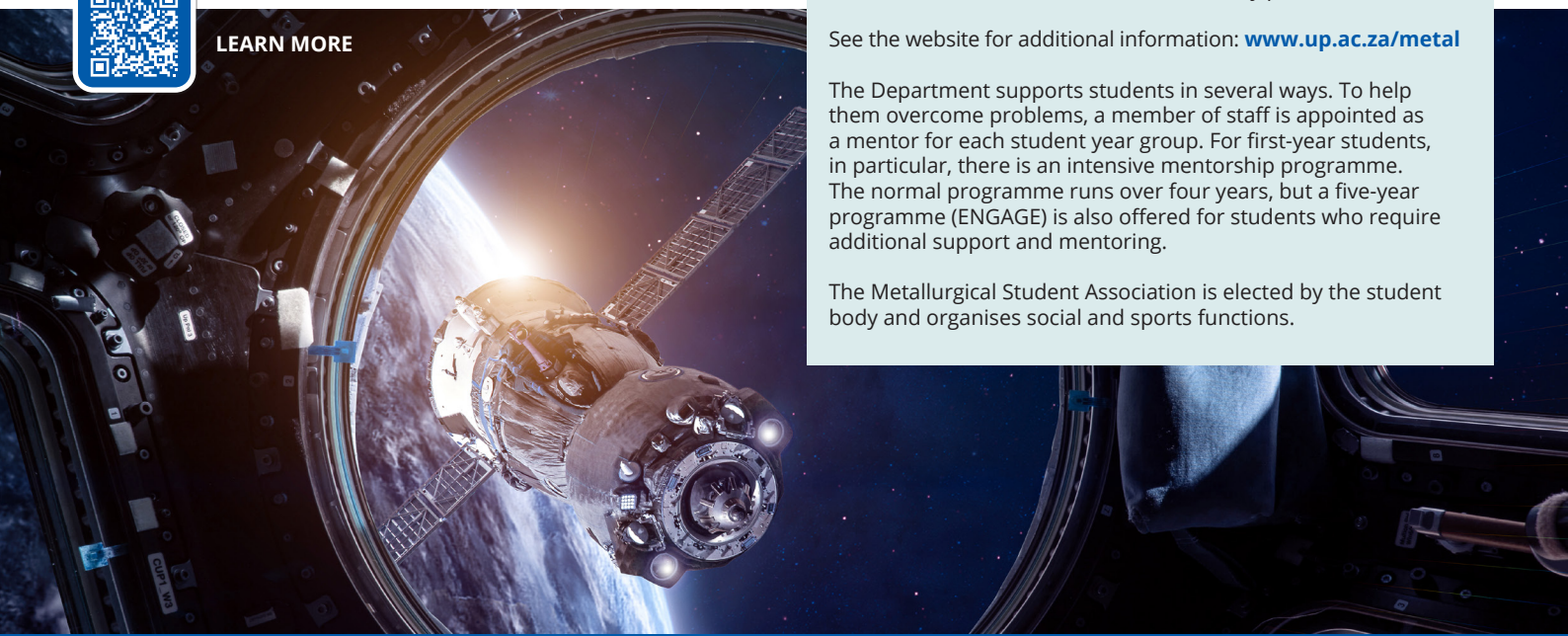
As the leading metallurgical engineering department in South Africa, the Department of Materials Science and Metallurgical Engineering currently plays a prominent role in the education of metallurgical engineers for the South African metallurgical and mining industries, and its graduates are in high demand. Many graduate engineers from other disciplines take postgraduate programmes in the Department to enhance their skills in the rich minerals industry in South Africa and abroad.

Unconditional accreditation by the Engineering Council of South Africa (ECSA) is a confirmation of the quality of undergraduate teaching in the Department, and the degree currently enjoys international recognition. Staff members consult with and conduct research for industry and maintain close contact with local metallurgical industries to ensure that teaching and research are in line with industry needs. Sophisticated research equipment is available in the Department, as well as in the Industrial Metals and Minerals Institute (IMMRI), which is located in the Department. Bursaries for metallurgical engineering students are available from various industry partners.

See the website for additional information: **www.up.ac.za/metal**

The Department supports students in several ways. To help them overcome problems, a member of staff is appointed as a mentor for each student year group. For first-year students, in particular, there is an intensive mentorship programme. The normal programme runs over four years, but a five-year programme (ENGAGE) is also offered for students who require additional support and mentoring.

The Metallurgical Student Association is elected by the student body and organises social and sports functions.



# METALLURGICAL ENGINEERING

Design, manage and optimise the processes where minerals are beneficiated and metals produced.

Extract and process metals from minerals into products that have commercial value and generate income.

Develop plans to optimally extract minerals and metals from the earth.

Minimise the environmental impact of metallurgical processes.

**Fields in which metallurgical engineers contribute their expertise**

Develop manufacturing processes and monitor the production and use of components and products made from metals and alloys.

Design innovative new components and products for the future.

Investigate the reasons for the failure of components through forensic analysis and testing.

Research the best methods to manufacture components and products for various applications, including aerospace and medical implants.

## Minimum admission requirements

**Bachelor of Engineering in Metallurgical Engineering:**
Minimum requirements for NSC/IEB for 2025

**APS: 35**

**Achievement levels required for specific subjects:**

- English Home Language or English First Additional Language: **Level 5**
- Mathematics: **Level 6**
- Physical Sciences: **Level 6**

The suggested second-choice programmes for Bachelor of Engineering in Metallurgical Engineering are Bachelor of Science *Chemistry*, Bachelor of Science *Mathematics* and Bachelor of Science *Physics* if your APS and subject requirements for your first-choice programme are not obtained.

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## 4-YEAR PROGRAMME

**Want to apply? Follow the online application process for prospective students on our website:**
**www.up.ac.za/apply**

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