



Undergraduate Information Materials Science and Metallurgical Engineering

Department of Materials Science and
Metallurgical Engineering

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Make today matter



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en
Inligtingtegnologie / Lefapha la Boetšenere,
Tikologo ya Kago le Theknološi ya Tshedimošo



1. Who are we?

2. What do we do?

3. What does our programme entail?

4. Tell me more about your facilities and staff.

5. What will my career be like?

6. How will I help the community?

7. Industry partners

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Contact us





The Department of Materials Science and Metallurgical Engineering

>> Part of the School of Engineering

>> Part of the Faculty of Engineering, Built Environment and Information Technology

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Who are we?



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1 Our history



Faculty of
Engineering,
Built Environment
and Information
Technology - 1956



Established in
1958
as one of the first
departments



Engineering Council of South Africa

The programme
is fully accredited
by **ECSA**
(2017-2021)



[Click here for more information on the history of the Department](#)

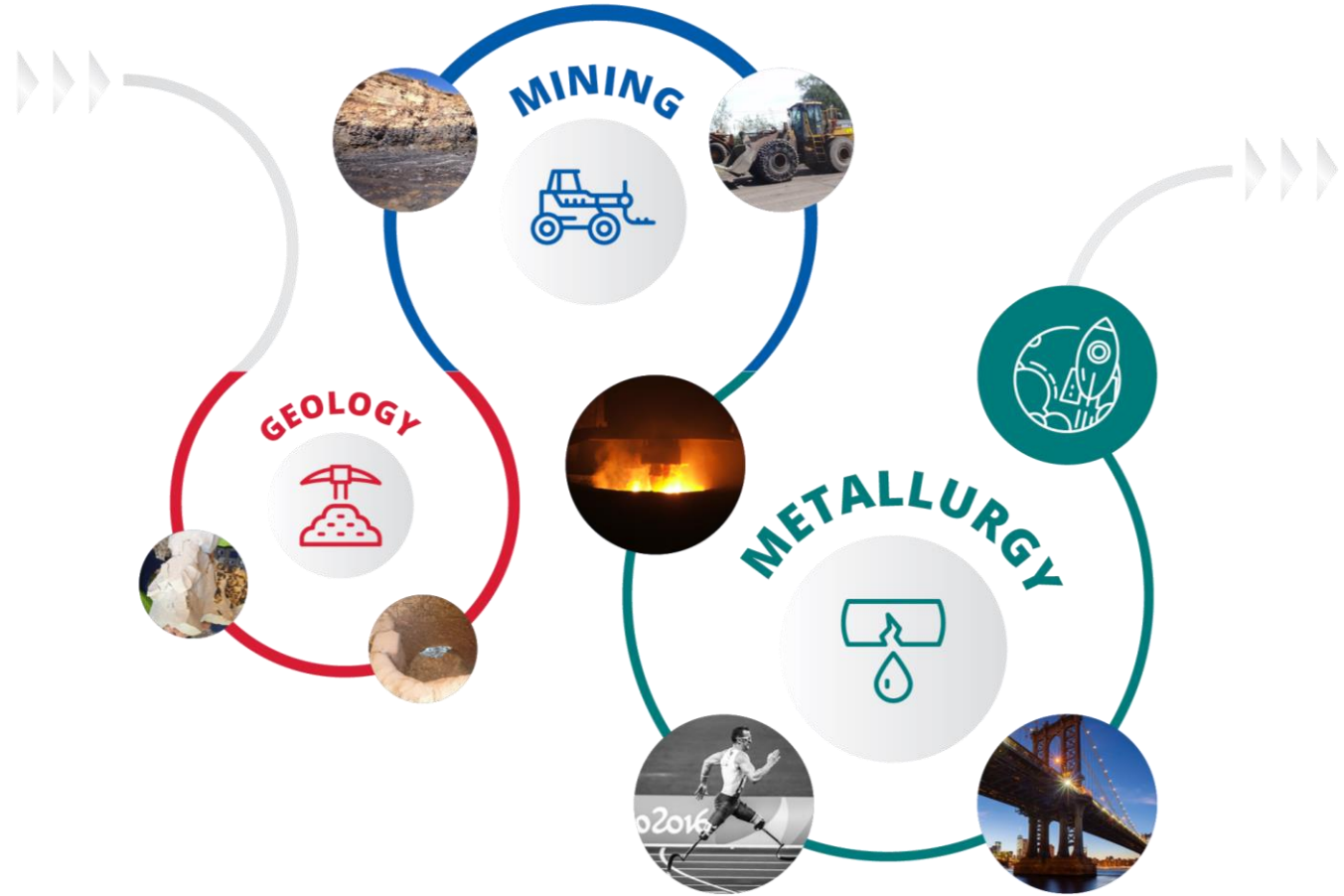
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1 Our context

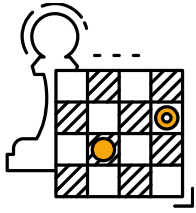
Minerals from Exploration to Utilisation



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2

What do we do

Metallurgical Engineers ensure that industrial equipment functions well by optimising the material properties through processing and treatment.

When the components fail, forensic metallurgists investigate it to find and correct the cause.



South Africa is blessed with the world's largest mineral deposits of gold, chromium, platinum, vanadium and manganese. This country also has large reserves of iron, lead, zinc, copper, nickel, titanium, coal and diamonds. The minerals industry contributes to some 50% of South Africa's exports and is one of the largest employers in the country.

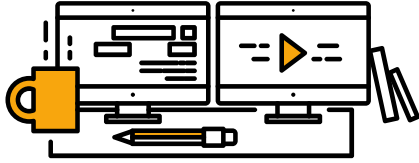
The metallurgical engineer plays a key role in the extraction of minerals and metals. Metallurgical engineers help to process metals into final products with added value. In this way, maximum income is generated in international markets. Components made from metals and other materials are used in all aspects of modern life.



[Click here for more information on Metallurgical Engineering](#)

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3 What does our programme entail?

The programme is there to ensure that you reach eleven exit level outcomes (ELOs) required for professional registration with the Engineering Council of South Africa (ECSA).

It also includes 43 modules spread over four years, ensuring that you achieve competency in the ELOs.



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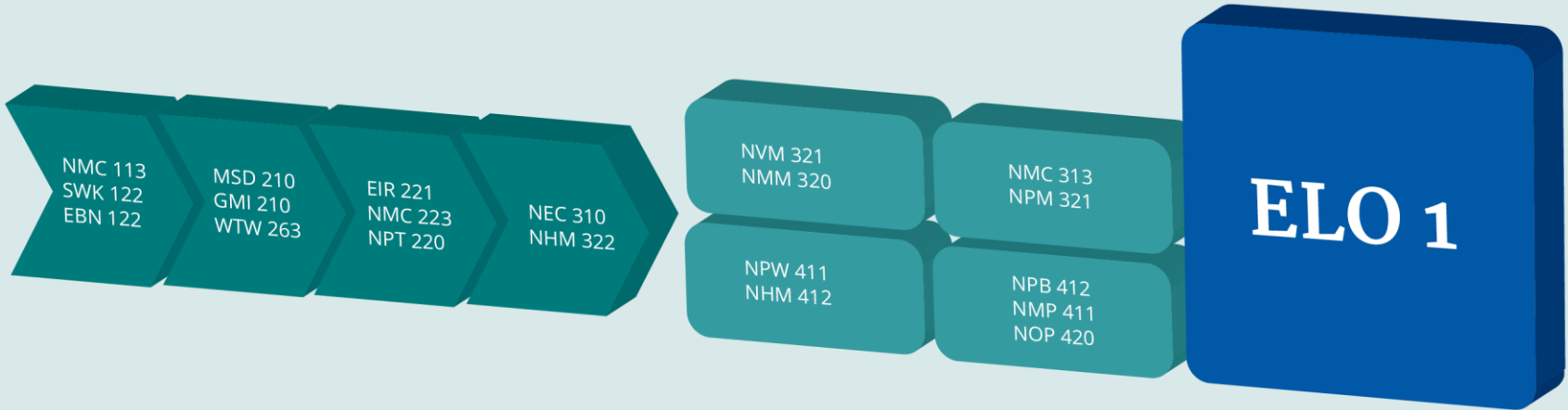




Problem solving

Learning outcome

Demonstrate competence to identify, assess, formulate and solve convergent and divergent engineering problems creatively and innovatively.



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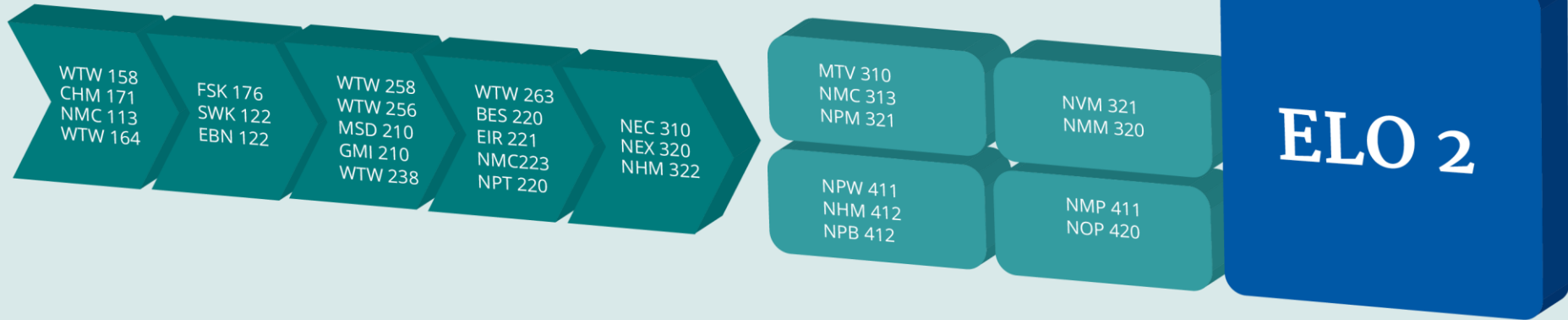




Application of scientific and engineering knowledge

Learning outcome

Demonstrate competence to apply knowledge of mathematics, basic science and engineering sciences from first principles to solve engineering problems.



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Engineering design

Learning outcome

Demonstrate competence to perform creative, procedural and non-procedural design and synthesis of components, systems, engineering works, products or processes.



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Investigations, experiments and data analysis

Learning outcome

Demonstrate competence to design and conduct investigations and experiments.



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Engineering methods, skills and tools, including information technology

Learning outcome

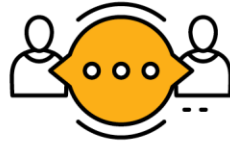
Demonstrate competence to use appropriate engineering methods, skills and tools, including those based on information technology.



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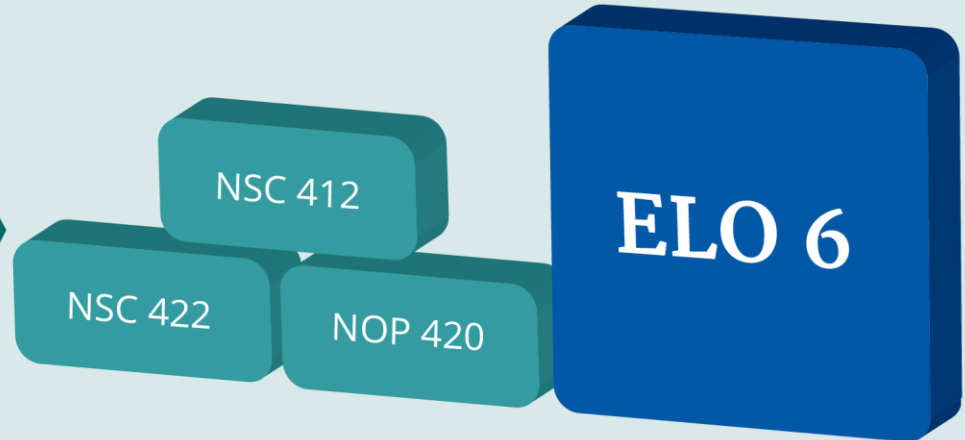
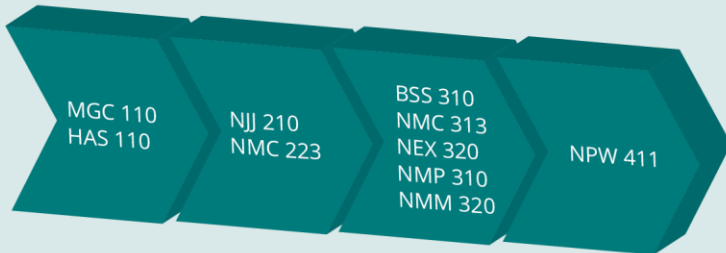




Professional and technical communication

Learning outcome

Demonstrate competence to communicate effectively, both orally and in writing, with engineering audiences and the community at large.



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Impact of engineering activity

Learning outcome

Demonstrate critical awareness of the impact of engineering activity on the social, industrial and physical environment.



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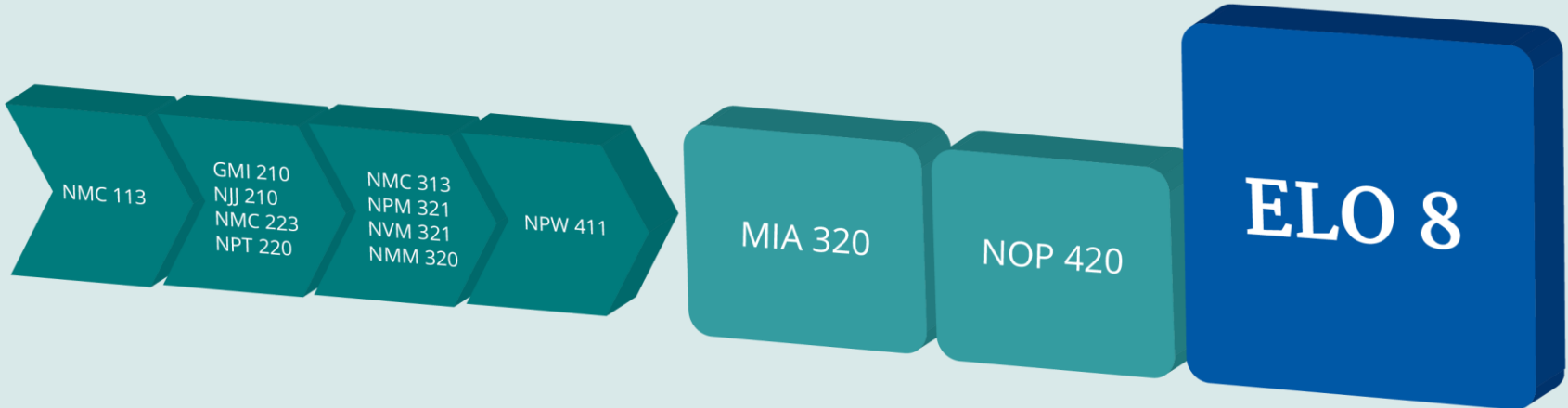




Individual, team and multidisciplinary working

Learning outcome

Demonstrate competence to work effectively as an individual, in teams and in multidisciplinary environments.



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Independent learning ability

Learning outcome

Demonstrate competence to engage in independent learning through well-developed learning skills.



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Engineering professionalism

Learning outcome

Demonstrate critical awareness of the need to act professionally and ethically and to exercise judgment and take responsibility within own limits of competence.



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Engineering management

Learning outcome

Demonstrate knowledge and understanding of engineering management principles and economic decision-making.



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Facilities



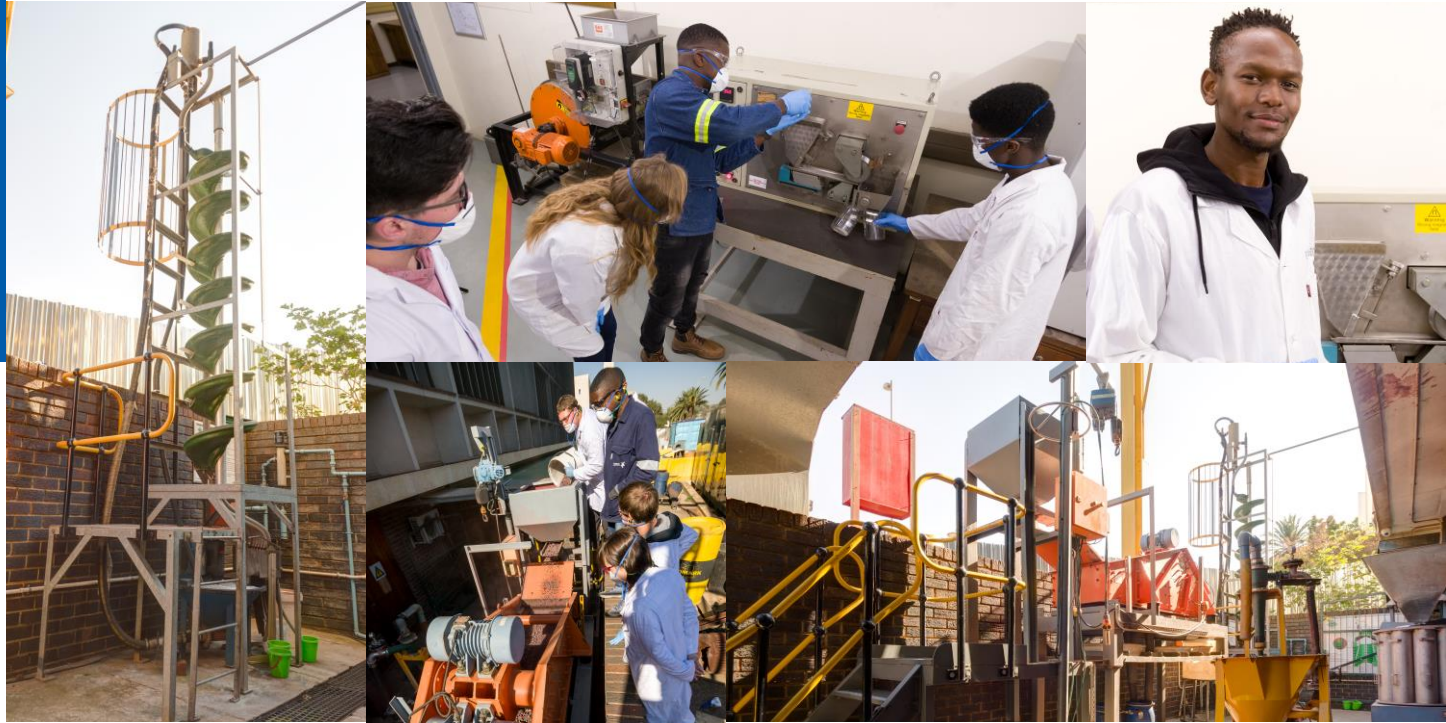
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Facilities



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Staff

Materials Engineering, Processing and Performance Focus Area



Prof Roelf Mostert
**Head of
Department**



Prof Pieter Pistorius



Prof Charles Siyasiya



Prof Waldo Stumpf



Dr Kofi Annan



Dr Hein Möller



Mr Vinod Kurup



Mr Sibusiso Mahlelela



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our staff

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Pyrometallurgy Research Focus Area



Prof Andrie Garbers-
Craig



Prof Johan de Villiers



Dr Robert Cromarty



Dr Johan Zietsman



Mr Dirk Odendaal

Minerals Processing Focus Area



Dr Natasia Naude



Dr Victor Ross



Mr Mfesane Tshazi



Mr Wynand Roux



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Hydrometallurgy Focus Area



Prof Roelf Sandenbergh



Dr Theresa Coetzee



Dr Kathy Sole



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What will my career be like?



What does a metallurgical engineer do?



Metallurgical engineers —

- Devise plans to optimally extract minerals from the earth
- Develop and manage mineral product quality
- Develop, manufacture and monitor the production and use of components made from metals and alloys
- Research the best methods to manufacture components for various applications including aerospace and medical implants
- Manage the environmental impact of processing plants (manufacturing processes)
- Design innovative new components for the future
- Investigate reasons for failure of components (forensic analysis and testing)

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How will I help the community?



Materials and Metallurgical Engineers play a very important part in societies and communities.

The video link below demonstrates how metallurgical students participated in a project to ensure that an innovative vehicle is constructed for a disadvantaged individual.

Our engineers have intimate knowledge about the best materials for the best job and how best to manufacture a specific item. Through their knowledge of processing valuable minerals, they contribute to the economy by generating jobs and wealth from our abundance of minerals.



[Click here to see how our students helped a disadvantaged person achieve a dream.](#)

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Career opportunities

Graduates in metallurgical engineering are responsible for process/component design and optimisation, commissioning, marketing, business analysis and research.

The metallurgical engineer plays a key role in the process of extracting wealth from the resources of South Africa and can be involved in **three major fields** of specialisation in metallurgical engineering:



Minerals processing

Processing the ore to release and concentrate the valuable minerals from the minerals resource.



Extractive metallurgy

The processing of mineral concentrates to metals through pyrometallurgy, for example, smelting or hydrometallurgy as recovery step.



Materials production, performance and integrity

The development of new alloys, the production of useful materials from raw metals, forming through casting and joining through welding, for instance. The forensic investigation of failures is also of great importance.

There is a place for everyone in metallurgical engineering!

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Industry partners



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Contact us

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Please contact Prof Roelf Mostert (HoD) or Dr Hein Möller

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