Undergraduate Information Materials Science and Metallurgical Engineering

Department of Materials Science and Metallurgical Engineering

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 Theknolotši ya Tshedimošo

www.up.ac.za/metal

Make today matter

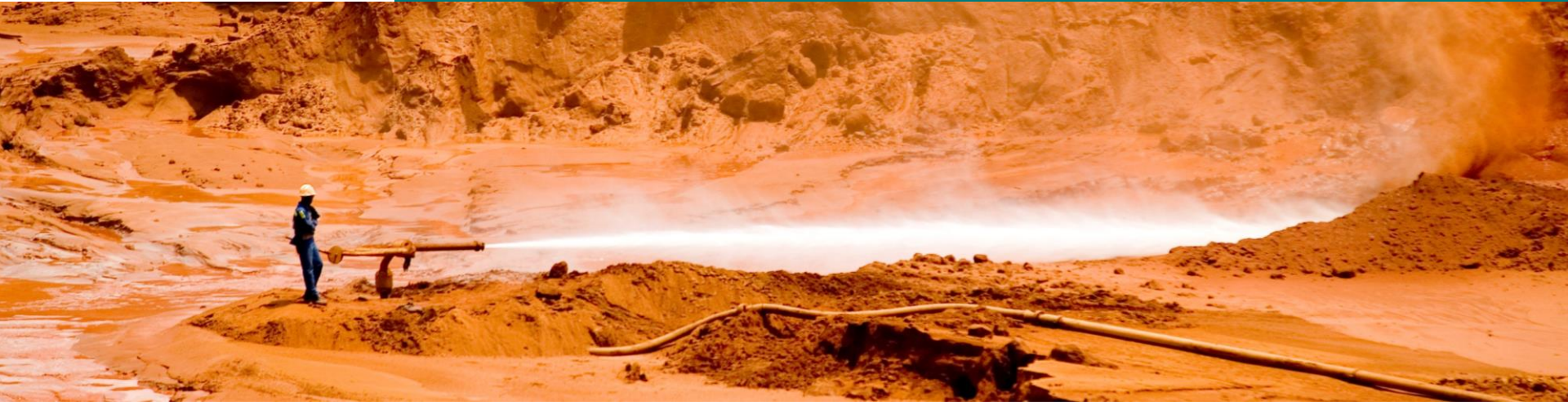

1. Who are we?
2. What do we do?
3. What does our programme entail?
4. Tell me more about your facilities and staff.
5. What will my career be like?
6. How will I help the community?
7. Industry partners
8. Where can I get more information?
Contact us

1 Who are we?

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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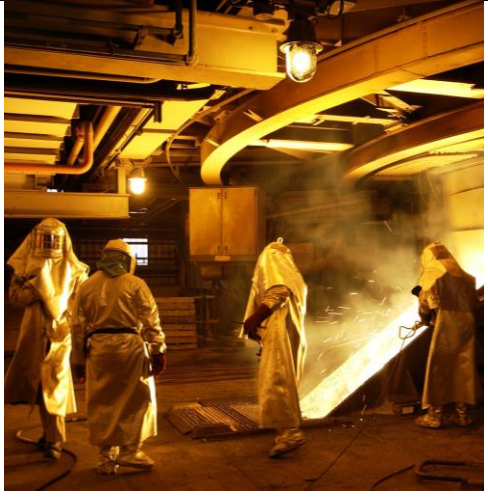
1 Our history

Faculty of Engineering, Built Environment and Information Technology - 1956

Established in

1958

as one of the first departments



ECSA

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

Click here for more information on the Department

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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.

NMC 113
SWK 122
EBN 122

MSD 210
GMI 210
WTW 263

EIR 221
NMC 223
NPT 220

NEC 310
NHM 322

NVM 321
NMM 320

NPW 411
NHM 412

NMC 313
NPM 321

NPB 412
NMP 411
NOP 420

ELO 1

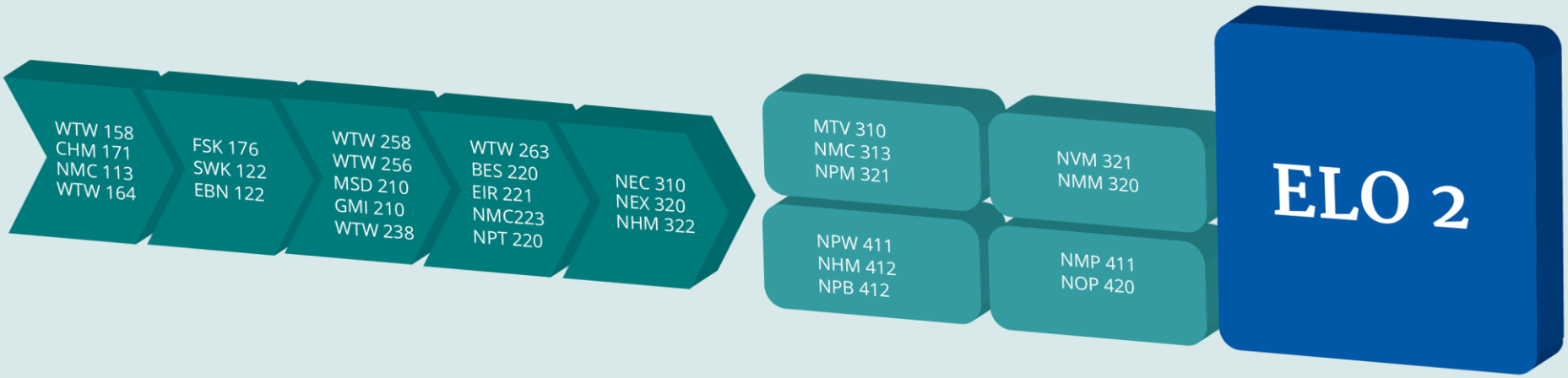
Click here for more information on the module content

Next

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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Next

Engineering design

Learning outcome

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

NMC 313
NPM 321

NVM 321
NMM 320

NPW 411
NHM 412

NPW 411

NOP 420

ELO 3

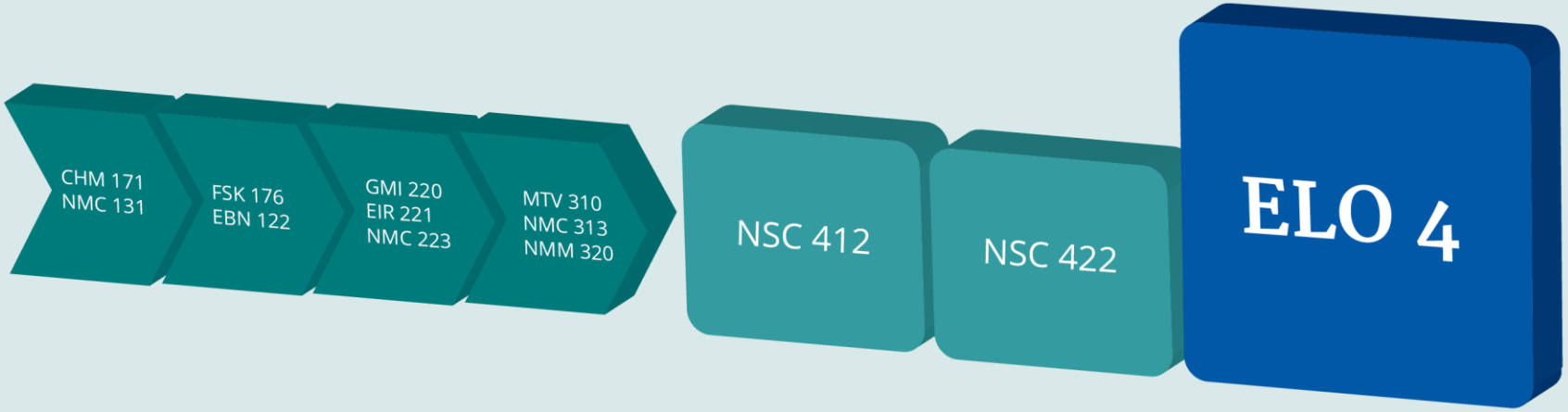
Click here for more information on the module content

Next

Investigations, experiments and data analysis

Learning outcome

Demonstrate competence to design and conduct investigations and experiments.



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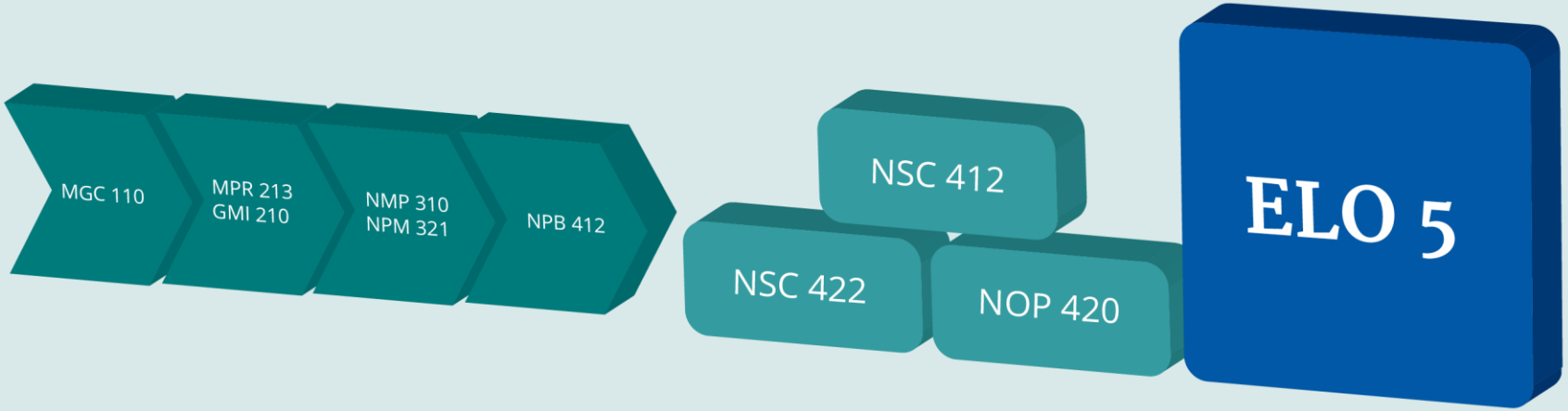
Next

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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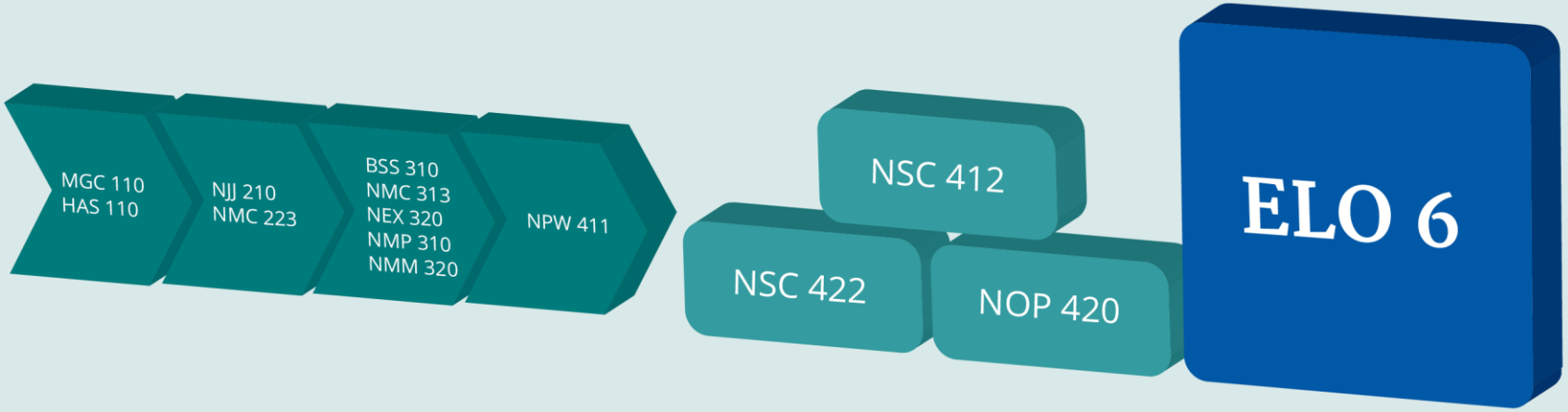
Next

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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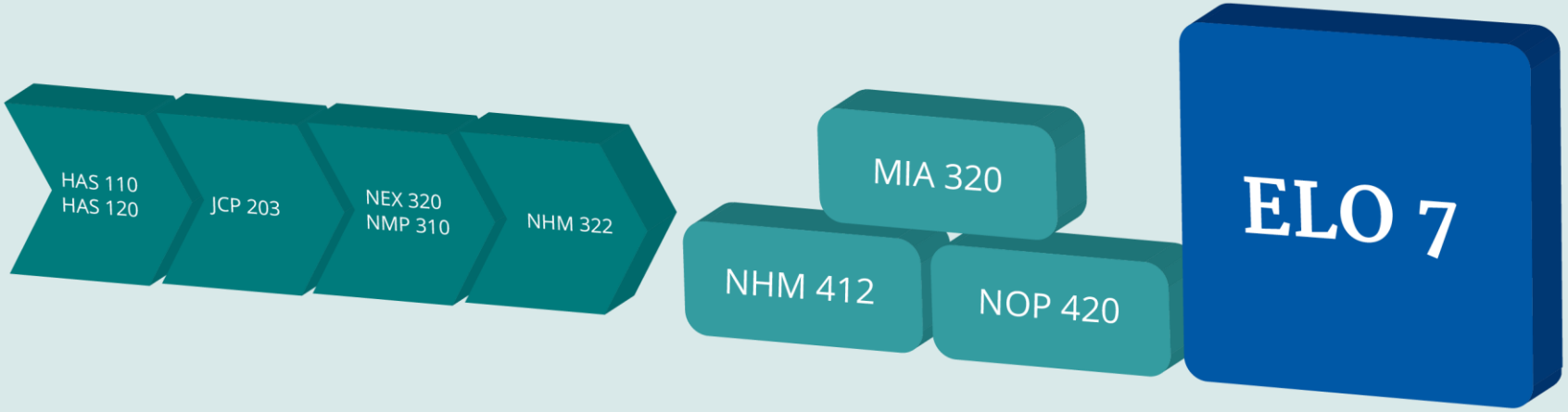
Next

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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Next

Individual, team and multidisciplinary working

Learning outcome

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

NMC 113

GMI 210
NJJ 210
NMC 223
NPT 220

NMC 313
NPM 321
NVM 321
NMM 320

NPW 411

MIA 320

NOP 420

ELO 8

Click here for more information on the module content

Next

Independent learning ability

Learning outcome

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

NMC 113
HAS 110
HAS 120

NMC 223

NMC 313
NVM 321
NMM 320

NPW 411

NSC 412

NSC 422

ELO 9

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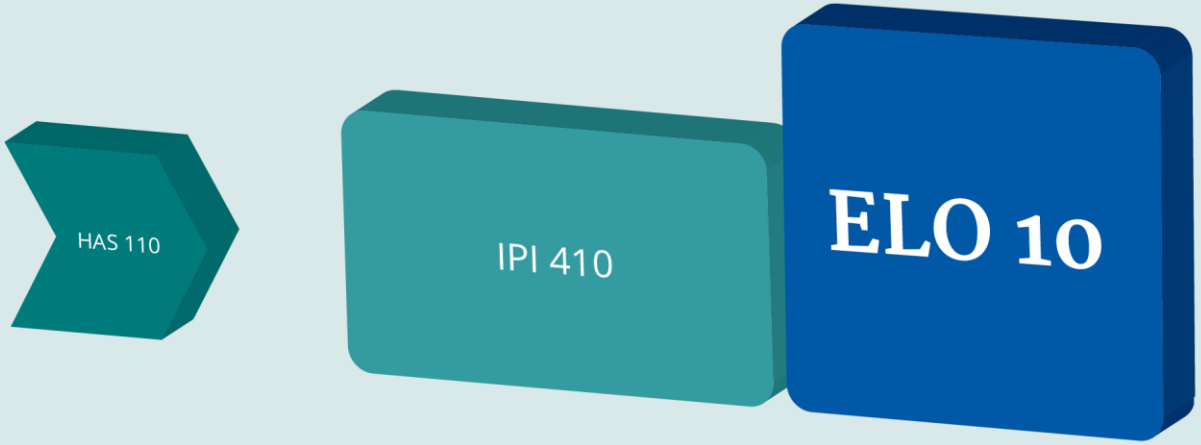
Next

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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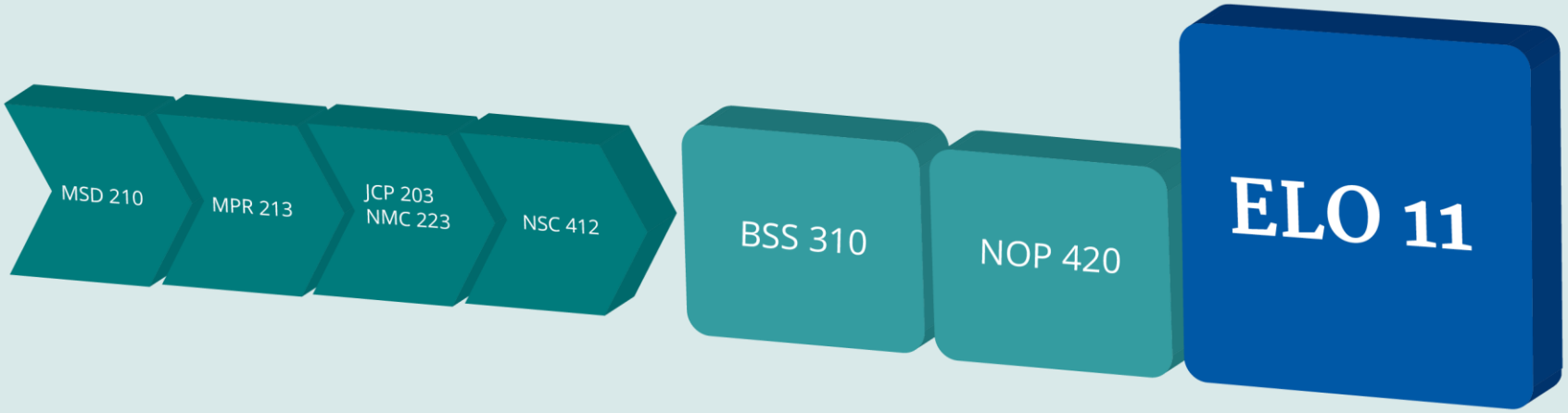
Engineering management

Learning outcome

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



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Facilities

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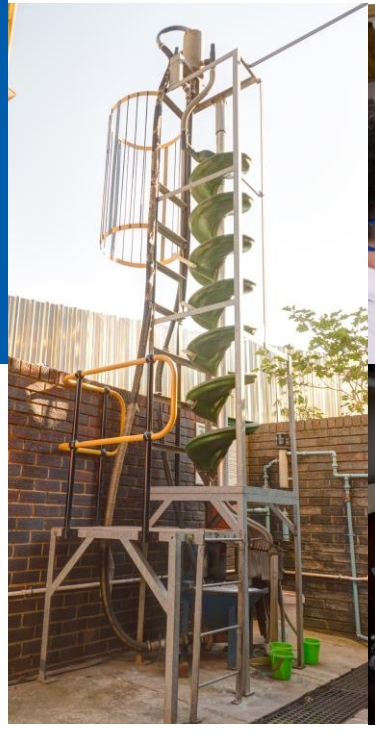
4 Facilities



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Staff

Materials Engineering, Processing and Performance Focus Area

Prof Roelf Mostert
Head of Department

Prof Pieter Pistorius

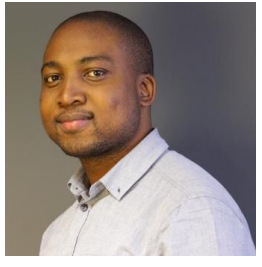
Prof Charles Siyasiya

Prof Waldo Stumpf

Dr Kofi Annan

Dr Hein Möller

Mr Vinod Kurup



Mr Sibusiso Mahlelela

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Next

Pyrometallurgy Research Focus Area

Prof Andrie Garbers-Craig

Prof Johan de Villiers

Dr Robert Cromarty

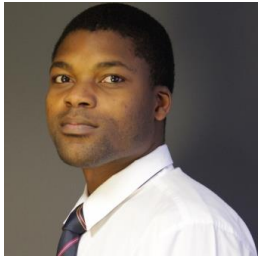
Dr Johan Zietsman

Mr Dirk Odendaal

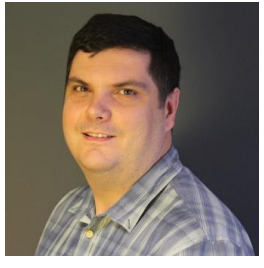
Minerals Processing Focus Area

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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5 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.

Next

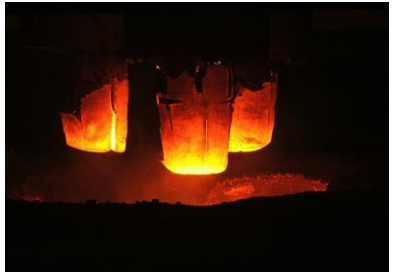
6 Career opportunities

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 pyrometallury, 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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7 Industry partners

AEROSUD

AngloAmerican

ArcelorMittal

COLUMBUS STAINLESS [Pty] Ltd

CSIR our future through science

Eskom

HULAMIN Think future. Think aluminium.

exxaro POWERING POSSIBILITY

GLENCORE

KUMBA IRON ORE

Sibanye Au we are one

necsa We're in your world South African Nuclear Energy Corporation SOC Limited

SAIW

samancor

sasol reaching new frontiers

SCAW METALS GROUP

TIZIRI ADVANCED MANUFACTURING TECHNOLOGIES

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Contact us

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Tel 012 420 3182

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

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