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Shaping Tomorrow: Engineering Management's Role in Cultivating Future-Ready Professionals

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Shaping Tomorrow: Engineering Management's Role in Cultivating Future-Ready Professionals

- Bridging Engineering & Management
- Industry-Relevant Curriculum
- Expert Faculty
- Industry-Focused Research
- Future-Ready Professionals
- Opportunities

Bridging Engineering & Management

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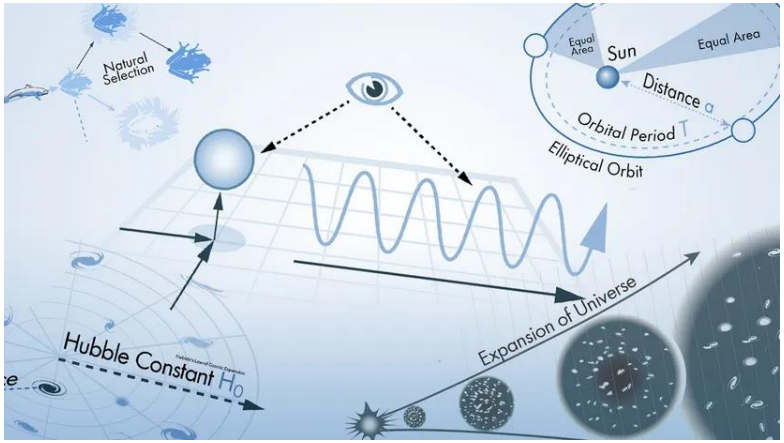
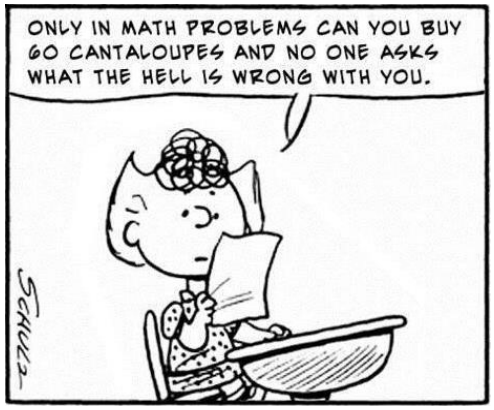
Engineering: The undergraduate years

- The beautiful things in life…
- A world where Mother Nature makes the rules
- Your undergraduate education is important and relevant…but only "part of the truth"

Laws of Nature

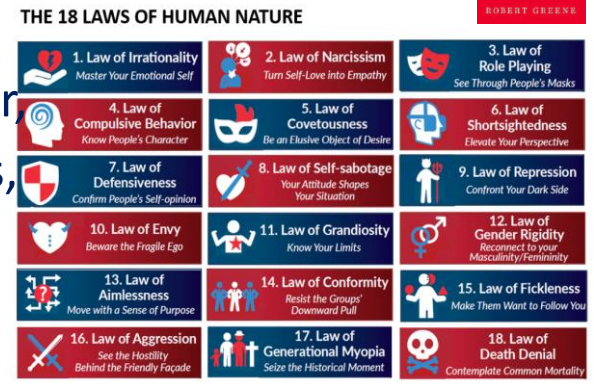




Bridging Engineering & Management

It is another world…..

- In addition, you are increasingly also required to deal with and "manage…"
  - Projects, budgets, people and places, technology and innovation
- The "people" are different
- Qualitative vs quantitative
- Governed by other types of laws: Human behaviour, social norms, accounting standards, economic laws, policies, regulations and legislation
- 'Management responsibilities' early in career
- Not covered in UG studies – for good reasons



Bridging Engineering & Management

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Why is it not covered in undergraduate studies ?

- Too little time, a lot of content to cover and to learn…
  - Year 1: Mostly underpinning natural science
  - Year 2: Applied science and fundamental engineering
  - Year 3: More advanced engineering
  - Year 4: Applied engineering (including design, synthesis)

  Notice: The linear progression of the themes, underpinned by a natural science

- Knowledge multiplies daily at an exponential rate
- You have to have experience..

Bridging Engineering & Management
"The gap"

MIND THE GAP

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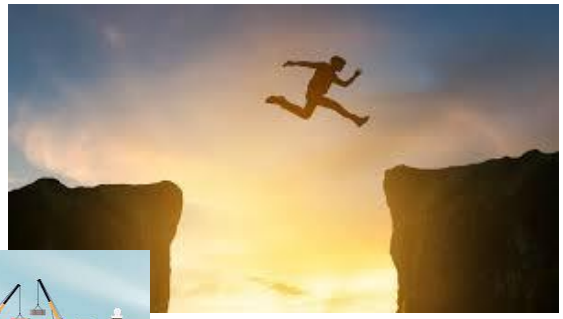
- **Very soon a realization develops that there is "a gap"**
  - "My skills", "others' skills" and what is required for "the job"
  - The real "job of the engineer" entails much more than just applying what was learnt in the undergraduate degree
  - Management and leadership responsibilities
- **How to deal with this ?**
  - How to gain the 'additional' skills in order to be able to perform the real "job of engineer" ?



Bridging Engineering & Management
The MEM vs MBA debate

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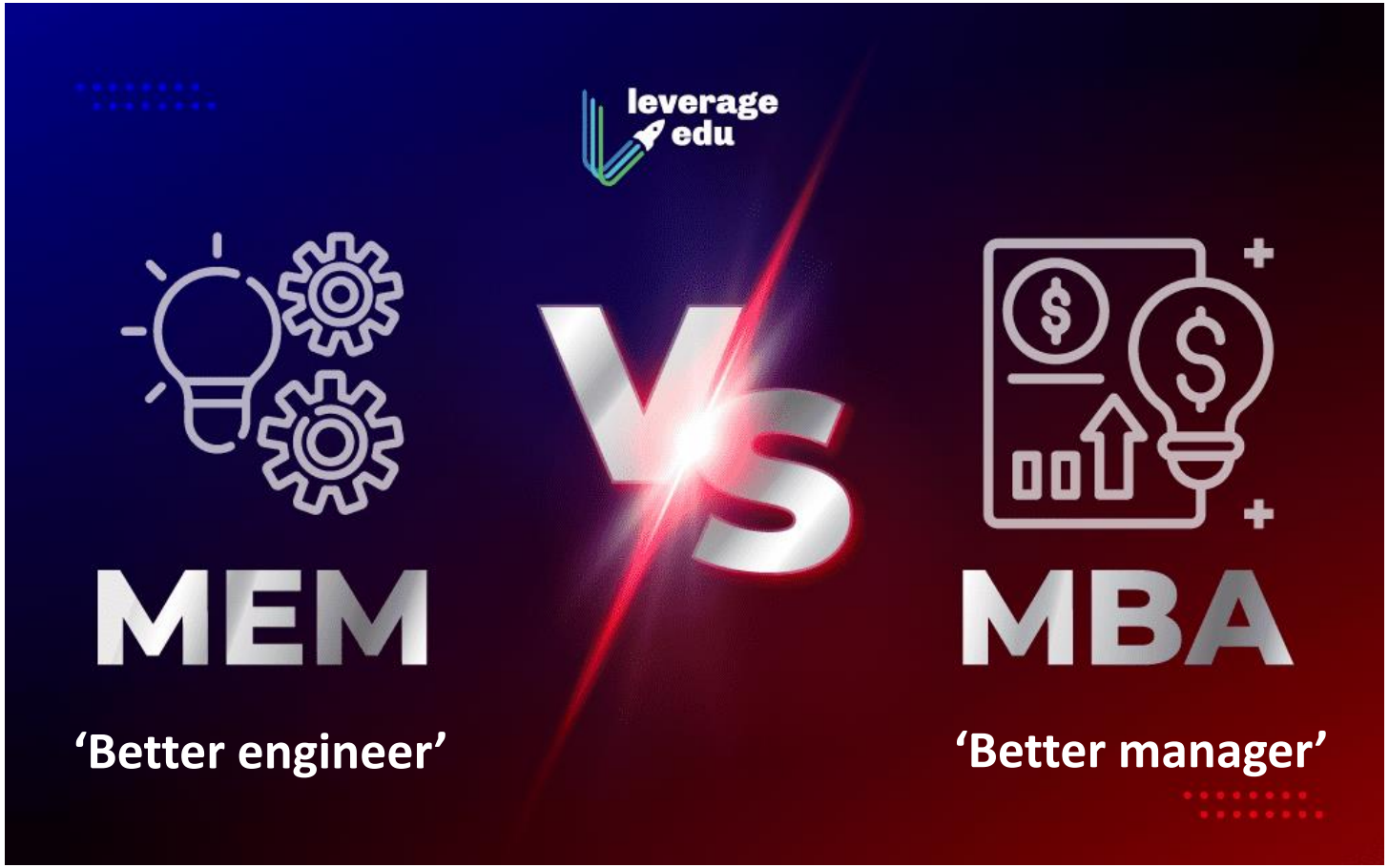

Bridging Engineering & Management
Why are so many CEOs engineers?

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Why Are So Many CEOs Engineers?

Published in Startup Stash

Himanshu Saini

December 2022

"There's one similarity between Amazon and Blue Origin CEO Jeff Bezos, Apple's Tim Cook. Alphabet's Sundar Pichai, Advanced Micro Devices' Lisa Su, General Motors' Mary Barra, and NVIDIA's Jensen Huang. These days, the heads of some of the most successful companies in the world have one thing in common. They're engineers….

…Harvard Business Review used to publish an annual list of the top 100 best performing CEOs. In 2018, they found that for a second year in a row, there were more CEOs with an engineering degree than an MBA, 34% compared to 32%"

Bridging Engineering & Management
MEM Programme Emphasis

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- Early to mid-career engineers/scientists
- Hybrid | Online learning model | Continuous assessment
- Interdisciplinary & industry focussed

Industry-Relevant Curriculum

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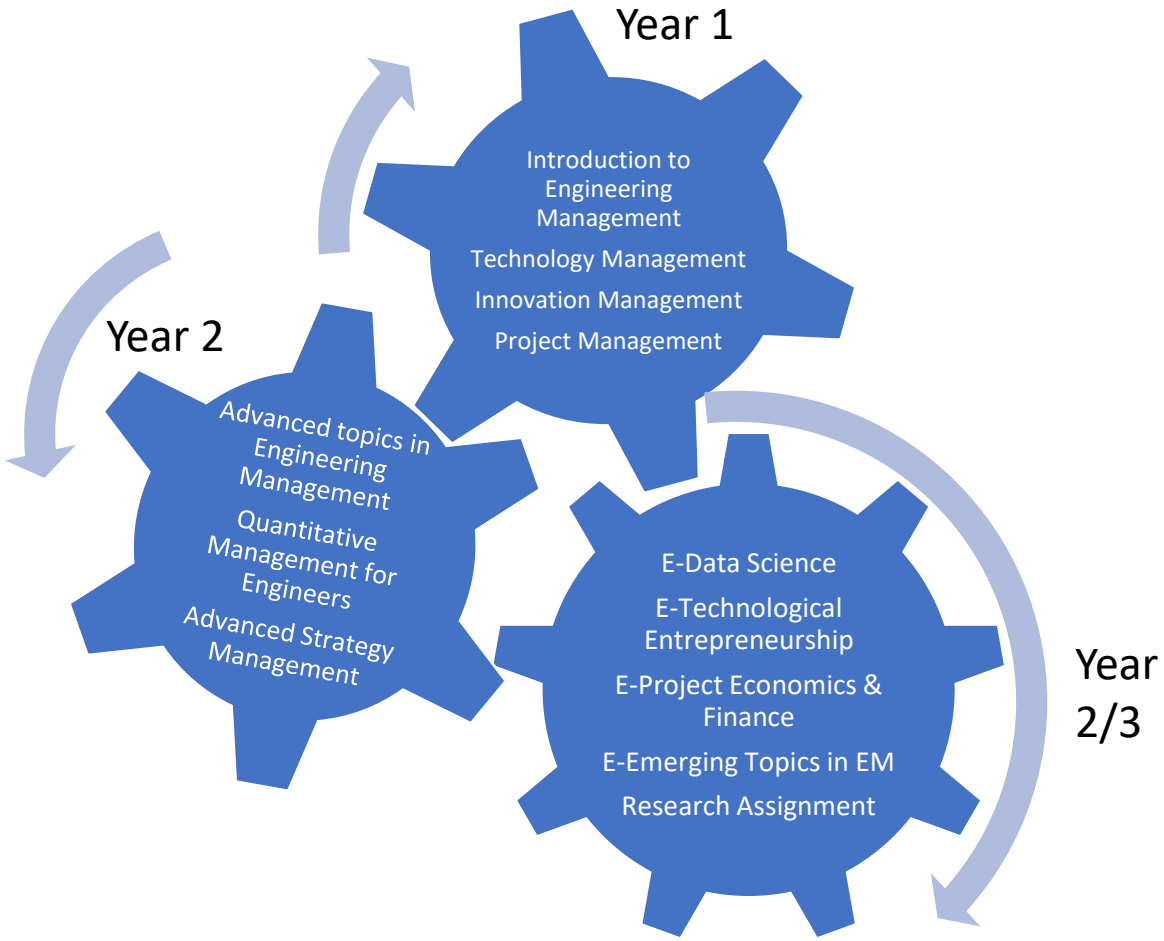
Masters in Engineering Management Programme

- 180 credits | 8 modules
- 2 modules/semester, 4 modules per year for 2 years
- 60 credit research module

- Semester spread over 15 weeks | 1 hour lecture per week
- Assessments | 3 group assignments, 2 individual assignments (formative & summative)

- 5 webinars per module



Expert Faculty
MEM Year 1 | Semester 1

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Introduction to Engineering Management IEM 873



Stellenbosch Business School

Prof Calie Pistorius | Prof Lee-Ann Steenkamp | Prof Andre Roux

- Gain insights into national/international/global engineering management challenges & opportunities
- Acquire financial skills for budgeting, forecasting & managing resources in engineering projects and startups.
- Understand economics
- Ethical considerations in EM & entrepreneurship.
- Importance of sustainable practices in engineering and business.
- Develop a Personal Learning Strategy, a Personal Decision-Making Strategy and an “Engineering Management Toolbox”.

Technology Management TM 873

Prof Sara (Saartjie) Grobelaar

- The nature of technology.
- Technology life cycle management: R&D, procurement, commissioning, operations, maintenance, decommissioning.
- Technology frameworks, platforms and ecosystems.
- Technology assessment and strategy.
- Knowledge, data and information management.
- Digital transformation.

Expert Faculty
MEM Year 1 | Semester 2

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Project Management PM 816

Prof Taryn Bond-Barnard

- Develop a critical understanding of the foundational principles that underpin engineering project management practice.
- Develop specialist knowledge of project management tools and techniques and how to scope, plan, manage and control an engineering project.
- Overview of adaptive/agile development approaches and ceremonies

Innovation Management IM 873

Prof Calie Pistorius

- Understanding the inherent nature of innovation, various innovation modes (incremental, radical, product, process, modular and architectural innovation as well as disruptive innovation).
- The importance of the market, including diffusion and adoption characteristics.
- Development of an institutional innovation strategy.
- Cultivating innovation skills to develop novel engineering solutions.
- Fostering a culture of innovation within engineering teams and organisations.

Expert Faculty
MEM Year 2 | Semester 1

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Advanced Engineering Management
AEM 873


Prof Mias de Klerk

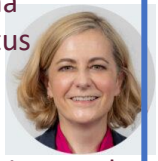

Leon Bosman


Zanele Nkomo


Ms Janine Truter


Dr Carly Steyn


Dr. Natasha Winkler-Titus


Prof Anita Bosch

- Develop leadership skills to effectively manage engineering teams and organisations.
- Understand virtual team dynamics and strategies for building high-performing teams.
- Transformational leadership and how to bring about and manage change in organisations.
- Personal leadership and management skills and development.
- Organisational behaviour, the innovative organisation & venture structures.

Stellenbosch Business School

Quantitative Management for Engineers
QME 873


Prof Antonie de Klerk

- The nature of uncertainty.
- Principles of statistics, applications to risk and risk management.
- Real options. Linear programming. Predictions and forecasting.
- Quantitative methods for decision support.
- Aspects of quality management. Applications of analytics.

Expert Faculty
MEM Year 2 | Semester 2 Core & Custom Elective

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Advanced Strategic Management ASM 873

Prof Willem Barnard

- Develop a deep understanding of strategic planning and decision-making processes in engineering organisations.
- Apply strategic thinking to identify opportunities for innovation and entrepreneurship within the engineering industry.
- Develop a systems thinking approach.

Harvard Business Publishing

Technological Entrepreneurship ET873

Dr Coen Bester

- Entrepreneurial inclinations based on Clifton StrengthsFinder
- Identifying and evaluating business opportunities within the engineering and technology field.
- Understand the value of partnerships and alliances in the engineering and entrepreneurial ecosystem.
- Create a complete business model for a technology-based start-up or new corporate venture.
- Sharktank pitch to venture capitalists with prize money for best pitch.

Expert Faculty
MEM Year 2 | Semester 2 Custom Electives

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Emerging Topics in Engineering ETE873

- Prof Calie Pistorius | The Nature of Data
- Dr Jakkie Pretorius | Enterprise Systems
- Ms Erna Solomon | Big Data
- Dr Stefan Kätker | Cloud Technologies
- Dr Marco Lotz | Analytics
- Prof Etienne Barnard | Artificial Intelligence 1 & 2
- Ms Berna Coetzee | Business Intelligence
- Mr Gilchrist Mushwana | Cyber Security
- Prof Calie Pistorius | Blockchain Applications
- Dr Harry Teifel | IoT and Sensors
- Ms Alyssa Pretorius | Data Privacy
- Dr Liesbeth Botha | Corporate Digital Transformation 1 & 2

Expert Faculty
MEM Year 2 | Semester 1 Custom Electives

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Project Economics and Finance PEF812

Dr Chris Jurgens

Financial management and financing aspects of infrastructure projects.

Data Science DS874

Prof Mandla Gwetu

Thorough knowledge of cross-industry standard process for data mining (CRISP-DM) as a workflow to help data scientists understand the data within a business context, prepare the data, select the appropriate model, evaluate the model, and deploy the model.

Expert Faculty
MEM Year 2/3 | Year long Research Assignment

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- Special interest project/'super' module
- Guidance by dedicated research supervisor
- Outcome has practical and academic/theoretical significance

Research-based approach

Apply knowledge and skills acquired to **identify, investigate** and **answer** a complex engineering management issue

Hone written and verbal communication/presentation skills

To effectively discuss and convey complex technical information to various stakeholders

Expert Faculty
Programme Outcome

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Focus

- prepares students to become leaders in their profession
- understanding of the various disciplines that intersect with engineering
- development of professional skills
- innovative and adaptable
- prioritise diversity, inclusion, and equity

Future-Ready Professionals
MEM Facts & Figures

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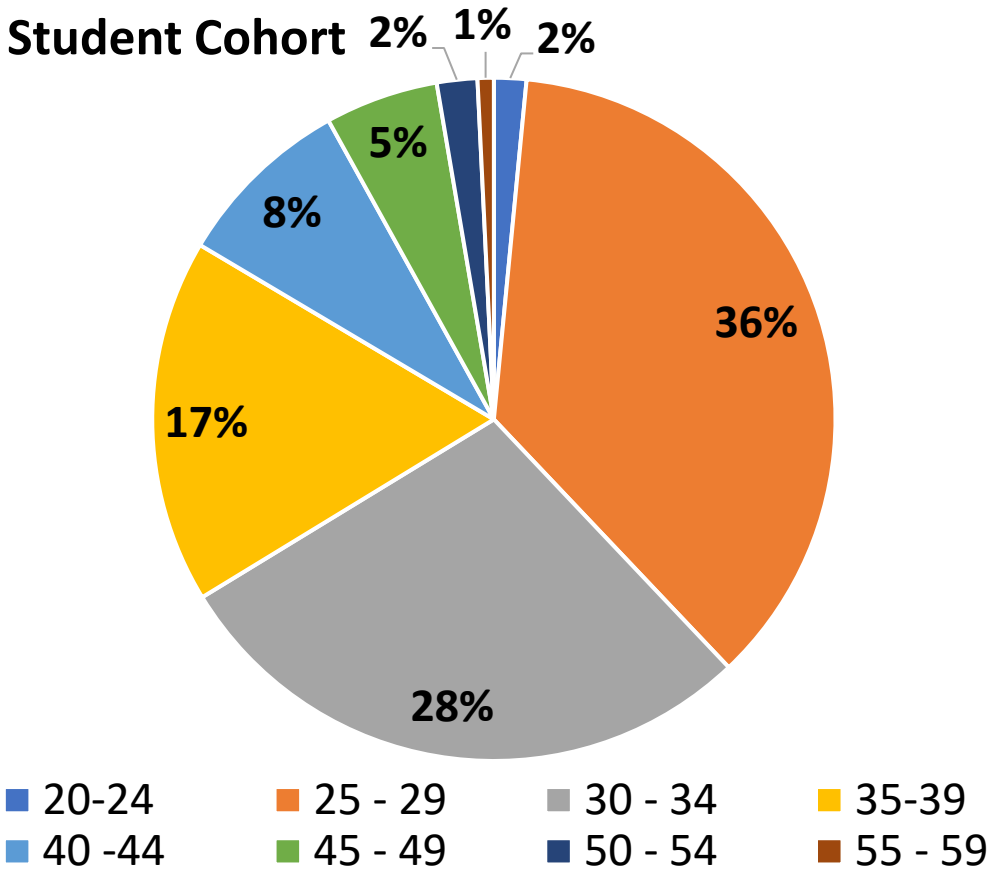
261 students

- 118 1st years
- 82 2nd years
- 61 3rd years

- 46% under the age of 40
- 38% under the age of 30



Future-Ready Professionals
MEM Facts & Figures cont.

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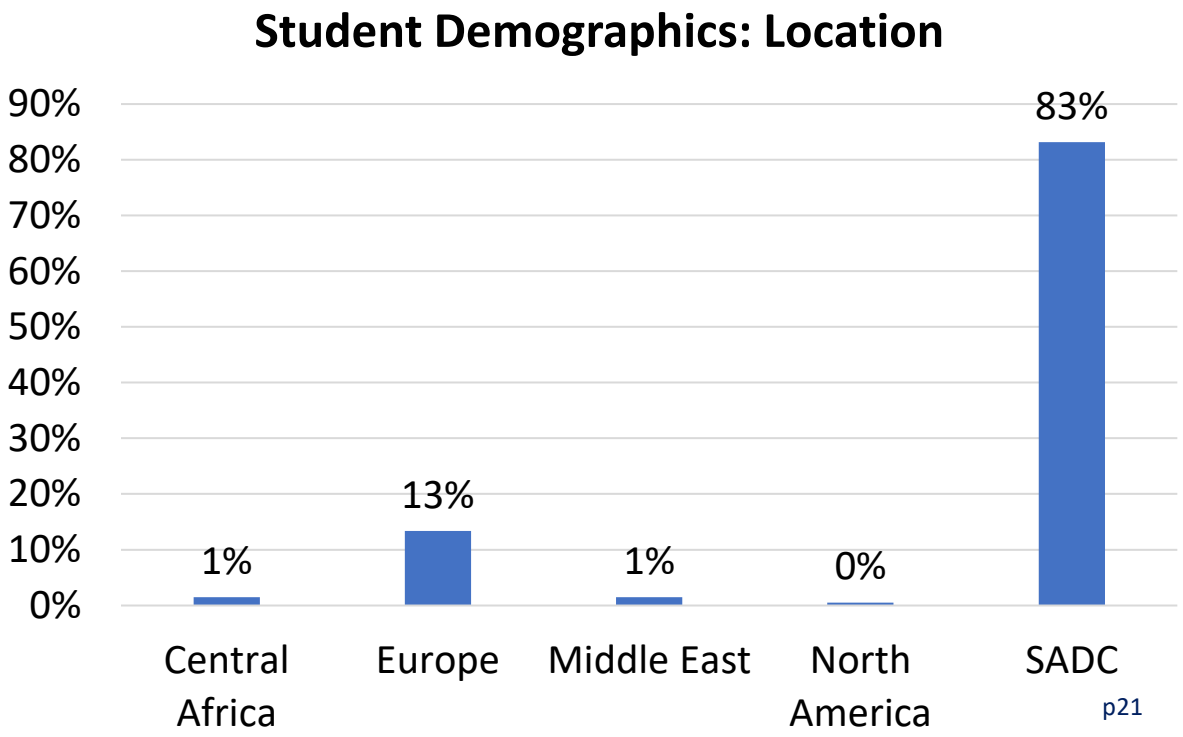
- 70% South African students
- 35% from the Western Cape

- Range of industries: engineering, defence, petrochemical, SOE's, governmental, Fintech, R&D, FMCG, utilities



Future-Ready Professionals
2023 Graduates – 6 MEM's with distinction

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Photo:
Top row (from left to right): Prof Joubert van Eeden (Chair, Department of Industrial Engineering), Mr Gustav Rhode, Miss Natalia Duiker (MEM Admin Coordinator), Miss Natalia Shiindi, Mrs Modesty Lewis, Dr Albert Strever, Mr Gian Robinson, Miss Veronica Mwamfupe, Ms Megan Higgo,

Bottom row (from left to right): Mrs Melissa Siegelaar (Learning Designer), Prof Celeste Viljoen (Acting Dean & Vice Dean: Teaching & Quality Assurance), Prof Calie Pistorius (Programme Founder & Lecturer), Prof Corne Schutte (Vice-Dean: Research & Industry Liaison) & Prof Taryn Bond-Barnard (MEM Academic Coordinator).

Industry-Focused Research

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Engineering Management

- A framework for the implementation of Engineering Management practices in a pharmaceutical engineering, procurement, construction and management firm
- An engineering management view on the future agricultural sciences student and lecturer: entrepreneurship and emerging agricultural technologies (agritech) integration.

Technology Management Knowledge Transfer

- Towards a knowledge transfer framework for megaprojects using technology management tools
- The development of a Technology Management Strategy Framework to overcome past technology implementation failures: a focus on the construction industry.

Digitalization

- Implementation of Digitalization within the South African construction industry

4th Industry Revolution Technologies

- The Potential Application Of 4IR Technologies To Mitigate Risk In Mine Residue Management

Opportunities

- Industry research topics or areas
- Industry projects as case studies for modules
- Supervisors for Research Assignment projects
- Advisory Board
- Module prizes
- Bursaries

*Applications close **31 October!!***

Thank you
Enkosi
Dankie

Photo by Stefan Els