Industrial Engineering

FAQ

What does industrial engineering entail?

Industrial Engineering is a discipline of engineering dealing with the optimisation of complex processes or systems. It is concerned with the development, improvement, implementation, and evaluation of integrated systems of people, money, knowledge, information, equipment, energy, materials, analysis and synthesis, as well as the mathematical, physical and social sciences, which — together with the principles and methods of engineering design — can be used to specify, predict, and evaluate the results to be obtained from such systems or processes. Its underlying concepts overlap considerably with certain business-oriented disciplines such as operations management and financial management, but the engineering side tends to emphasise extensive mathematical proficiency and usage of quantitative methods.

Industrial engineering's main branches are manufacturing technology and operational systems design. Industrial engineering involves facets of industry that are important in the modern industrial and service environments, such as quality assurance, robotics, engineering economics, operations research, data science, industrial ergonomics, and information technology.

What are common practical examples of tasks performed by industrial engineers?

- Reconfigure airport check-in services to shorten queues and improve passenger's satisfaction.
- Streamline an operating room so that it is safer, faster, and easier to use.
- Analyse retail customer order history to predict future behaviour and develop targeted marketing strategies.
- Investigate how mineral-rich countries can leverage their mineral endowments optimally for sustainable development.
- Routing and scheduling decisions for fleets of delivery vehicles.
- Employee duty roster or timetabling decisions for the manufacturing and health sectors.
- Manufacture customised products like a maxillofacial implant that is surgically inserted into patients who have lost significant portions of their facial bone structure due to disease.
- Shelf-space allocation and inventory decisions for retailers.
- Crop irrigation and agricultural pest-control.
- Facility location decisions for effective supply chain logistics

In what industries/sectors do industrial engineers work?
Manufacturing, consulting, retail, logistics, information technology, financial technology, and services.

Which companies employ industrial engineers in South Africa?

- Manufacturing: Volkswagen, South African Breweries, Sasol, Tiger Brands, Tetra Pak
- Consulting: PWC, Deloitte, Accenture, Pragma, LTS, McKinsey & Company
- Retail: Takealot, Checkers, Shoprite, Woolworths, Pep
- Logistics: Value Logistics, Imperial Logistics, Barloworld Logistics, Transnet
- FinTech & services: Capitec, Mediclinic, FNB, Standard Bank, Discovery, Allan Gray

What knowledge and skills can you gain from studying industrial engineering at Stellenbosch University?

The industrial engineering programme is an interdisciplinary programme in which training in several applied sciences, for instance mechanical, mechatronic, electrical, and electronic engineering, together with economic management, natural sciences, information technology and operational research, are combined as a unit for the design and operation of various operational systems. This programme also particularly trains you to use computers in decision-making for enterprise management.

What are the main research areas within our department?

Engineering management: Includes fields such as project-, risk-, innovation-, quality- and performance management, and feasibility studies in the wider sense.

Manufacturing: Focusses on development of resource efficient process chains to ensure sustainable manufacturing as value creation system of products, but also for wider application in the services sector.

Operations & supply chain management: Focusses on process excellence from both intra-organizational and inter-organizational points of view.

Systems modelling, operations research and decision support: Focusses on the development of mathematical models and their incorporation into computerised systems aimed at supporting scientifically justifiable and effective decisions in industry.

Data science: The scientific investigation that employs innovative approaches and algorithms, most notably machine learning algorithms, for processing and analysing data. Data science technologies can be applied to both small and big data, of various types such as relational, images, video, audio, and text.

How is the industrial engineering undergraduate course structured?

In the first year, all engineering students follow the same courses to acquire suitable mathematical and scientific skills. From the second year onward, the pure mathematical content starts to make way for engineering course modules where mathematics is applied to engineering problems and also sometimes developed further, as required. Thus, in the second year, the different engineering degree courses start to diverge.

In the first two years of study the student takes modules mainly in engineering mathematics, applied mathematics, chemistry, electro-techniques, and engineering drawings. Specialised industrial engineering fields include modules from production management, quality assurance and management, operations research, information systems, data science, engineering economy and manufacturing. Students also follow modules in complementary fields like project management, philosophy and ethics and environmental engineering. All students follow a common first year programme and it is possible to change the main study programme if specified conditions are met.

Minimum admission requirements for all four year engineering programmes:

- A National Senior Certificate with admission to bachelor's studies, or an exemption certificate issued by the Matriculation Board, and
- A minimum average of at least 70% using the six best matric subjects (excluding Life Orientation and Mathematical Literacy, and
- A minimum average of at least 70% for Mathematics, and
- A minimum average of at least 60% for Physical Sciences, and
- Language minima:

  - English Home Language: At least 50%, with no Afrikaans requirement; or
  - English First Additional Language: At least 60%, with no Afrikaans requirement; or

- English First Additional Language: At least 50%, together with Afrikaans Home Language of at least 50%; or
- English First Additional Language: At least 50%, together with Afrikaans 2nd Additional Language of at least 60%

Selection process for all four-year engineering programmes

The selection score is the most important measure used by the Faculty for selecting students for BEng programmes. This score is calculated as follows:

Selection score = Mathematics mark + Physical Sciences mark + 6 x Matric average

a) The percentages you obtained in Mathematics and Physical Sciences, plus the average percentage of your six best matric subjects (excluding Life Orientation and Mathematical Literacy), are used for calculating the selection score.

b) This means that the selection score takes a broad group of matric subjects into account, and that, in effect, Mathematics and Physical Sciences usually each contribute twice.

c) The maximum score obtainable is therefore 800 if you achieve 100% for all your matric subjects (100 + 100 + (6 X 100) = 800)

d) The Faculty sets an admission threshold and a minimum selection score for each BEng programme. The admission threshold is a selection score based on:

1. the number of applicants who meet the admission requirements, and

2. the number of places available in the particular degree programme.

e) The minimum selection score is the lowest score that indicates that a student will be reasonably likely to complete the particular programme. This score is based on the Faculty's experience with previous students.

f) You will be selected if you:

1. meet the admission requirements and

2. your selection score is equal to, or larger than, the admission threshold score for the particular degree programme that you want to follow.

g) Please note that:

1. Being selected for one BEng programme does not mean that you have been selected for another BEng programme.

2. You may apply for more than one BEng programme and you will be considered for each programme independently. If you are selected for more than one BEng programme, you will receive more than one offer to choose from.

3. If your selection score is below the admission threshold, but above the minimum admission requirements for your preferred BEng programme(s), the following happens:

   o you are placed on a waiting list, which means that you may still be admitted to a particular programme if places become available later; or

   o you can apply to be admitted to another BEng programme if you meet the selection requirements for that particular programme. You must contact the Faculty Officer or the Faculty Administrator if you consider changing the programmes you applied for.

Where can I find more information?

Visit the following links:

- www.ie.sun.ac.za
- Facebook
- LinkedIn

For further information please contact our administration office at ksmith@sun.ac.za