



# FACULTY OF ENGINEERING AND RELATED DESIGN

NATIONAL CERTIFICATE (VOCATIONAL)

## Engineering and Related Design LEVEL 2-4

### ENTRY REQUIREMENTS

Grade 9 with a 50% pass in Mathematics

### DURATION

3 Years

### WHAT IS THIS PROGRAMME ABOUT?

In Engineering and Related Design, the student will be exposed to the basic industrial environment, engineering principles and operations, as well as engineering systems, activities and processes.

### WHAT VOCATIONAL ACTIVITIES WILL I BE ABLE TO PERFORM?

- > Take part in the manufacturing of tools
- > Take part in the operation and maintenance of machines
- > Extract tools, equipment and processes to produce components
- > Create sketches and computer aided designs (CAD)
- > Interpret and produce engineering drawings and maps

### WHAT CAREER OPPORTUNITIES ARE OUT THERE?

- > Manufacturing and Industrial Engineering
- > Metallurgical and Materials Engineering
- > Boilermaking
- > Automotive Repair and Maintenance
- > Aerospace Engineering
- > Tool Making
- > Fitting and Machining
- > Welding

### WHAT SUBJECTS WILL I BE TAKING?

#### FUNDAMENTAL SUBJECTS

- > Language (English/Afrikaans)
- > Mathematics
- > Life Orientation

#### VOCATIONAL SUBJECTS

##### Level 2

- > Engineering Fundamentals
- > Engineering Technology
- > Engineering Systems
- > Automotive Repair and Maintenance (O) or Welding (O)

##### Level 3

- > Engineering Practice and Maintenance
- > Materials Technology
- > Engineering Graphics and Design (CAD)
- > Automotive Repair and Maintenance (O) or Welding (O)

##### Level 4

- > Engineering Processes
- > Professional Engineering Practice
- > Applied Engineering Technology
- > Automotive Repair and Maintenance (O) or Welding (O)

(O)=Optional/Choice Subject

### WHAT DO THESE SUBJECTS ENTAIL?

#### ENGINEERING FUNDAMENTALS

Engineering Fundamentals introduces you to the three important fields of engineering in the manufacturing, engineering and technology environments. Students interested in Fabrication and Extraction, Manufacturing and Assembly or Engineering and Related Design will be exposed to the basic industrial environment, engineering principles and operations as well as engineering systems, activities and processes.

#### ENGINEERING TECHNOLOGY

Engineering Technology introduces you to a variety of engineering tools and equipment used in various fields of engineering and instructs you on how to use the tools and equipment correctly, accurately and safely. As you progress, you'll be able to identify and select the correct tools for a particular job quicker and quicker and not waste time searching.

#### ENGINEERING SYSTEMS

Engineering Systems deals with the mechanical, electrical, electronic, hydraulic and pneumatic aspects of a system (e.g. various systems in a vehicle or machinery), including identifying, selecting and preparing components in terms of their operation, control and pre-operational maintenance. The required calculations are also included.

#### AUTOMOTIVE REPAIR AND MAINTENANCE

Automotive Repair and Maintenance introduces you to the fundamentals of vehicle technology and equips you with the necessary confidence to perform tasks related to, for example, vehicle components, engines, gearboxes, fuel systems, body components and electronics. The tasks are limited to removal, cleaning, servicing (replenishing of fluid) and fitting.

#### WELDING

The purpose of this subject is to provide you with insight into the welding industry as a student welder. Welding Level 3 forms part of the progression, which exposes you to the most common welding technologies available within the Manufacturing and Engineering Industry. Additional welding processes are introduced at this level and include both Gas Brazing and Gas Metal Arc Welding (GMAW). At this level skills are also enhanced for Shielded Metal Arc Welding (SMAW) and Gas Welding.

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## Engineering and Related Design LEVEL 2-4 (CONTINUED)

### ENGINEERING PRACTICE AND MAINTENANCE

Engineering Practice and Maintenance is the research of new exciting systems to manage and control operations, such as faultfinding and solutions for mechanical and electrical equipment in a production plant. Information, communication and technology are used to develop solutions for given design problems.

### MATERIALS TECHNOLOGY

Materials Technology introduces you to the materials commonly used for components in the mechanical engineering field, capable of withstanding stresses that allow for innovative engineering design. Properties of the materials, processes used for working with them and their applications are the main focus.

### ENGINEERING GRAPHICS AND DESIGN (CAD)

Engineering Graphics and Design (CAD) deals with the drawing language, developments, projections, first-angle and third-angle orthographic projection drawings of single objects, assembling drawings and detail drawings, freehand sketches, isometric drawing, oblique drawings, computer environment for scale production drawings using a CAD program, printing CAD scale production drawings and management of files.

### ENGINEERING PROCESSES

Engineering Processes is the achievement of design gain through the evaluation and monitoring of components manufactured by modern technological equipment in the workplace, which allows for new methodologies to be developed.

The following considerations are included:

- > Flow and handling of materials
- > Automatic machines
- > Management techniques to reduce work content and ineffective time
- > Movements of workers in the shop
- > Factory organisation
- > Design and location of a factory
- > The elements of costs
- > Factory organisation in conjunction with the costing system
- > Purchasing procedure
- > Store's routine (buying and store keeping)
- > Labour (employment, time-keeping and time-booking, methods of remuneration, wages)
- > Overheads (depreciation and interest on capital)
- > Contract costs
- > Factory job cost accounting
- > Estimating and planning
- > Personnel administration
- > Incentive schemes

### PROFESSIONAL ENGINEERING PRACTICE

Professional Engineering Practice introduces you to the code of ethics in the engineering world of work. It explains the engineering profession, its role, the role of engineering professional bodies, as well as the impact of engineering on both society and the environment. It introduces you to effective communication through graphics, drawings and graphs. It also embeds the basics of computer programming, as well as small-scale computer aided design.

### APPLIED ENGINEERING TECHNOLOGY

Applied Engineering Technology includes considerations of flow and handling of materials; automatic machines; management techniques to reduce work content and ineffective time; movements of workers in the shop; factory organisation; design and location of a factory; the elements of costs; factory organisation in conjunction with the costing system; purchasing procedure; store's routine (buying and store keeping); labour (employment, time-keeping and time-booking, methods of remuneration, wages, overheads (depreciation and interest on capital); contract costs; factory job cost accounting; estimating and planning; personnel administration; incentive schemes.