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| --- | --- | --- | --- |
| **Programme title** | **Abbreviation** | **HEQC Feedback** | **UJ Response** |
| **Diploma in Engineering Technology in Extraction Metallurgy** | Dip (Engineering Technology) (Extraction Metallurgy) | The programme has been recurriculated into a new HEQSF qualification type, 240 Diploma. Therefor the institution needs to submit a new application for DHET approval and HEQC accreditation. | After the 240 credit Diploma option became available again in the revised HEQSF, the Faculty of Engineering and the Built Environment (FEBE) decided (after consultation with the HEQC) to submit 11 Engineering Diplomas as Category B programmes by removing the WIL component and converting it to 240 credit diplomas. These Diplomas were previously categorised as Category C.  There are two routes for an ECSA diploma the new 360 (E-02-PN) and the new 240 (E-08-PN).  The Faculty believes that either transition would be a less than 50 % change.  In fact the new 240 is closer to the current NDIP in many ways as very few changes to the curriculum need to be made other than dropping the 2 semesters (120 credits) of WIL, ensuring that the credits go to 140 per year and checking the knowledge area distribution.  The Faculty had gone through this exercise in 2010 in preparation for the ECSA visit in 2011 in fact.  They also did the mapping of Exit Level Outcomes, etc.  At that time ECSA had a draft on the new standard which was used and then when this standard was formalized we did another review to align.  A 240 credit Diploma is furthermore to our view not a new qualification type. According to the HEQSF a diploma accommodates two specification types, namely a 240 credit and 360 credit variant – both on NQF level 6. Also, the recurriculation of the existing diplomas from 360 credits to 240 credits (by removing the WIL component) does not represent a change of more than 50%. Only 120 credits out of 360 credits were affected and the purpose and exit-level outcomes of the programmes did not change.  For your benefit the ECSA Qualification Standard for a Diploma in Engineering Technology: NQF Level 6 is attached to this response. |

|  |  |  |  |
| --- | --- | --- | --- |
| **ENGINEERING COUNCIL OF SOUTH AFRICA** | | |  |
| ***Standards and Procedures System*** | | |
|  | | |
| **Qualification Standard for**  **Diploma in Engineering Technology: NQF Level 6** | | |
|  | | |
| **Status: Approved by Council** | | |
| **Document: E-08-PN** | **Rev 2** | **14 March 2013** |

# Background: The ECSA Education System Documents

The documents that define the Engineering Council of South Africa (ECSA) system for accreditation of programmes meeting educational requirements for professional categories are shown in Figure 1 which also locates the current document.

**Figure 1: Documents defining the ECSA Accreditation System**

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**P**

**Registration**

**Policy**

Addresses

Criteria

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**02**

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**PN Standard**

**for Accredited**

**Diploma**

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**03**

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**P**

**Accreditation**

**Criteria**

Defines the Standard for

accredited programme in terms

of purpose, NQF level, credits,

knowledge profile and outcomes

Defines the requirements

for accredited programmes

of all types

Defines Council Policy giving

effect to the Act

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s power to

register in Professional Categories

Defines Accreditation

Policy for all types of

programmes

Detail specific aspects

of accreditation process

Identifies

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**Background to**

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**Figure 1: Documents defining the ECSA Accreditation System**

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# Purpose

This document defines the standard for accredited Diploma in Engineering Technology-type programmes in terms of programme design criteria, a knowledge profile and a set of exit level outcomes. This standard is referred to in the Accreditation Criteria defined in ECSA document E-03-P.

# HEQF and NQF Specification

**Field:** Manufacturing, Engineering and Technology

**Sub-Field:** Engineering and Related Design

**NQF Level:** Level 6

**Credits:** 280 credits total: Not less than 120 Credits shall be at NQF level 6

**Acceptable titles:** Diploma in Engineering Technology

**Abbreviation**: Dip (Eng Tech)

**Qualifiers:** See section 3

# Qualifiers

The qualification must have a qualifier(s) defined in the provider’s rules for the Diploma that is reflected on the academic transcript and Diploma certificate, subject to the following:

1. There must be at least one qualifier which contains the word Engineering Technology together with a disciplinary description such as: Agricultural, Aeronautical, Chemical, Civil, Computer, Electrical, Electro-mechanical, Electronic, Environmental, Industrial, Extractive Metallurgical, Information, Materials, Mechanical, Mechatronics, Metallurgical, Mineral(s) Processing, Physical Metallurgical and Mining. Qualifiers are not restricted to this list.

* + 1. A second qualifier, if present, must indicate a focus area within the field of the first qualifier such as: Environmental, Information, Extractive Metallurgical, Minerals Processing and Physical Metallurgical.
    2. The qualifier(s) must:
* clearly indicate the nature and purpose of the programme;
* be consistent with the fundamental engineering science content of the programme; and
* be comparable with typical programmes within the Dublin Accord Signatories.
  + 1. The target market indicated by the qualifier(s) may be a traditional discipline of engineering or a branch of engineering or a substantial industrial sector. Formal education for niche markets should be satisfied by broad undergraduate programmes such as specified in this standard followed by specialized course-based programmes.

In the case of a provider offering programmes with different titles but having only minor differences in content or undifferentiated purposes, only one programme will be accredited by ECSA.

Examples of acceptable qualification titles in accordance with HEQF policy are:

* Diploma in Engineering Technology in Civil Engineering, abbreviated Dip (Eng Tech) (Civil Engineering)

In case of a second *Qualifier*:

* Diploma in Engineering Technology in Civil Engineering in Environmental Engineering, abbreviated, Dip (Eng Tech) (Civil Engineering) (Environmental)

1. **Purpose of the Qualification**

This qualification is primarily vocational, or industry oriented, characterised by the knowledge emphasisis, general principles and application or technology transfer. The qualification provides students with a sound knowledge base in a particular field or discipline and the ability to apply their knowledge and skills to particular career or professional contexts, while equipping them to undertake more specialised and intensive learning. Programmes leading to this qualification tend to have a strong vocational, professional or career focus and holders of this qualification are usually prepared to enter a specific niche in the labour market.

The specific purpose of educational programmes designed to meet this qualification are to build the necessary knowledge, understanding, abilities and skills required for further learning towards becoming a competent practicing Professional Engineering Technician. This qualification provides:

1. Preparation for careers in engineering and areas that potentially benefit from engineering skills, for achieving technical proficiency and competency to make a contribution to the economy and national development;
2. The educational base required for registration as a Candidate and/or a Professional Engineering Technician with ECSA (Refer to qualification rules).
3. Entry to programmes e.g. Diploma or Bachelor Degree programmes.
4. Entry to an Advanced Diploma upon successful completion of a work-integrated learning component, or a combination of work-integrated learning and coursework, equivalent to at least 30 credits but not to exceed 120 credits.

Engineering students completing this qualification will demonstrate competence in all the Exit Level Outcomes contained in this standard.

1. **Rationale**

Professional Engineering Technicians are characterized by the ability to apply proven, commonly understood techniques, procedures, practices and codes to solve *well-defined* engineering problems. They manage and supervise engineering operations, construction and activities. They work independently and responsibly within an allocated area or under guidance.

Professional Engineering Technicians must therefore have a working understanding of engineering sciences underlying the techniques used, together with financial, commercial, legal, socio-economic, health, safety and environmental methodologies, procedures and best practices.

The process of professional development of a Professional Engineering Technician starts with the attainment of an accredited RSA qualification or combination of substantially equivalent qualification(-s) that meets this standard. After graduation a programme of training and experience is completed to attain the competencies for registration in the category Professional Engineering Technician.

1. **Programme Structure**

The programme leading to the qualification shall contain a minimum of 280 credits, with not less than 120 credits at NQF level 6. Credits shall be distributed in order to create a coherent progression of learning toward the exit level.

**6.1 Knowledge Profile of the Graduate**

The content of the educational programme when analysed by knowledge area shall not fall below the minimum credits in each knowledge area as listed below.

|  |  |
| --- | --- |
| Table 1: Minimum credits in knowledge areas | |
| Total | 280 |
| Mathematical Sciences | 28 |
| Natural Sciences | 21 |
| Engineering Sciences | 126 |
| Engineering Design & Synthesis | 28 |
| Computing and IT | 21 |
| Complementary Studies | 14 |
| Available for re-allocation in above areas | 42 |

Credits available for re-allocation must be assigned to the knowledge areas to form a coherent, balanced programme.

The method of calculation of credits and allocation to knowledge area is defined in ECSA document E-01-P or Appendix A.

**6.2 Core and Specialist Requirements**

The programme shall have a coherent core of mathematics, basic sciences and fundamental engineering sciences totalling not less than 50% of the total credits that provides a viable platform for further studies and lifelong learning. The coherent core must enable development in a traditional discipline or in an emerging field. The coherent core includes fundamental elements. The provider may allow elective credits, subject to the minimum credits in each knowledge area and the exit level outcomes being satisfied for all choices.

A programme shall contain specialist engineering study at the exit level. Specialist study may lead to elective or compulsory credits. Specialist study may take on many forms including further deepening of a theme in the core, a new sub-discipline, or a specialist topic building on the core. It is recognized that the extent of specialist study is of necessity limited in view of the need to provide a substantial coherent core. Specialist study may take the form of compulsory or elective credits.

In the Complementary Studies area, it covers those disciplines outside of engineering sciences, basic sciences and mathematics which are relevant to the practice of engineering in two ways: (a) principles, results and method are applied in the practice of engineering, including engineering economics, the impact of technology on society and effective communication; and (b) study broadens the student's perspective in the humanities or social sciences to support an understanding of the world. Underpinning Complementary Studies knowledge of type (b) must be sufficient and appropriate to support the student in satisfying Exit Level Outcomes 6, 7 and 10 in the graduates specialized practice area.

**6.3 Curriculum Content**

This qualification standard does not specify detailed curriculum content. The fundamental and specialist engineering science content must be consistent with the designation of the qualification.

Designers of specific qualifications may build on this generic base by specifying occupation-related content and specific skills required. The particular occupation may also require other qualifications, learnerships, skills programmes or further learning.

1. **Access to Qualification**

This standard is specified as a set of exit level outcomes and overall distribution of credits. Providers therefore have the freedom to construct programmes geared to different levels of preparedness of learners, including:

* Use of access programmes for learners who do not meet the minimum requirements; and
* Creating articulation paths from other qualifications.

1. **Minimum Learning Assumed to be in Place**

The minimum entry requirement is the National Senior Certificate or the National Certificate (Vocational) with appropriate subject combinations and levels of achievement, as defined in the Government Gazette, Vol 751, No 32131 of 11 July 2008, and in the *Government Gazette,* Vol. 533, No. 32743, November 2009. Alternatively, a Higher Certificate or an Advanced Certificate or Diploma in a cognate field may satisfy the minimum admission requirements.

**Note:** Appropriate Language, Mathematics and Physical Science are required at NQF level 4.

1. **Exit Level Outcomes**

Exit Level Outcomes defined below are stated generically and may be assessed in various engineering disciplinary or cross-disciplinary contexts in a provider-based or simulated practice environment. Words and phrases having specific meaning are defined in this document or in the ECSA document E-01-P.

**Notes:**

1. For Critical Cross-field Outcomes linked to Exit Level Outcomes refer to normative information in Appendix B.
2. For exemplified informative associated assessment criteria, refer to Appendix C.
3. The Level Descriptor: *Well-Defined engineering problems* applicable to this Qualification Standard is characterised by:
4. Can be solved mainly by practical engineering knowledge, underpinned by related theory;

***and one or more of the characteristics:***

1. are largely defined but may require clarification;
2. are discrete, focussed tasks within engineering systems;
3. are routine, frequently encountered, may be unfamiliar but in familiar context;

***and one or more of the characteristics:***

1. can be solved in standardized or prescribed ways;
2. are encompassed by standards, codes and documented procedures; requires authorization to work outside limits;
3. information is concrete and largely complete, but requires checking and possible supplementation;
4. involve several issues but few of these imposing conflicting constraints and a limited range of interested and affected parties.

***General Range Statement***: The competencies defined in the ten exit level outcomes may be demonstrated in a provider-based and / or simulated workplace context.

**Exit Level Outcome 1: Problem Solving**

Apply engineering principles to systematically diagnose and solve *well-defined* engineering problems.

**Exit Level Outcome 2:** **Application of Scientific and Engineering Knowledge**

Apply knowledge of mathematics, natural science and engineering sciences to applied engineering procedures, processes, systems and methodologies to solve *well-defined* engineering problems.

***Range Statement:*** Knowledge of mathematics, natural science and engineering science is characterized by:

1. A coherent range of fundamental principles in mathematics and natural science underlying a sub-discipline or recognised practice area.
2. A coherent range of fundamental principles in engineering science and technology underlying an engineering sub-discipline or recognised practice area.
3. A codified practical knowledge in recognised practice area.
4. The use of mathematics, natural sciences and engineering sciences, supported by established mathematical formulas, codified engineering analysis, methods and procedures to solve well-defined engineering problems.

**Exit Level Outcome 3: Engineering Design**

Perform procedural design of components, systems, works, products or processes to meet desired needs usually within applicable standards, codes of practice and legislation.

***Range Statement:*** Design problems used in assessment must conform to the definition of *well-defined* engineering problems:

1. A design project should be used to provide evidence of compliance with this outcome.
2. The problem would be typical of that which the graduate would participate in a typical employment situation shortly after graduation.
3. The selection of components, systems, engineering works, products or processes to be designed is dependent on the sub-discipline.
4. A design project should include one or more of the following impacts: socio-economic, legal, health, safety, and environmental.

**Exit Level Outcome 4: Investigation**

Conduct investigations of *well-defined* problems through locating and searching relevant codes and catalogues, conducting standard tests, experiments and measurements.

***Range Statement:*** The balance of investigation should be appropriate to the discipline. An investigation should be typical of those in which the graduate would participate in an employment situation shortly after graduation.

**Note:** An investigation differs from a design in that the objective is to produce knowledge and understanding of a phenomenon.

**Exit Level Outcome 5: Engineering Methods, sSkills, Tools, including Information Technology**

Use appropriate techniques, resources, and modern engineering tools including information technology for the solution of *well-defined* engineering problems, with an awareness of the limitations, restrictions, premises, assumptions and constraints.

***Range Statement:*** A range of methods, skills and tools appropriate to the discipline of the program including:

1. Sub-discipline-specific tools processes or procedures.
2. Computer packages for computation, simulation, and information handling;
3. Computers and networks and information infrastructures for accessing, processing, managing, and storing information to enhance personal productivity and teamwork;
4. Basic techniques from economics, management, and health, safety and environmental protection.

**Exit Level Outcome 6: Professional and Technical Communication**

Communicate effectively, both orally and in writing within an engineering context.

***Range Statement:*** Material to be communicated is in a simulated professional context:

1. Audiences are engineering peers, academic personnel and related engineering persons using appropriate formats.
2. Written reports range from short (minimum 300 words) to long (a minimum of 2 000 words excluding tables, diagrams and appendices), covering material at the exit level.
3. Methods of providing information include the conventional methods of the discipline, for example engineering drawings, physical models, bills of quantities as well as subject-specific methods.

**Exit Level Outcome 7: Impact of Engineering Activity**

Demonstrate knowledge and understanding of the impact of engineering activity on the society, economy, industrial and physical environment, and address issues by defined procedures.

***Range Statement:*** The combination of social, workplace (industrial) and physical environmental factors must be appropriate to the sub-discipline of the qualification. Evidence may include case studies typical of the technical practice situations in which the graduate is likely to participate.

Issues and impacts to be addressed:

1. Are encompassed by standards and documented codes of practice.
2. Involve a limited range of stakeholders with differing needs.
3. Have consequences that are locally important and are not far reaching.
4. Are *well-defined* and discrete and part of an engineering system.

**Exit Level Outcome 8: Individual and Teamwork**

Demonstrate knowledge and understanding of engineering management principles and apply these to one’s own work, as a member and leader in a technical team and to manage projects.

***Range Statement:***

1. The ability to manage a project should be demonstrated in the form of the project indicated in ELO 3.
2. Tasks are discipline specific and within the technical competence of the graduate.
3. Projects could include: laboratories, business plans, design etc
4. Management principles include:

* Planning: set objectives, select strategies, implement strategies and review achievement.
* Organising: set operational model, identify and assign tasks, identify inputs, delegate responsibility and authority.
* Leading: give directions, set example, communicate, motivate.
* Controlling: monitor performance, check against standards, identify variations and take remedial action.

**Exit Level Outcome 9: Independent Learning**

Engage in independent and life-long learning through well-developed learning skills.

***Range Statement:*** The learning context is well-structured with some unfamiliar elements.

**Exit Level Outcome 10: Engineering Professionalism**

Understand and commit to professional ethics, responsibilities and norms of engineering technical practice.

***Range Statement:*** Evidence includes case studies, memorandum of agreement, code of conduct, membership of professional societies etc typical of engineering practice situations in which the graduate is likely to participate.

1. **International Comparability**

International comparability of engineering education qualifications is ensured through the Washington, Sydney and Dublin Accords, all being members of the International Engineering Alliance (IEA). International comparability of this engineering technician education qualification is assured through the Dublin Accord.

The exit level outcomes and level descriptors defined in this qualification are aligned with the International Engineering Alliance’s Graduate Attributes and Professional Competencies (See [www.ieagreements.org](http://www.ieagreements.org)).

1. **Integrated Assessment**

Providers of programmes shall in the quality assurance process demonstrate that an effective integrated assessment strategy is used. Clearly identified components of assessment must address summative assessment of the exit level outcomes. Evidence should be derived from major work or multiple instances of limited scale work.

1. **Recognition of Prior Learning**

Recognition of prior learning (RPL) may be used to demonstrate competence for admission to this programme. This qualification may be achieved in part through recognition of prior learning processes. Credits achieved through RPL must not exceed 50% of the total credits and must not include credits at the exit level.

1. **Articulation Possibilities**

Candidates who complete the 280-credit Diploma may enter an Advanced Diploma in Engineering Technology upon successful completion of a work integrated learning component or a combination of work-integrated learning and coursework equivalent to a minimum of 120 credits that is approved and accredited by an education provider and/or a professional body and the relevant Quality Council. A qualification may not be awarded for early exit from a Diploma Programme.

Completion of a 280-credit Diploma meets the minimum entry requirement for admission to a Diploma or Bachelor's degree. Accumulated credits may also be presented for admission into a cognate 360-credit Diploma in Engineering or a Bachelor's Degree programme.

1. **Moderation and Registration of Assessors**

Providers of programmes shall in the quality assurance process demonstrate that an effective moderation process exists to ensure that the assessment system is consistent and fair.

Registration of assessors is delegated by the Higher Education Quality Committee to the Higher Education providers responsible for programmes.

**Appendix A: Method of Calculation of Credits and Allocation to Knowledge Area.**

The method of calculation assumes that certain activities are scheduled on a regular weekly basis while others can only be quantified as a total activity over the duration of a course or module. This calculation makes the following assumptions:

1. Classroom or other scheduled contact activity generates notional hours of the student’s own time for each hour of scheduled contact. The total is given by a multiplier applied to the contact time.
2. Two weeks of full-time activity accounts for assessment in a semester.
3. Assigned work generates only the notional hours judged to be necessary for completion of the work and is not multiplied.

Define for each course or module identified in the rules for the degree: Type of Activity, Time Unit in Hours and Contact Time Multiplier

The credit for the course is: C = {W (L\*TL \*ML + T\*TT \*MT) + P\*TP \*MP + X\*TX \*MX + A\*TA }/10

Where:

L = number of lectures per week,

TL = duration of a lecture period

ML = total work per lecture period

T = number of tutorial per week

TT = duration of a tutorial period

MT = total work per tutorial period

P = total practical periods

T = duration of a practical period

MP = total work per practical period

X = total other contact periods

TX = duration of other period

MX = total work per other period

A = total assignment non-contact Hours

TA = 1 hour

W = number of weeks the course lasts (actual + 2 week per semester for examinations,

if applicable to the course or module)

The resulting credit for a course or value may be divided between more than one knowledge area. In allocating the credit for a course to multiple knowledge areas, only new knowledge or skills in a particular area may be counted. Knowledge and skills developed in other courses and used in the course in question shall not be counted. Such knowledge is classified by the nature of the area in which it is applied. In summary, no knowledge is counted more than once as being new.

**Appendix B: Consistency of Exit Level Outcomes with Critical Cross-field Outcomes**

**(Normative)**

|  |  |
| --- | --- |
| **SAQA Critical Cross-Field Outcomes** | **Equivalent Exit Level Outcome** |
| Identifying and solving problems in which responses display that responsible decisions using critical thinking have been made. | ELO 1.2.3.5 |
| Working effectively with others as a member of a team, group, organisation and community. | ELO 8 |
| Organising and managing oneself and one’s activities responsibly and effectively | ELO 8 |
| Collecting, analysing, organising and critically evaluating information. | ELO 1, 3, 5 |
| Communicating effectively using visual, mathematical and/or language skills | ELO 2, 6 |
| Using science and technology effectively and critically, showing responsibility toward the environment and health of others | ELO 2, 3, 4, 5, 7 |
| Demonstrating an understanding of the world as a set of related systems by recognising that problem context do not exist in isolation | ELO 1, 3 |
| Contributing to the full personal development of each learner and the social and economic development of society at large, by making it an underlying intention of the programme of learning to make an individual aware of:   * reflecting on and exploring a variety of strategies to learn more effectively * participating as responsible citizens in the life of local, national and global communities * being culturally and aesthetically sensitive across a range of contexts * exploring education and career opportunities * developing entrepreneurial opportunities | ELO 9  ELO 10  ELO 7  ELO 8  ELO 3 |

**Appendix C: Exemplified Associated Assessment Criteria**

The assessment criteria presented here are typifying, not normative.

**Exit Level Outcome 1:**

* 1. The problem is analysed and defined and criteria are identified for an acceptable solution.
  2. Relevant information and engineering knowledge and skills are identified and used for solving the problem.
  3. Various approaches are considered and formulated that would lead to workable solutions.
  4. Solutions are modelled and analysed.
  5. Solutions are evaluated and the best solution is selected.
  6. The solution is formulated and presented in an appropriate form.

**Exit Level Outcome 2:**

* 1. An appropriate mix of knowledge of mathematics, statistics, natural science and engineering science knowledge at a fundamental level is brought to bear on the solution of *well-defined* engineering problems.
  2. Applicable principles and laws are used.
  3. Engineering materials, components, systems or processes are analysed.
  4. Concepts and ideas are presented in a logical and methodical manner.
  5. Reasoning about engineering materials, components, systems or processes is performed.
  6. Procedures for dealing with uncertain/ undefined/ill defined variables are outlined and justified.
  7. Work is performed within the boundaries of the practice area

**Exit Level Outcome 3:**

* 1. The design problem is formulated to satisfy user needs, applicable standards, codes of practice and legislation.
  2. The design process is planned and managed to focus on important issues and recognises and deals with constraints.
  3. Knowledge, information and resources are acquired and evaluated in order to apply appropriate principles and design tools to provide a workable solution.
  4. Design tasks are performed that include analysis and optimisation of the product, or system or process, subject to relevant premises, assumptions and constraints.
  5. Alternatives are evaluated for implementation and a preferred solution is selected based on techno-economic analysis and judgement.
  6. The design logic and relevant information is communicated in a technical report.
  7. Procedures are applied to evaluate the selected design and assessed in terms of the impact and benefits.

**Exit Level Outcome 4:**

1. The scope of the investigation is defined.
2. Investigations are planned and conducted within an appropriate discipline.
3. Available literature is searched and material is evaluated for suitability to the investigation.
4. Relevant equipment or software is selected and appropriately used for the investigation.
5. Data obtained is analysed and interpreted.
6. Conclusions are drawn from an analysis of all available evidence.
7. The purpose, process and outcomes of the investigation are recorded in a technical report.

**Exit Level Outcome 5:**

5.1 The method, skill or tool is assessed for applicability and limitations against the required result.

5.2 The method, skill or tool is applied correctly.

5.3 Results produced by the method, skill or tool are tested and assessed

5.4 Relevant computer applications are selected and used.

**Exit Level Outcome 6:**

1. The structure, style and language of written and oral communication is appropriate for the purpose of the communication and the target audience.
2. Graphics used are appropriate and effective in enhancing the meaning of the text.
3. Visual materials used enhance oral communications.
4. Information is provided in a format that can be used by others involved in the engineering activity.
5. Oral communication is delivered with the intended meaning being apparent.

**Exit Level Outcome 7:**

7.1 The impact of technology is demonstrated in terms of the benefits and limitations to society.

7.2 The engineering activity is analysed in terms of the impact on occupational and public health and safety.

7.3 The engineering activity is analysed in terms of the impact on the physical environment.

7.4 The methods to minimise/mitigate impacts outlined in 7.2 and 7.3 are considered.

**Exit Level Outcome 8:**

1. The principles of planning, organising, leading and controlling are explained.
2. Individual work is carried out effectively, strategically and on time.
3. Individual contributions made to team activities support the output of the team as a whole.
4. Functioning as a team leader is demonstrated.
5. A project is organised and managed.
6. Effective communication carried out in the context of individual and team work.

**Exit Level Outcome 9:**

1. Learning tasks are identified, planned and managed.
2. The requirement for independent learning is identified/ recognised and demonstrated.
3. Relevant information is sourced, organised and evaluated
4. Knowledge acquired outside of formal instruction is comprehended and applied.
5. Awareness is displayed of the need to maintain continued competence through keeping abreast of up-to-date tools and techniques available in the workplace.

**Exit Level Outcome 10:**

1. The nature and complexity of ethical dilemmas is described in terms of required practices, legislation and limitations of authority.
2. The ethical implications of engineering decisions are described in terms of the impact on environment, the business, costs and trustworthiness.
3. Judgements in decision making during problem solving and design are ethical and within acceptable boundaries of current competence.
4. Responsibility is accepted for consequences stemming from own actions or inaction.
   1. Decision making is limited to area of current competence.