



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

CURRICULUM AND ASSESSMENT POLICY STATEMENT (CAPS)

ENGINEERING GRAPHICS AND DESIGN

FINAL

SECTION 1

NATIONAL CURRICULUM AND ASSESSMENT POLICY STATEMENT FOR ENGINEERING GRAPHICS AND DESIGN

1.1 Background

The *National Curriculum Statement Grades R – 12 (NCS)* stipulates policy on curriculum and assessment in the schooling sector.

To improve its implementation, the National Curriculum Statement was amended, with the amendments coming into effect in January 2012. A single comprehensive National Curriculum and Assessment Policy Statement was developed for each subject to replace the old Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R - 12.

The amended *National Curriculum and Assessment Policy Statements (January 2012)* replace the *National Curriculum Statements Grades R - 9 (2002)* and the *National Curriculum Statements Grades 10 - 12 (2004)*.

1.2 Overview

- (a) The *National Curriculum Statement Grades R – 12 (January 2012)* represents a policy statement for learning and teaching in South African schools and comprises the following:

National Curriculum and Assessment Policy Statements for each approved school subject as listed in the policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R – 12*, which replaces the following policy documents:

- (i) *National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF)*; and
 - (ii) *An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs*, published in the *Government Gazette, No.29466* of 11 December 2006.
- (b) The *National Curriculum Statement Grades R – 12 (January 2012)* should be read in conjunction with the *National Protocol for Assessment Grade R – 12*, which replaces the policy document, *An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment Grade R – 12*, published in the *Government Gazette, No. 29467* of 11 December 2006.
- (c) The Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R - 9 and Grades 10 - 12 are repealed and replaced by the *National Curriculum and Assessment Policy Statements for Grades R – 12 (January 2012)*.

- (d) The sections on the Curriculum and Assessment Policy as contemplated in Chapters 2, 3 and 4 of this document constitute the norms and standards of the *National Curriculum Statement Grades R – 12* and therefore, in terms of *section 6A* of the *South African Schools Act, 1996 (Act No. 84 of 1996)*,) form the basis for the Minister of Basic Education to determine minimum outcomes and standards, as well as the processes and procedures for the assessment of learner achievement to be applicable to public and independent schools.

1.3 General aims of the South African Curriculum

- (a) The *National Curriculum Statement Grades R - 12* gives expression to what is regarded to be knowledge, skills and values worth learning. It will ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes the idea of grounding knowledge in local contexts, while being sensitive to global imperatives.
- (b) The National Curriculum Statement Grades R - 12 serves the purposes of:
- equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfilment, and meaningful participation in society as citizens of a free country;
 - providing access to higher education;
 - facilitating the transition of learners from education institutions to the workplace; and
 - providing employers with a sufficient profile of a learner's competences.
- (c) The National Curriculum Statement Grades R - 12 is based on the following principles:
- Social transformation: ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of our population;
 - Active and critical learning: encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths;
 - High knowledge and high skills: the minimum standards of knowledge and skills to be achieved at each grade are specified and sets high, achievable standards in all subjects;
 - Progression: content and context of each grade shows progression from simple to complex;
 - Human rights, inclusivity, environmental and social justice: infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa. The National Curriculum Statement Grades 10 – 12 (General) is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors;
 - Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and
 - Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.
- (d) The National Curriculum Statement Grades R - 12 aims to produce learners that are able to:

- identify and solve problems and make decisions using critical and creative thinking;
 - work effectively as individuals and with others as members of a team;
 - organise and manage themselves and their activities responsibly and effectively;
 - collect, analyse, organise and critically evaluate information;
 - communicate effectively using visual, symbolic and/or language skills in various modes;
 - use science and technology effectively and critically showing responsibility towards the environment and the health of others; and
 - demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation.
- (e) Inclusivity should become a central part of the organisation, planning and teaching at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.

The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures within the school community, including teachers, District-Based Support Teams, Institutional-Level Support Teams, parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should use various curriculum differentiation strategies such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

1.4 Time Allocation

1.4.1 Foundation Phase

- (a) The instructional time for subjects in the Foundation Phase is as indicated in the table below:

Subject	Time allocation per week (hours)
I. Languages (FAL and HL)	10 (11)
II. Mathematics	7
III. Life Skills	6 (7)
• Beginning Knowledge	1 (2)
• Creative Arts	2
• Physical Education	2
• Personal and Social Well-being	1

- (b) Instructional time for Grades R, 1 and 2 is 23 hours and for Grade 3 is 25 hours.
- (c) In Languages 10 hours is allocated in Grades R-2 and 11 hours in Grade 3. A maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 2 hours and a maximum of 3 hours for Additional Language in Grades R – 2. In Grade 3

a maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 3 hours and a maximum of 4 hours for First Additional Language.

- (d) In Life Skills Beginning Knowledge is allocated 1 hour in Grades R – 2 and 2 hours as indicated by the hours in brackets for Grade 3.

1.4.2 Intermediate Phase

- (a) The table below shows the subjects and instructional times in the Intermediate Phase.

Subject	Time allocation per week (hours)
I. Home Language	6
II. First Additional Language	5
III. Mathematics	6
IV. Science and Technology	3.5
V. Social Sciences	3
VI. Life Skills	4
• Creative Arts	1.5
• Physical Education	1
• Personal and Social Well-being	1.5

1.4.3 Senior Phase

- (a) The instructional time in the Senior Phase is as follows:

Subject	Time allocation per week (hours)
I. Home Language	5
II. First Additional Language	4
III. Mathematics	4.5
IV. Natural Sciences	3
V. Social Sciences	3
VI. Technology	2
VII. Economic Management Sciences	2
VIII. Life Orientation	2
IX. Creative Arts	2

1.4.4 Grades 10-12

(a) The instructional time in Grades 10-12 is as follows:

Subject	Time allocation per week (hours)
I. Home Language	4.5
II. First Additional Language	4.5
III. Mathematics	4.5
IV. Life Orientation	2
V. Three Electives	12 (3x4h)

The allocated time per week may be utilised only for the minimum required NCS subjects as specified above, and may not be used for any additional subjects added to the list of minimum subjects. Should a learner wish to offer additional subjects, additional time must be allocated for the offering of these subjects.

SECTION 2

Introduction to Engineering Graphics and Design (EGD)

Engineering Graphics and Design (EGD) teaches internationally acknowledged principles that have both academic and technical applications. The emphasis in EGD is on teaching specific basic knowledge and various drawing techniques and skills so that the EGD learners will be able to produce drawings within the contexts of Mechanical Technology, Civil Technology and Electrical Technology.

2.1 The main topics of EGD:

- General drawing principles for all technological drawings
- Free-hand drawing
- Instrument drawing
- First- and third-angle orthographic projections
- Descriptive and solid geometry
- Mechanical working drawing
- Civil working drawing
- Isometric drawing
- Perspective drawing
- Electrical diagrams
- Interpenetrations and developments
- Loci of helixes, cams and mechanisms
- The Design Process
- CAD (Computer-Aided Drawing/Design)

2.2 The specific aims of EGD are to teach the following:

- Graphical drawings as the primary means of communication in the technological world
- Specific basic content and concepts within the contexts of Mechanical Technology, Civil Technology and Electrical Technology
- Various instrument and freehand drawing techniques and skills
- Solving technological problems through graphical drawings
- The application of the Design Process
- The implementation of CAD (Computer Aided Drawings/Design) as a drawing method.

2.3 The requirements for offering EGD:

- The minimum requirements for an EGD classroom are:
*These requirements are the **responsibility of the school.***
 - Sufficient security to safeguard all the required resources and equipment
 - Sufficient space for medium-to-large school desks or drawing tables
 - Sufficient artificial fluorescent lighting
 - Desks with a minimum top size of 700 mm X 450 mm or A2, or larger drawing tables that will sufficiently accommodate an A3 drawing board and drawing instruments
 - ALL the computer hardware and software required for CAD
 - A large blackboard and/or whiteboard, with an eraser and chalk/pens
 - Large set squares, ruler, protractor and compasses for the black/whiteboard
 - Overhead projector and large projector screen
 - A large lockable cupboard for all the teacher's files and resource material
 - Sufficient cupboards or storage space for all the learners' EGD files

- Approved EGD textbooks, with explanatory examples and exercises for each topic, with teachers guides
- Sufficient A4 and A3 drawing sheets for all the drawing tasks.
- The minimum requirements for each EGD learner are:
 - An approved EGD textbook with self-explanatory examples and exercises for each topic

NOTE:

A workbook/work file may only be used in conjunction with a textbook and not as a substitution for a textbook

*The following requirements should be the **responsibility of the learner.***

- A large file
- A3 drawing board with a T-square
- Masking tape
- Drawing pencil: 2H, 3H or 4H
- Eraser
- Ruler
- 30°/60° drawing set square
- 45° drawing set square
- Drawing compass, preferably with an adjustment wheel
- Divider
- Small protractor
- Dust cloth
- Calculator.

2.4 EGD provides the fundamental knowledge and drawing skills required for the following career opportunities:

- Architecture
- Most engineering fields (e.g. Civil, Mechanical, Aviation, Maritime, Agricultural, Mining etc.)
- Medical technician
- Industrial designer
- Interior designer
- Landscape architect
- Quantity surveyor
- Building management
- City planner
- Land surveyor
- Teacher
- Graphic illustrator
- Jewellery designer
- Model builder (scale models)
- Draughtsperson (e.g. Steel structure, Architectural, Civil, Design, Electrical etc.)
- Technicians
- Most manufacturers
- Most artisans
- CAD system operator

SECTION 3

3.1 OVERVIEW OF THE TOPICS

Topic	Grade	Examinable Content
Introduction to & Purpose of EGD	This topic must be incorporated into the scenarios of assessment tasks in an appropriate way.	
	Grade 10	Purpose, scope and career opportunities
	Grade 11	
	Grade 12	
Analytical and Visualisation exercises	Grade 10	Applicable to pre-prepared civil, mechanical and electrical drawings
	Grade 11	
	Grade 12	
General Drawing Principles	Grade 10	Use and care of drawing instruments , dangers of sharp instruments (HIV/AIDS), line types and line-work, lettering (writing) and annotations, dimensioning techniques and conventions
	Grade 11	<i>The Grade 10 content remains applicable to all the grade 11 topics</i>
	Grade 12	<i>The Grade 10 content remains applicable to all the grade 12 topics</i>
Free-hand Drawing	Grade 10	Free-hand drawing techniques
	Grade 11	<i>The Grade 10 content remains applicable to all the grade 11 topics</i>
	Grade 12	<i>The Grade 10 content remains applicable to all the grade 12 topics</i>
Setting up a Drawing Sheet	Grade 10	A4 and A3 drawing sheets with general name/title blocks
	Grade 11	A4 and A3 drawing sheets with relevant civil and mechanical name/title blocks/panels
	Grade 12	A4 and A3 drawing sheets with relevant civil and mechanical name/title blocks/panels
Geometrical Construction	Grade 10	Instrumental constructions, regular polygons and ellipses
	Grade 11	<i>The Grade 10 content remains applicable to all the relevant grade 11 topics</i>
	Grade 12	<i>The Grade 10 content remains applicable to all the relevant grade 12 topics</i>
Scales	Grade 10	The application of any scale
	Grade 11	<i>The Grade 10 content remains applicable to all the relevant grade 11 topics</i>
	Grade 12	<i>The Grade 10 content remains applicable to all the relevant grade 12 topics</i>
Descriptive Geometry	Grade 10	Points and line segments, true lengths, true inclinations and true shapes
	Grade 11	<i>The Grade 10 content remains applicable to all the relevant grade 11 topics</i>
	Grade 12	<i>The Grade 10 content remains applicable to all the relevant grade 12 topics</i>
Solid Geometry	Grade 10	Right-regular solids with sections and true shapes
	Grade 11	Combinations of the right-regular solids with sections and true shapes
	Grade 12	Revision of the Grade 11 combined solids with sections and true shapes
Mechanical Drawing	All mechanical drawings must be presented as 3rd angle orthographic working drawings in accordance with the <i>SANS (SABS) 0111 Guidelines</i> .	
	Grade 10	Castings
	Grade 11	Simple assemblies
	Grade 12	Complex assemblies and welding, machining & treatment symbols
Civil Drawing	All civil drawings, limited to single-story dwellings, must be presented as 1st angle orthographic working drawings in accordance with the <i>SANS (SABS) 0143 Guidelines</i> .	
	Grade 10	Foundation to slab
	Grade 11	Foundation to ceiling
	Grade 12	Foundation to roof, electrical fixtures and site plans
Isometric Drawing	Grade 10	Simple isometric drawings with auxiliary views
	Grade 11	Complex isometric drawings with auxiliary views and circles
	Grade 12	Complex isometric drawings with auxiliary views, circles and sections
Perspective Drawing	Grade 10	1-point perspective drawings
	Grade 11	2-point perspective drawings
	Grade 12	Complex 2-point perspective drawings with circles and arcs
Electrical Diagrams	Grade 10	Simple circuit diagrams
	Grade 11	Parallel and series circuit diagrams
	Grade 12	Electrical fixtures and wiring on floor plans of civil drawings

Interpenetration	Grade 10	N/A
	Grade 11	Between two in-line regular geometrical prisms and/or cylinders
	Grade 12	Between two in-line or offset regular geometrical prisms and/or cylinders
Development	Grade 10	N/A
	Grade 11	Interpenetrations, truncated pyramids & cones, simple transition pieces etc.
	Grade 12	Interpenetrations, sectioned pyramids & cones, complex transition pieces etc.
Loci (Helix)	Grade 10	N/A
	Grade 11	Simple helixes, e.g. augers, coil springs and square screw thread.
	Grade 12	Complex helixes e.g. augers, spiral chutes, coil springs, different screw thread.
Loci (Cam)	Grade 10	N/A
	Grade 11	Simple cams with uniform motion and wedge shaped followers
	Grade 12	Complex cams with uniform and/or harmonic motion and either wedge shaped or roller followers
Loci (Mechanisms)	Grade 10	N/A
	Grade 11	N/A
	Grade 12	Loci of a point(s) on the moving components of mechanisms

Topic	Grade	Practical Assessment Task (PAT) Content These topics must be formally assessed within the PAT .
The Design Process	Grade 10	Application of the complete Design Process to the selected scenario
	Grade 11	
	Grade 12	
CAD (Computer-Aided Drawing/Design)	Grade 10	<ul style="list-style-type: none"> • Application and management of the specific CAD software used • Presentation drawings for the PAT
	Grade 11	
	Grade 12	

3.2 AN ANNUAL TEACHING PLAN

- This annual teaching plan is suitable for schools that will be teaching CAD either during one period per week/cycle or after normal school hours.
- It is the responsibility of each school's EGD teacher(s) to select the resource material, activities and assessment tasks for the annual teaching plan.
- The hours in the duration column are an indication of the minimum time that should be spent on the specific topic. The number of days, indicated in brackets in the same column, is an indication of the maximum number of school days for the specific topic.
- All the assessment tasks for each topic must also be completed within the allocated week(s)/days for the topic.
- In order to successfully implement the annual teaching plan for EGD, the time table must be adjusted to allow for four hours contact time during a five-day week.

NOTE:

The sequences and/or allocated week(s)/days of these annual teaching plans may be altered. However, the altered sequences and/or allocated week(s)/days must be approved by an Engineering Graphics and Design subject adviser or co-ordinator and must still contain all the topics and prescribed content.

NOTE: The duration indicates the minimum time or the *maximum number of school days* that should be spent on the topic.

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 1			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
2¼ hrs (3 days)	1	Classroom and administrative management	All administrative and classroom managerial structures must be put in place and the teachers' EGD files as well as all the learners' EGD files must be prepared for use throughout the year.
1½ hrs (2 days)	2	Introduction to & Purpose of EGD	The scope, educational and career opportunities related to EGD. Include human rights, gender, and inclusivity and HIV/AIDS issues.
6 hrs (8 days)	2 – 3	General Drawing Principles relevant to all types of drawing	<ul style="list-style-type: none"> The correct use and care of drawing instruments; The dangers of sharp instruments that could cause bleeding and the transfer of HIV/AIDS; Relevant line types as contained in the <i>SANS (SABS) 0111 and 0143 Guidelines</i>; <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>GUIDELINES for PENCIL LINE-WORK: NOTE: A wooden, 0.3 or 0.5 pencil with either a 2H, 3H or 4H lead should be used.</p> <p>A–Type line (darkest line): Border & title/name block/panel; outlines & visible parts; answers of e.g. loci; projection symbol; tables</p> <p>B–Type line (medium line): All writing & numbering; dimensions; projection planes; auxiliary views; hatching; screw threads; folding lines, break lines</p> <p>C–Type line (lightest line): Constructions; planning; projections; guidelines (for writing)</p> <p>Medium Chain–line (B–Type): Centre points of circles; centre lines (centre axis); section planes; assembly diagrams; building lines/boundaries (servitudes)</p> <p>Dark Chain–line (A–Type): Plumbing, water pipes, drainage, services, irrigation systems</p> <p>Short Broken–line (B–Type): Hidden detail; items to be removed on civil drawings</p> <p>Long Broken–line (B–Type): Contour lines on civil site plans</p> </div> <ul style="list-style-type: none"> General lettering (writing) and annotation requirements as contained in the <i>SANS (SABS) 0111 & 0143 Guidelines</i>; General dimensioning requirements as contained in the <i>SANS (SABS) 0111 & 0143 Guidelines</i>.
5¼ hrs (7 days)	4 – 5	Free-hand Drawing	The basic hand movements needed to draw proportional single, multi view and pictorial drawings on plain paper and/or grid sheets.
2¼ hrs (3 days)	5	Setting up of a Drawing Sheet	A4 and A3 sized drawing sheets with borders and basic name/title blocks .
16½ hrs (22 days)	6 – 10	Geometrical Construction	<ul style="list-style-type: none"> Geometrical constructions: bisecting lines and angles, perpendicular lines, angles, dividing a line, a circle through three points, circle divisions, inscribed and circumscribed circle to triangles, fillets, tangents, convex and concave tangential arcs; Regular polygons with 3, 4, 5, 6 & 8 sides; Ellipse.
2¼ hrs (3 days)	10	Scales	<ul style="list-style-type: none"> Different scales, e.g. 5:1, 2:1, 1:2, 1:25, 1:50, 1:75, 1:100 etc. The application of any scale to all types of drawing.
3 hrs (4 days)	11	PAT (Practical Assessment Task)	<ul style="list-style-type: none"> The 'Design Process': <ul style="list-style-type: none"> Problem identification and the formulation of a design brief with a list of specifications and/or constraints Conducting research and generating graphical ideas/concepts Selecting best solution within the context of specifications/constraints Presenting the final solution with working and 3D drawings Evaluation of the whole process The PAT scenarios must be given to the learners and each scenario must be explained and discussed.

FORMAL ASSESSMENT FOR GRADE 10 TERM 1	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Test	60%
Course drawings: <ul style="list-style-type: none"> Freehand drawing Geometrical construction Ellipse 	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 2			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
11¼ hrs (15 days)	1 – 3	Mechanical Drawing	3 rd angle orthographic working drawings with non-sectional and sectional views of mechanical castings and objects from industry. Include the following: <ul style="list-style-type: none"> Title, scale, hidden detail techniques, dimensioning techniques, cutting planes, hatching detail, relevant conventions, notes and symbol of projection NOTE: ALL drawings must be in accordance with the SANS (SABS) 0111 Guidelines.
11¼ hrs (15 days)	4 – 7	Isometric Drawing	Simple isometric drawings with isometric and non-isometric lines as well as auxiliary views .
3¾ hrs (5 days)	8	PAT (Practical Assessment Task)	Phase 1: Complete the following 'Design Process' requirements: <ul style="list-style-type: none"> Formulation of a design brief with specifications and/or constraints Evidence of the external research conducted Generate THREE ideas/concepts analytically and graphically (<i>Comprehensive free-hand drawings</i>) Selecting the best solution within context of design brief.

FORMAL ASSESSMENT FOR GRADE 10 TERM 2	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Course drawings: <ul style="list-style-type: none"> TWO mechanical drawings Isometric drawing 	25%
Mid-year examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 3			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
11¼ hrs (15 days)	1 – 3	Solid Geometry	<p>1st angle orthographic views of right-regular prisms and pyramids with 3, 4, 5, 6 and 8 sides only, as well as cylinders and cones. The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only.</p> <ul style="list-style-type: none"> • Sectional views • The true shape of the cut surface.
6 hrs (8 days)	4 – 5	Descriptive Geometry	<p>1st angle orthographic views of points and line segments that are perpendicular, inclined or oblique to the projection planes.</p> <ul style="list-style-type: none"> • The true length and the true inclination of line segments to the horizontal plane(HP) or vertical plane (VP) using different methods, e.g. projection or construction • The true shapes of surfaces from given edge (side) views.
9¼ hrs (13 days)	6 – 8	Civil Drawing	<p>Limited to single-story dwellings, 1st angle orthographic working drawings with floor plans, basic single line elevations and sectional elevations showing the detail of the foundation to the slab. Include the following:</p> <ul style="list-style-type: none"> • Annotations, labels, dimensioning and scales • Relevant abbreviations and conventions • On the floor plan only: windows and doors • Hatching detail • Perimeters and floor areas <p>NOTE: ALL drawings must be in accordance with the SANS (SABS) 0143 <i>Guidelines</i>.</p>
9 hrs (12 days)	8 – 10	Perspective Drawing	<p>1- Point perspective drawings of castings, dwellings and civil structures.</p> <ul style="list-style-type: none"> • The position of the HL, PP and SP can be varied to provide any desired view e.g. bird's eye, a natural view, a worm's eye view etc.
3 hrs (4 days)	11	PAT (Practical Assessment Task)	<ul style="list-style-type: none"> • Phase 2: Complete ALL the 'Instrument and CAD presentation drawings' as required by the selected scenario. • Phase 3: Complete the 'PAT Portfolio'.

FORMAL ASSESSMENT FOR GRADE 10 TERM 3	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Test	60%
Course drawings: <ul style="list-style-type: none"> • Solid geometry • Descriptive geometry • Civil floor plan • Civil sectional elevation • One-point perspective 	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 10: TERM 4			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
3¾ hrs (5 days)	1	Electrical Drawing	Simple circuit diagrams by using given electrical and electronic component symbols.
	2 – 3	All topics not completed during previous terms:	
	2 – 3	Consolidation	<ul style="list-style-type: none"> • Mechanical working drawings • Civil working drawings

COMPULSORY FORMAL ASSESSMENT FOR GRADE 10 PROMOTION		
Assessment Tasks		Contribution to final promotion mark
SBA	ALL tests	30 marks (7.5%)
	ALL course drawings	30 marks (7.5%)
	Mid-year examination	40 marks (10%)
PAT		100 marks (25%)
Final examination		200 marks (50%)

NOTE: The duration indicates the minimum time or the *maximum number of school days* that should be spent on the topic.

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 1			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
(3 days)	1	Classroom and administrative management	All administrative and managerial structures must be put in place and the teachers' 'EGD' files , as well as all the learners' 'EGD' files , must be prepared for use throughout the year.
2 hrs (3 days)	1	Revision of the General Drawing Principles	<ul style="list-style-type: none"> The use, care and dangers of sharp instruments Line types, lettering (writing) and dimensioning Free-hand drawing techniques The principles of 1st angle and 3rd angle orthographic projections
13½ hrs (18 days)	2 – 5	Mechanical Drawing	3rd angle orthographic working drawings with non-sectional, sectional, half-sectional and part-sectional views of simple to complex mechanical assemblies . Include the following: <ul style="list-style-type: none"> Hexagonal bolts, nuts and lock nuts, washers/spacers, keys and keyways, appropriate labels, title, scale, hidden detail, dimensioning, cutting planes, hatching techniques, relevant conventions, notes and symbol of projection The different types of section Format and content of working drawing name/title blocks NOTE: ALL drawings must be in accordance with the SANS (SABS) 0111 <i>Guidelines</i> .
1½ hrs (2 days)	5	PAT (Practical Assessment Task)	<ul style="list-style-type: none"> The 'Design Process': <ul style="list-style-type: none"> Problem identification and the formulation of a design brief with a list of specifications and/or constraints Conducting research and generating graphical ideas/concepts Selecting best solution within the context of specifications/constraints Presenting the final solution with working and 3D drawings Evaluation of the whole process The PAT scenarios must be given to the learners and each scenario must be explained and discussed.
9 hrs (12 days)	6 – 8	Isometric Drawing	Simple to complex isometric drawings with isometric and non-isometric lines as well as auxiliary views and circles .
9¾ hrs (13 days)	8 – 10	Perspective Drawing	2- Point perspective drawings of simple castings, dwellings and civil structures <ul style="list-style-type: none"> The HL, PP and SP can be varied to provide any desired view.
3 hrs (4 days)	11	PAT (Practical Assessment Task)	Phase 1: Complete the following 'Design Process' requirements: <ul style="list-style-type: none"> Problem identification and the formulation of a design brief with a list of specifications and/or constraints Evidence of the external research conducted Generate THREE ideas/concepts analytically and graphically (<i>Comprehensive free-hand drawings</i>) Selecting the best solution within the context of the design brief.

FORMAL ASSESSMENT FOR GRADE 11 TERM 1	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Test	60%
Course drawings: <ul style="list-style-type: none"> Mechanical analytical exercise Mechanical assembly Isometric drawing Two-point perspective 	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 2			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
11¼ hrs (15 days)	1 – 4	Civil Drawing	Limited to single-story dwellings, 1st angle orthographic working drawings with floor plans, elevations and sectional elevations showing the detail of the foundation to the ceiling . Include the following: <ul style="list-style-type: none"> • Annotations, labels, dimensioning and scales • Relevant abbreviations and conventions • On all relevant views/elevations: windows, doors, and fixtures such as WC, bath, sink, shower and built-in cupboards • Hatching detail and the application of colours • Perimeters and floor areas • Format and content of working drawing name/title blocks NOTE: ALL drawings must be in accordance with the SANS (SABS) 0143 <i>Guidelines</i> .
11¼ hrs (15 days)	5 – 7	Solid Geometry	1st angle orthographic views of right-regular solids or a combination of the right solids . The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only. <ul style="list-style-type: none"> • Sectional views • The true shape of the cut surface
3¾ hrs (5 days)	8	PAT (Practical Assessment Task)	Phase 2: Complete ALL the 'Instrument and CAD presentation drawings' as required by each specific scenario.

FORMAL ASSESSMENT FOR GRADE 11 TERM 2	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Course drawings: <ul style="list-style-type: none"> • Civil floor plan with elevations • Civil sectional elevation • Solid geometry 	25%
Mid-year examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 3			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
11¼ hrs (15 days)	1 – 3	Interpenetration	<p>1st angle orthographic views showing the curve of interpenetration formed between two solids or pipes joined at either 30°, 45°, 60° or 90°.</p> <ul style="list-style-type: none"> The solids or pipes must be right regular geometrical prisms and/or cylinders only. The curves of interpenetration must be symmetrical. The axes of the two solids or pipes must be in line. The focus should be on industrial examples.
9¾ hrs (13 days)	4 – 6	Developments	<p>The surface developments of:</p> <ul style="list-style-type: none"> the parts of the interpenetrating solids or pipes containers hoppers truncated pyramids and cones simple transition pieces <ul style="list-style-type: none"> The focus should be on industrial examples.
7½ hrs (10 days)	7 – 8	Loci (Helix)	<p>The principles of the helix in simple applications of:</p> <ul style="list-style-type: none"> single-line augers coil springs square thread <ul style="list-style-type: none"> The direction must be emphasised.
7½ hrs (10 days)	9 – 10	Loci (Cam)	<p>The principles of the cam in simple mechanical applications in which the following must be shown:</p> <ul style="list-style-type: none"> the cam shaft and follower detail the complete displacement graph the complete cam profile <ul style="list-style-type: none"> The motion must be uniform. The direction must be emphasised. The follower must be on the vertical centre line. The follower must be wedge shaped.
3 hrs (4 days)	11	PAT (Practical Assessment Task)	Phase 3: Complete the 'PAT Portfolio'.

FORMAL ASSESSMENT FOR GRADE 11 TERM 3	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Test	60%
<p>Course drawings:</p> <ul style="list-style-type: none"> Interpenetration and development Development of a transition piece Loci (Helix) Loci (Cam) Mechanical assembly 	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 11: TERM 4			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
3¼ hrs (5 days)	1	Electrical Drawing	Parallel and series circuit diagrams, relevant to simple electrical appliances and house wiring, by using given electrical and electronic component symbols. Include appropriate notes.
	2 – 3	All topics not completed during previous terms:	
	2 – 3	Consolidation	<ul style="list-style-type: none"> • Mechanical assemblies • Civil working drawings

COMPULSORY FORMAL ASSESSMENT FOR GRADE 11 PROMOTION		
Assessment Tasks		Contribution to final promotion mark
SBA	ALL tests	30 marks (7.5%)
	ALL course drawings	30 marks (7.5%)
	Mid-year examination	40 marks (10%)
PAT		100 marks (25%)
Final examination		200 marks (50%)

NOTE: The duration indicates the minimum time or the *maximum number of school days* that should be spent on the topic.

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 1			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
(3 days)	1	Classroom and administrative management	All administrative and managerial structures must be put in place and the teachers' 'EGD' files as well as all the learners' 'EGD' files must be prepared for use throughout the year.
2 hrs (3 days)	1	Revision of the General Drawing Principles	<ul style="list-style-type: none"> The use, care and dangers of sharp of instruments Line types, lettering (writing) and dimensioning Free-hand drawing techniques The principles of 1st angle and 3rd angle orthographic projections
9¾ hrs (13 days)	2 – 4	Mechanical Drawing	3rd angle orthographic working drawings with non-sectional, sectional, half-sectional and part-sectional views of complex mechanical assemblies . Include the following: <ul style="list-style-type: none"> Title, scale, hexagonal bolts, nuts and lock nuts, washers/spacers. keys and keyways, appropriate labels, dimensioning techniques application of hidden detail, cutting planes, hatching, relevant conventions, different types of sections, notes and symbols of projection Format and content of layout/working drawing name/title blocks Basic welding, machining and surface treatment symbols Tolerances NOTE: ALL drawings must be in accordance with the <i>SANS (SABS) 0111 Guidelines</i> .
1½ hrs (2 days)	4	PAT (Practical Assessment Task)	<ul style="list-style-type: none"> The 'Design Process': <ul style="list-style-type: none"> Problem identification and the formulation of a design brief with a list of specifications and/or constraints Conducting research and generating graphical ideas/concepts Selecting best solution within the context of specifications/constraints Presenting the final solution with working and 3D drawings Evaluation of the whole process The PAT scenarios must be given to the learners and each scenario must be explained and discussed.
15 hrs (20 days)	5 – 8	Civil Drawing	Limited to single-story dwellings, 1st angle orthographic working drawings with floor plans, detailed elevations and sectional elevations showing the detail of the foundation to the roof . Include the following: <ul style="list-style-type: none"> Annotation, labels, dimensioning, scales Relevant abbreviations and conventions On all relevant views/elevations: detail of gabled and lean-to roofs (trusses, buttons/purlins, covering, fascia, barge-board, ceiling etc.), gutters and rain-water downpipes, plumbing and drainage detail, electrical fixtures and wiring diagrams as well as all the other features already covered in Gr. 10 and Gr. 11 Hatching detail and the application of colours Perimeters and floor areas Format and content of layout/working drawing name/title blocks Detailed site plans showing electrical, plumbing and drainage services detail as well as relevant natural features Perimeters, floor areas and size of site NOTE: ALL drawings must be in accordance with the <i>SANS (SABS) 0143 Guidelines</i>

Continuation of GRADE 12: TERM 1			
7½ hrs (10 days)	9 – 10	Perspective Drawing	2- Point perspective drawings of complex castings, dwellings and civil structures with overhangs, depth detail, circles and arcs . <ul style="list-style-type: none"> The HL, PP and SP can be varied to provide any desired view.
3 hrs (4 days)	11	PAT (Practical Assessment Task)	Phase 1: Complete the following 'Design Process' requirements: <ul style="list-style-type: none"> Problem identification and the formulation of a design brief with a list of specifications and/or constraints Evidence of the external research conducted Generate THREE ideas/concepts analytically and graphically (<i>Comprehensive free-hand Drawings</i>) Selecting the best solution within context of the design brief.

FORMAL ASSESSMENT FOR GRADE 12 TERM 1	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Test	60%
Course drawings: <ul style="list-style-type: none"> Mechanical assembly Mechanical analytical exercise Civil sectional elevation Civil floor plan with elevations Civil site plan Two-point perspective 	40%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 2			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
7½ hrs (10 days)	1 – 2	Isometric Drawing	Complex isometric drawings with isometric and non-isometric lines as well as auxiliary views, circles and sections .
3¾ hrs (5 days)	3 – 4	Solid Geometry	Revision of the solid geometry covered in Grade 11 i.e. 1st angle orthographic views of right regular solids or a combination of the right solids . The axis of the solids may be perpendicular, parallel or inclined to one principal projection plane only. <ul style="list-style-type: none"> Sectional views The true shape of the cut surface.
11¼ hrs (15 days)	5 – 7	Interpenetration	1st angle orthographic views showing the curve of interpenetration formed between two solids or pipes joined at either 30°, 45°, 60° or 90°. <ul style="list-style-type: none"> The solids or pipes must be regular geometrical prisms and/or cylinders only. The axes of the two solids or pipes could be either in line or offset. The focus should be on industrial examples.
3¾ hrs (5 days)	8	PAT (Practical Assessment Task)	Phase 2: Complete ALL the 'Instrument and CAD presentation drawings' as required by each specific scenario.

FORMAL ASSESSMENT FOR GRADE 12 TERM 2	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Course drawings: <ul style="list-style-type: none"> Isometric drawing Solid geometry Interpenetration and development Mechanical assembly 	25%
Mid-year examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 3			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
7½ hrs (10 days)	1 – 2	Developments	The surface developments of: <ul style="list-style-type: none"> ○ the parts of the interpenetrating solids or pipes ○ hoppers ○ sectioned pyramids and cones ○ complex transition pieces <ul style="list-style-type: none"> • The focus should be on industrial examples. • Seam allowances should be included where relevant.
3¾ hrs (5 days)	3	PAT (Practical Assessment Task)	Phase 3: Complete the 'PAT Portfolio'.
4½ hrs (6 days)	4 – 5	Loci (Helix)	The principles of the helix in complex applications of: <ul style="list-style-type: none"> ○ augers ○ spiral chutes ○ coil springs ○ different types of thread ○ worm gears <ul style="list-style-type: none"> • The direction must be emphasised.
5¼ hrs (7 days)	5 – 6	Loci (Cam)	The principles of the cam in complex applications in which the following must be shown: <ul style="list-style-type: none"> ○ the cam shaft and follower detail ○ the complete displacement graph ○ the complete cam profile <ul style="list-style-type: none"> • The motion may be uniform and/or simple harmonic. • The direction must be emphasised. • The follower may be placed at any angle. • The follower may be wedge shaped or a roller.
7½ hrs (10 days)	7 – 8	Loci (Mechanisms)	The principles of the loci of a point(s) on schematic drawings of the moving components of mechanisms .
± 18 hrs	Sept/Oct Holiday	Preparation for the NSC examination	Previous Grade 12 NCS EGD question papers must be given to all the Grade 12 EGD learners so that they can answer the question papers as part or their preparation for the NSC examination.

FORMAL ASSESSMENT FOR GRADE 12 TERM 3	
Assessment Tasks <i>These are the minimum requirements for the term.</i>	Suggested contribution for the term
Test	15%
Course drawings: <ul style="list-style-type: none"> • Development of a transition piece • Loci (Helix) • Loci (Cam) • Loci (Mechanisms) • Mechanical assembly 	10%
Preparatory examination	75%

ANNUAL TEACHING PLAN for ENGINEERING GRAPHICS & DESIGN			
GRADE 12: TERM 4			
Min/(Max) Duration	Week(s) of term	Topic	Prescribed Content
	1 – 2	All topics not completed during previous terms:	
7½ hrs	1 – 3	Revision	<ul style="list-style-type: none"> The memoranda of the previous Grade 12 NCS EGD question papers must be given to all the EGD learners and all the answers must be discussed with the learners as part of their preparation for the NSC examination. Consolidation of all examinable content

COMPULSORY FORMAL ASSESSMENT FOR GRADE 12 PROMOTION		
Assessment Tasks		Contribution to final promotion mark
SBA	ALL tests	30 marks (7.5%)
	ALL course drawings	30 marks (7.5%)
	Mid-year and preparatory examinations	40 marks (10%)
PAT		100 marks (25%)
NSC examination		200 marks (50%)

This annual teaching plan for CAD is suitable for schools who will be teaching CAD either during one period per week/cycle or after normal school hours.

An ANNUAL TEACHING PLAN for CAD	
<p>The PAT for EGD requires that some of the presentation drawings must be generated by a CAD system. CAD is therefore a mandatory part of EGD. However, it is the responsibility of the school to provide a secure facility for CAD and to procure the required computer hardware and CAD software, which must be available for use by all the EGD learners.</p> <p>Although there is no prescribed CAD software program that must be used, it is advisable to procure a recognised CAD software program that will benefit the learners once they leave school.</p> <p>However, a period of grace has been extended to schools that are still in the process of preparing a secure CAD facility and/or procuring the required computer hardware and/or CAD software. The learners of those schools must in the interim complete all the required presentation drawings of the PAT as instrument drawings.</p>	

GRADE 10			
Duration	Terms	Topic	Suggested Content
± 15 hrs	1 – 3	CAD (Computer-Aided Drawing/Design)	<ul style="list-style-type: none"> • Set up a 2D CAD drawing environment. • Activate the basic toolbars. • Use basic tools that should include: drawing (lines and circles), modify, erase, copy, dimension, text. • Set up and work with layers. • Produce orthographic drawings. • Save and retrieve a drawing.

GRADE 11			
Duration	Terms	Topic	Suggested Content
± 15 hrs	1 – 3	CAD (Computer-Aided Drawing/Design)	<ul style="list-style-type: none"> • Set up a CAD drawing environment. • Activate the advanced toolbars. • Use advanced tools such as: mirror, rotate, move, hatch, scale, and properties. • Set up and work with layers. • Draw orthographic and pictorial drawings. • Save and retrieve a drawing. • Print/plot.

GRADE 12			
Duration	Terms	Topic	Suggested Content
± 10 hrs	1 – 2	CAD (Computer-Aided Drawing/Design)	<ul style="list-style-type: none"> • Set up a CAD drawing environment. • Activate more advanced toolbars. • Set up and work with layers. • Use more advanced tools, properties and settings. • Set up and work with layers. • Draw advanced orthographic and pictorial drawings. • Save and retrieve a drawing. • Print/plot. • Optional: 3D CAD operations for the more advanced learners.

SECTION 4

4.1 INTRODUCTION

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. It involves four steps: generating and collecting evidence of achievement; evaluating this evidence; recording the findings and using this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching.

Assessment should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases regular feedback should be provided to learners to enhance the learning experience.

Engineering Graphics & Design (EGD) is both a knowledge and application/skill-based subject. Various informal tasks on the content of each topic must therefore be done on a regular (daily) basis. These informal tasks are an essential part of the developmental process that is required for EGD. It is however important that the EGD learners should, as part of the teaching and learning of EGD, be given regular feedback on their acquired knowledge and skills on each of the topics. It is therefore essential that most of the informal tasks should be assessed on a regular basis. However, to ensure that the assessment of the tasks successfully contributes to the teaching and learning process of EGD, it is imperative that assessment tasks, whether formal or informal, must be assessed within ONE week of being submitted.

4.2 INFORMAL OR DAILY ASSESSMENT (ASSESSMENT FOR LEARNING)

Assessment for learning has the purpose of continuously collecting information on a learner's achievement that can be used to improve their learning.

Informal assessment is a daily monitoring of learners' progress. This is done through observations, discussions, practical demonstrations; learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to the learners and to inform planning for teaching, but need not be recorded. It should not be seen as separate from learning activities taking place in the classroom. Learners or teachers can mark these assessment tasks.

Self assessment and peer assessment actively involves learners in assessment. This is important as it allows learners to learn from and reflect on their own performance. The results of the informal daily assessment tasks are not formally recorded unless the teacher wishes to do so. In such instances, a simple checklist may be used to record this assessment. However, teachers may use the learners' performance in these assessment tasks to provide verbal or written feedback to learners, the school management team and parents. This is particular important if barriers to learners or poor levels of participation are encountered. The results of daily assessment tasks are not taken into account for promotion and certification purposes.

4.3 FORMAL ASSESSMENT (ASSESSMENT OF LEARNING)

All assessment tasks that make up a formal programme of assessment for the year are regarded as Formal Assessment. Formal assessment tasks are marked and formally recorded by the teacher for progression and certification purposes. All Formal Assessment tasks are subject to moderation for the purpose of quality assurance and to ensure that proper standards are maintained.

Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a grade and in a particular subject. Examples of formal assessments include projects, oral presentations, demonstrations, performances, tests, examinations, practical tasks, etc. Formal assessment tasks form part of a year-long formal Programme of Assessment in each grade and subject.

The minimum formal assessment requirements for Engineering Graphics and Design are as follow:

GRADE 10:

- Two Tests
- Twelve Course Drawings
- Mid-year Examination
- One Practical Assessment Task
- Final Examination

GRADE 11:

- Two Tests
- Thirteen Course Drawings
- Mid-year Examination
- One Practical Assessment Task
- Final Examination

GRADE 12:

- Two Tests
- Fifteen Course Drawings
- Mid-year Examination
- One Practical Assessment Task
- Trail/preparatory Examination
- The Final NSC Examination

The forms of assessment used should be age and developmental level appropriate. The design of these tasks should cover the content of the subject and include a variety of tasks designed to achieve the objectives of the subject. Formal assessments must cater for a range of cognitive levels and abilities of learners.

The weightings of the cognitive levels for the EGD formal assessment tasks are as follow:

The application of Bloom's Taxonomy	
Cognitive level	Weighting
Lower order (Understanding and remembering)	± 30%
Middle order (Analysing and applying)	± 40%
Higher order (Creating and evaluating)	± 30%

4.4 PROJECTS:

The only project for Engineering Graphics and Design is the Practical Assessment Task (PAT). The EGD PAT is implemented across the first three terms of the school year and should be undertaken as one extended task, which is broken down into three different phases. Each EGD learner must complete one PAT for every year of the FET phase. (See 4.9)

Instead of an additional project(s), EGD makes use of Course Drawings, which must come from the normal yet essential developmental process of regular drawing and analytical tasks, as part of the formal assessment program. (See 4.5.5.2)

4.5 PROGRAMME OF ASSESSMENT

The Programme of Assessment is designed to spread formal assessment tasks in all subjects in a school throughout a term. Without this programme, tests and tasks are crowded into the last few weeks of the term creating unfair pressure on the learners.

4.5.1 THE EGD PROGRAMME OF FORMAL ASSESSMENT

The programme of formal assessment is an overview of ALL the assessment components with their formal assessment tasks and the contribution of each towards the final promotion mark.

4.5.1.1 GRADES 10 & 11:

GRADES 10 & 11 FORMAL ASSESSMENT PROGRAMME					
INTERNAL FORMAL ASSESSMENT: 100%					
CONTINUOUS ASSESSMENT 25% (Internally set and assessed)		PRACTICAL ASSESSMENT TASK (PAT) 25% (Externally set and internally assessed)		NOVEMBER EXAMINATION 50% (Internally or externally set and internally assessed)	
LEARNER'S EGD FILE		LEARNER'S PAT PORTFOLIO			
Tests: ALL the prescribed and other formal tests	30	PAT Part A: The Design Process & PAT Part B: Presentation Drawings of Part A (Instrument & CAD)		NB: The final mark for each paper can be a mark that has been converted to 100.	
Course Drawings: All the prescribed and other formally assessed and recorded tasks	30			Paper One:	100
Examination: Mid-year (June)	40			Paper Two:	100
Total	100	Total	100	Total	200

4.5.2 GRADE 12:

GRADE 12 FORMAL ASSESSMENT PROGRAMME					
INTERNAL FORMAL ASSESSMENT: 25%		EXTERNAL FORMAL ASSESSMENT: 75%			
CONTINUOUS ASSESSMENT 25% (Internally set and assessed)		PRACTICAL ASSESSMENT TASK (PAT): 25% (Externally set & internally assessed)		NOVEMBER NSC EXAMINATION: 50% (Externally set and assessed)	
LEARNER'S EGD FILE		LEARNER'S PAT PORTFOLIO			
Tests: ALL the prescribed and other formal tests	30	PAT Part A: The Design Process & PAT Part B: Presentation Drawings of Part A (Instrument & CAD)		The final mark for each paper will be a mark that has been converted from 200 to 100.	
Course Drawings: All the prescribed and other formally assessed and recorded tasks	30			Paper One: 3 hrs (200 marks ÷ 2 = 100)	100
Examinations: Mid-year (June) & Preparatory (September)	40			Paper Two: 3 hrs (200 marks ÷ 2 = 100)	100
Total	100	Total	100	Total	200

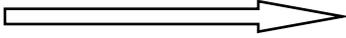
4.5.3 THE EGD ANNUAL FORMAL ASSESSMENT PLAN

The annual formal assessment plan is an overview of each term's minimum compulsory formal assessment tasks that must be recorded for reporting purposes. ALL the compulsory formal assessment tasks must contribute to the final promotion mark.

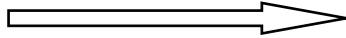
4.5.3.1 GRADE 10

GRADE 10 ANNUAL FORMAL ASSESSMENT PLAN					
ASSESSMENT TASKS	TERM 1	TERM 2	TERM 3	TERM 4	PROMOTION MARK
Tests	1		1		30 (7.5%)
Mid-year examination		1			40 (10 %)
Course Drawings	3	3	5	1	30 (7.5%)
PAT: Part A & Part B	 Do over first 3 terms and record for the 4 th .			1	100 (25%)
Final examination				1	200 (50%)
TOTAL					400 (100%)

4.5.3.2 GRADE 11

GRADE 11 ANNUAL FORMAL ASSESSMENT PLAN					
ASSESSMENT TASKS	TERM 1	TERM 2	TERM 3	TERM 4	PROMOTION MARK
Tests	1		1		30 (7.5%)
Mid-year examination		1			40 (10 %)
Course Drawings	4	3	5	1	30 (7.5%)
PAT: Part A & Part B	 Do over first 3 terms and record for the 4 th .			1	100 (25%)
Final examination				1	200 (50%)
TOTAL					400 (100%)

4.5.3.3 GRADE 12

GRADE 12 ANNUAL FORMAL ASSESSMENT PLAN					
ASSESSMENT TASKS	TERM 1	TERM 2	TERM 3	TERM 4	PROMOTION MARK
Tests	1		1		30 (7.5%)
Internal examinations		1	1		40 (10 %)
Course Drawings	6	4	5		30 (7.5%)
PAT: Part A & Part B	 Do over first 3 terms and record for the 4 th .			1	100 (25%)
NSC examination				1	200 (50%)
TOTAL					400 (100%)

4.5.4 THE COMPULSORY EGD SCHOOL-BASES ASSESSMENT TASKS FOR EACH TERM

This is a detailed overview of each term's compulsory School-Based Assessment (SBA) tasks. ALL the compulsory SBA tasks are part of the compulsory Programme of Formal Assessment. The compulsory SBA tasks of a specific term, with the exception of the PAT, must therefore be recorded during that specific term and included as part of the term's reported mark.

The indicated compulsory SBA tasks are in accordance with the suggested annual teaching plans that are included in this document.

NOTE:

The indicated compulsory SBA tasks are the **minimum requirements** for each term.

4.5.4.1 GRADE 10

GRADE 10 COMPULSORY SCHOOL-BASED ASSESSMENT TASKS					
TERM 1		TERM 2		TERM 3	
Assessment Tasks	Suggested contribution	Assessment Tasks	Suggested contribution	Assessment Tasks	Suggested contribution
Course drawings: <ul style="list-style-type: none"> Freehand drawing Geometrical construction Ellipse 	40%	Course drawings: <ul style="list-style-type: none"> 1st mechanical drawing 2nd mechanical drawing Isometric drawing 	25%	Course drawings: <ul style="list-style-type: none"> Solid geometry Descriptive geometry Civil floor plan Civil sectional elevation One-point perspective 	40%
Test(s)	60%	Mid-year examination: Paper 1 & Paper 2	75%	Test(s)	60%

4.5.4.2 GRADE 11

GRADE 11 COMPULSORY SCHOOL-BASED ASSESSMENT TASKS					
TERM 1		TERM 2		TERM 3	
Assessment Tasks	Suggested contribution	Assessment Tasks	Suggested contribution	Assessment Tasks	Suggested contribution
Course drawings: <ul style="list-style-type: none"> Mechanical analytical exercise 1st mechanical assembly Isometric drawing Two-point perspective 	40%	Course drawings: <ul style="list-style-type: none"> Civil floor plan with elevations Civil sectional elevation Solid geometry 	25%	Course drawings: <ul style="list-style-type: none"> Interpenetration & develop. Development of a transition piece Loci (Helix) Loci (Cam) 2nd mechanical assembly 	40%
Test(s)	60%	Mid-year examination: Paper 1 & Paper 2	75%	Test(s)	60%

4.5.4.2 GRADE 12

GRADE 12 COMPULSORY SCHOOL-BASED ASSESSMENT TASKS					
TERM 1		TERM 2		TERM 3	
Assessment Tasks	Suggested contribution	Assessment Tasks	Suggested contribution	Assessment Tasks	Suggested contribution
Course drawings: <ul style="list-style-type: none"> 1st mechanical assembly Mechanical analytical exercise Civil sectional elevation Civil floor plan with elevations Civil site plan Two-point perspective 	40%	Course drawings: <ul style="list-style-type: none"> Isometric drawing Solid geometry Interpenetration & development 2nd mechanical assembly 	25%	Course drawings: <ul style="list-style-type: none"> Development of a transition piece Loci (Helix) Loci (Cam) Loci (Mechanisms) 3rd mechanical assembly 	10%
				Test(s)	15%
Test(s)	60%	Mid-year examination: Paper 1 & Paper 2	75%	Preparatory examination: Paper 1 & Paper 2	75%

4.5.5 THE EGD FORMAL SCHOOL-BASED ASSESSMENT TASKS

4.5.51 Tests

All the questions of the EGD tests must be of a similar or higher standard than the corresponding questions of the DBE's examination/exemplar papers. The mark allocations must also correlate with the DBE's examination/exemplar papers' memoranda.

The question or questions for each test must justify a minimum time allocation of 60 minutes and a minimum mark allocation of 50 marks. Most tests will therefore have to consist of at least TWO questions. However, if the time allocated for a test is not sufficient for the completion of both questions, the two questions can be written as two separate tests in order to make up the required 50 marks. It is however recommended to have as many tests as possible, formal and/or informal, written throughout the year because of the true reflection of achievement and preparatory value that tests have.

4.5.5.2 Course Drawings

The purpose of the Course Drawings is to provide evidence that ALL the topics have been adequately covered and that all the learners have been assessed and given sufficient feedback on their acquired knowledge and skills on common tasks on the prescribed content of each topic.

Engineering Graphics & Design is both a knowledge and application/skill-based subject. Drawing and analytical tasks must therefore be done on a regular (daily) basis. From this normal yet essential developmental process of regular (daily) tasks, at least one common task must be selected from the prescribed content of each topic. The selected common task must then be formally assessed and recorded as part of the compulsory Programme of Formal Assessment. The selected common tasks will be referred to as the Course Drawings.

NOTE:

ALL the prescribed content that is assessed and recorded as formal tests do not have to be assessed and recorded as Course Drawings.

Requirement of the Course Drawings (CDs):

- The CDs must come from the normal teaching and learning process of EGD and should therefore be one or more of the regular (daily) tasks.
- The teacher must ensure that each CD is each learner's own work.
- ALL the learners must be afforded extended opportunities, within realistic time frames, to attempt to complete, correctly or incorrectly, each of the CDs.
- Each CD must address all, or most of, the grade-specific content of the topic and it must be of an appropriate higher order of complexity for the specific grade. However, more than one task may be used to obtain the recorded CD mark.
- To ensure that all the CDs comply with test and examination requirements and standards, all CDs, with the exception of the analytical exercises and the perspective drawing(s), must be tasks that are completely redrawn.
- The questions and model answers of ALL the CDs must be in the teacher's EGD file and ALL the assessed and recorded CDs of each learner must be in his/her EGD file.
- Simplified rubrics may be used to assess ALL the CDs.
- ALL the CDs are compulsory Formal Assessment Tasks that must contribute to the final promotion mark.
- It is important to note that the CDs are not tests.
- Detailed descriptions of all the CDs are on the last two pages of this document (See ANNEXURE 4).

4.5.5.3 Examinations

The Engineering Graphics & Design examination papers must, in terms of format and content, be of a similar or higher standard than the DBE's examination/exemplar papers. The mark allocations must also be similar to the DBE's examination/exemplar papers.

In order to ensure the validity of examination papers, all papers should consist of original questions. Complete previous EGD exam papers, whether internally or externally set, may therefore not be used again. However, individual questions from previous question paper may, preferably with some changes, be used again.

Format and composition of the final EGD examination papers are as follow:

GRADE 10 EXAMINATION PAPERS					
PAPER 1 - <i>CIVIL</i> - (2 hours)			PAPER 2 - <i>MECHANICAL</i> - (2 hours)		
In first-angle orthographic projection			In third-angle orthographic projection		
Q 1A	Civil analytical	± 20%	Q 1	Mechanical analytical	± 20%
Q 1B	Electrical circuits		Q 2	Geometrical construction	± 25%
Q 2	Descriptive geometry and/or Solid geometry	± 25%	Q 3	Isometric drawing	± 25%
Q 3	1-point perspective drawing	± 25%	Q 4	Mechanical working drawing	± 30%
Q 4	Civil working drawing	± 30%			
For the June examination, the TWO 2-hour papers may be substituted by ONE 3-hour paper					

GRADE 11 EXAMINATION PAPERS					
PAPER 1 - <i>CIVIL</i> - (3 hours)			PAPER 2 - <i>MECHANICAL</i> - (3 hours)		
In first-angle orthographic projection			In third-angle orthographic projection		
Q 1A	Civil analytical	± 15%	Q 1	Mechanical analytical	± 15%
Q 1B	Electrical circuits		Q 2	Loci of a Helix and/or Loci of a Cam	± 20%
Q 2	Interpenetration and development or development of a transition piece or Solid geometry	± 20%	Q 3	Isometric drawing	± 25%
Q 3	2-point perspective drawing	± 25%	Q 4	Mechanical assembly	± 40%
Q 4	Civil working drawing	± 40%			

GRADE 12 EXAMINATION PAPERS					
PAPER 1 - <i>CIVIL</i> - (3 hours)			PAPER 2 - <i>MECHANICAL</i> - (3 hours)		
In first-angle orthographic projection			In third-angle orthographic projection		
Q 1	Civil analytical	± 15%	Q 1	Mechanical analytical	± 15%
Q 2	Interpenetration and development or development of a transition piece or Solid geometry	± 20%	Q 2	Loci of a Helix and/or Loci of a Cam and/or Loci of a point(s) of a mechanism	± 20%
Q 3	2-point perspective drawing	± 20%	Q 3	Isometric drawing	± 20%
Q 4	Civil working drawing including electrical features	± 45%	Q 4	Mechanical assembly	± 45%

4.5.6 ASSESSMENT OF EGD FORMAL ASSESSMENT TASKS

Assessment is an integral part of teaching and learning, and should be done on a regular basis. It is therefore essential that most informal exercises should also be assessed.

However, to ensure that assessment successfully contributes to the teaching and learning process, it is imperative that all assessment tasks, whether formal or informal, must be assessed within ONE week of being submitted.

4.5.6.1 Course Drawings (CDs)

- A mark out of 10 allocated according to a SIMPLIFIED RUBRIC. (See ANNEXURE 1, 2 and 3)

NOTE:

The complete MODEL ANSWER of each CD must be in the teacher's EGD file and used as a guideline for obtaining the mark.

- Or, a converted mark out of 10, allocated according to a MARKING MEMORANDUM.

4.5.6.2 Tests

- Marks allocated according to MARKING MEMORANDA (In accordance with the DBE's Exemplar and Pilot/November examination papers.)

4.5.6.3 Examinations

- Marks allocated according to MARKING MEMORANDA (In accordance with the DBE's Exemplar and Pilot/November examination papers.)

NOTE:

The principals of 'marking with the mistake' and 'benefit of doubt to the learner' should be applied when assessing Formal Assessment Tasks.

4.6 RECORDING

Recording is a process in which the teacher documents the level of a learner's performance in a specific assessment task. It indicates learner progress towards the achievement of the knowledge as prescribed in the Curriculum and Assessment Policy Statements. Records of learner performance should provide evidence of the learner's conceptual progression within a grade and her / his readiness to progress or being promoted to the next grade. Records of learner performance should also be used to verify the progress made by teachers and learners in the teaching and learning process.

From the above teachers will record actual marks against the tasks by using a record sheet and also report in percentages against the subject on the learner's report cards.

4.7 REPORTING

Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Learner performance can be reported in a number of ways. These include report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc. Teachers in all grades report in percentages against the subject. The following rating scale will apply for reports:

Rating codes and percentages for reporting:

RATING CODE	DESCRIPTION OF COMPETENCE	PERCENTAGE
7	Outstanding achievement	80 – 100
6	Meritorious achievement	70 – 79
5	Substantial achievement	60 – 69
4	Adequate achievement	50 – 59
3	Moderate achievement	40 – 49
2	Elementary achievement	30 – 39
1	Not achieved	0 - 29

Note: The seven point scale should have clear descriptors that give detailed information for each level.

4.8 MODERATION OF ASSESSMENT

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be implemented at school, district, provincial and national levels. Comprehensive and appropriate moderation practices must be in place for the quality assurance of all subject assessments.

ALL the grades 10 and 11 EGD formal assessment tasks must, unless provided, be internally set, assessed and moderated. All grades 10 and 11 EGD formal assessment tasks must also be external moderated.

ALL the grade 12 EGD formal school-based (internal) assessment tasks must, unless provided, be internally set, assessed and moderated. The final grade 12 EGD formal school-based (internal) assessment task marks must be externally moderated and verified.

The grade 12 PAT, which will be externally set, must be internally assessed and externally moderated and verified. The final NSC examination will be externally set, assessed and moderated.

All external moderation for EGD should be done by the EGD provincial subject advisor.

4.9 PRACTICAL ASSESSMENT TASK (PAT)

The Practical Assessment Task (PAT) is essentially the third examination paper of EGD. ALL the presentation requirements of the PAT must therefore be completed at school under supervision of the EGD teacher. Each learner must complete one PAT for every year of the FET phase.

The primary purpose of the PAT is to assess four subjective content and concept topics that are not assessed within the examination papers. These are:

- the Design Process
- the application of drawing knowledge and drawing skills to the design process
- CAD management and drawings
- the quality and neatness of free-hand, instrument and CAD drawings.

The elements and mark allocation for each grade's PAT:

Elements	Gr. 10	Gr. 11	Gr. 12
Part A: The design process	50 %	40 %	25%
Part B: Correctness and quality of the presentation drawings	50 %	60 %	75 %

The PATs should be completed in phases during the first three terms:

- Phase 1: Design Process (By the end of the 1st term for Grades 11 & 12)
- Phase 2: Presentation drawings (By the end of the 2nd term for Grades 11 & 12)
- Phase 3: Completion of PAT Portfolio (Before provincial moderation in the 3rd term)

Although the phases could be done either CYCLICALLY (one EGD period per week) or in a BLOCK TIME (as contained in the work schedule), it is recommended that one entire day per term, preferably during the examination sessions, be allocated for each phase.

Assessment of the Practical Assessment Task (PAT)

For each criterion, a mark out of 10 allocated according to the RUBRICS for the PAT EGD

4.10 PROGRESSION/PROMOTION MARKS

This is a detailed overview of each grades **minimum compulsory formal assessment tasks** that must contribute to the final progression/promotion mark.

GRADE 10 PROGRESSION/PROMOTION MARK		
Assessment Tasks		Compulsory contribution
SBA	ALL tests	30 (7.5%)
	ALL course drawings	30 (7.5%)
	Mid-year examination: Paper 1 & Paper 2	40 (10%)
Practical Assessment Task (PAT)		100 (25%)
November (final) examination: Paper 1 (100 marks) & Paper 2 (100 marks)		200 (50%)
TOTAL		400

GRADE 11 PROGRESSION/PROMOTION MARK		
Assessment Tasks		Compulsory contribution
SBA	ALL tests	30 (7.5%)
	ALL course drawings	30 (7.5%)
	Mid-year examination: Paper 1 & Paper 2	40 (10%)
Practical Assessment Task (PAT)		100 (25%)
November (final) examination: Paper 1 (100 marks) & Paper 2 (100 marks)		200 (50%)
TOTAL		400

GRADE 12 PROGRESSION/PROMOTION MARK		
Assessment Tasks		Compulsory contribution
SBA	ALL tests	30 (7.5%)
	ALL course drawings	30 (7.5%)
	Mid-year examinations: Paper 1 & Paper 2	15 (3.75%)
	Prelim/preparatory examinations: Paper 1 & Paper 2	25 (6.25%)
Practical Assessment Task (PAT)		100 (25%)
November (final) examination: Paper 1 (100 marks) & Paper 2 (100 marks)		200 (50%)
TOTAL		400

4.11 ANNEXURE:

4.11.1 ANNEXURE 1: A simplified RUBRIC for assessing Course Drawings (CDs) and daily exercises

NOTE:

If the task is a Course Drawing, the complete model answer of the drawing must be used as a guideline for obtaining the mark.

RUBRIC FOR THE CORRECTNESS OF THE DRAWING			
DESCRIPTION for MARK	GENERAL INDICATORS	± PERCENTAGE	MARK
OUTSTANDING	<i>Error free</i>	100%	7
MERITORIOUS (VERY GOOD)	<i>Few errors</i>	± 85% A distinction drawing	6
SUBSTANTIAL (GOOD)		± 70% A good 'C' to 'B' drawing	5
ADEQUATE (SATISFACTORY)	<i>Some errors</i> (± ½ right and ½ wrong)	± 55% MORE than a 50%	4
MODERATE (ACCEPTABLE)		± 40% LESS than a 50%	3
ELEMENTARY (UNACCEPTABLE)	<i>Many errors</i>	± 33% Only a few correct features	2
NOT ACHIEVED (VERY BAD)	<i>Completely wrong</i>	± 25% & LESS 'Something' drawn very wrongly	1
NON COMPLIANCE	<i>No work was handed in</i>	<i>Nothing to mark</i>	NC

+

RUBRIC FOR THE QUALITY AND NEATNESS OF THE DRAWING			
Assess the consistency and quality of line work, printing/writing, dimensioning techniques and general neatness of the drawing.			
DESCRIPTION for MARK	GENERAL INDICATORS	± PERCENTAGE	MARK
OUTSTANDING (VERY GOOD)	<i>Very easy to 'read'</i>	80% +	3
ADEQUATE (SATISFACTORY)	<i>'Readable', but could be better</i>	60% +	2
NOT ACHIEVED (UNACCEPTABLE)	<i>Difficult to 'read'</i>	50% & LESS	1
NON COMPLIANCE	<i>No work was handed in</i>	<i>Nothing to mark</i>	NC

=

TOTAL	10
--------------	-----------

PTO for ANNEXURE 2 & 3

4.11.2 ANNEXURE 2: A simplified RUBRIC for assessing multi-view civil working drawings

NOTE:

If the task is a Course Drawing, the complete MODEL ANSWER of the multi-view civil working drawing must be used as a guideline for obtaining the mark.

CRITERIA	2 VIEWS	3 VIEWS	4 VIEWS	OWN CRITERIA	MARKS
VIEW 1	6	4	3		
VIEW 2	6	4	3		
VIEW 3	-	4	3		
VIEW 4	-	-	3		
BORDER and COMPLETE TITLE BLOCK	1	1	1		
ANNOTATIONS / NOTES / SECTION PLANE	2	2	2		
DIMENSIONS	2	2	2		
PRESENTATION: Planning, Quality and Neatness	3	3	3		
TOTAL	20	20	20	TOTAL	
<i>CALCULATION</i>	<i>÷ 2</i>	<i>÷ 2</i>	<i>÷ 2</i>	<i>CALCULATION</i>	
RECORDED TOTAL	10	10	10	RECORDED TOTAL	10
<i>No work was handed in</i>	<i>NC</i>	<i>NC</i>	<i>NC</i>	<i>No work was handed in</i>	<i>NC</i>

4.11.3 ANNEXURE 3: A simplified RUBRIC for assessing multi-view mechanical working drawings

NOTE:

If the task is a Course Drawing, the complete MODEL ANSWER of the multi-view mechanical working drawing must be used as a guideline for obtaining the mark.

CRITERIA	2 VIEWS	3 VIEWS	4 VIEWS	OWN CRITERIA	MARKS
VIEW 1	6	4	3		
VIEW 2	6	4	3		
VIEW 3	-	4	3		
VIEW 4	-	-	3		
BORDER and COMPLETE TITLE BLOCK	1	1	1		
SECTION PLANE(S)	1	1	1		
PROJECTION SYMBOL	1	1	1		
DIMENSIONS	2	2	2		
PRESENTATION: Planning, Quality and Neatness	3	3	3		
TOTAL	20	20	20	TOTAL	
<i>CALCULATION</i>	<i>÷ 2</i>	<i>÷ 2</i>	<i>÷ 2</i>	<i>CALCULATION</i>	
RECORDED TOTAL	10	10	10	RECORDED TOTAL	10
<i>No work was handed in</i>	<i>NC</i>	<i>NC</i>	<i>NC</i>	<i>No work was handed in</i>	<i>NC</i>

PTO for ANNEXURE 4

4.11.4 ANNEXURE 4: Detailed descriptions of the prescribed Course Drawings (CDs):

The CDs listed below are the **minimum** number of compulsory CDs required for each grade's promotion mark out of 30.

NOTE:

A **working drawing** refers to a layout drawing in which **all relevant drawing features** such as a complete title block, symbols, dimensions and labels, cutting plane(s), hatching detail etc, **must be included**.

GRADE 10 (12 CDs):

- **Freehand drawing:** An enlarged freehand drawing that must show clear evidence of the use of blocks to establish correct proportions and size.
- **Geometrical constructions:** A complex drawing(s) that must provide evidence that all or most of the geometrical constructions were taught.
- **Construction of an ellipse:** A complex drawing that must provide evidence that the construction of the ellipse has been taught.
- **TWO mechanical drawings:** These must be multi-view 'working' drawings of two **complex castings** that are completely different in terms of their design.
- **Isometric drawing:** A drawing with isometric and non-isometric lines. Hidden detail could be included.
- **Solid geometry:** A multi-view 1st angle drawing of a sectioned right regular geometrical solid with an inclined axis. Include the true shape(s) of the sectioned plane(s).
- **Descriptive geometry:** A multi-view 1st angle drawing with at least THREE true lengths and THREE true angles with at least one to the VP and one to the HP (realistic application).
- **Civil floor plan:** The floor plan must be of a dwelling with more than one room/space that must contain all the basic drawing features such as 'outer' and 'inner' walls, 'outer' and 'inner' doors, windows, hatching detail, all relevant labels and dimensions. The perimeter and floor area of the dwelling must also be indicated.
- **Civil sectional elevations of 'foundation-to-slab':** A detailed working drawings of both a load-bearing and a non-load-bearing must be presented on the drawing sheet. Include ALL relevant labels and dimensions.
- **One-point perspective drawing:** An advanced one-point perspective.
- **Electrical:** A circuit diagram with at least eight components.

GRADE 11 (13 CDs):

- **Mechanical analytical exercise:** Different types of sections and conventions for mechanical drawings must be included and there must be at least 15 questions.
- **TWO mechanical assemblies:** These must be multi-view 'working' drawings of two **advanced** mechanical assemblies that are completely different in terms of their design, their function and their parts. Both must have fasteners that are presented in different ways.
- **Isometric drawing:** A complex drawing with an auxiliary view(s) and constructed circles. Hidden detail could be included.
- **Two-point perspective drawing:** The perspective must be of a complex civil object.
- **Civil floor-plan with elevations:** A working drawing that shows the complete floor plan and at least THREE elevations of a dwelling that has at least two separate bedrooms, a separate bathroom, a separate kitchen and a separate living/working area. Include ALL the relevant Grade 11 fixtures and ALL the relevant drawing features.
- **Civil sectional elevations of 'foundation-to-ceiling':** A detailed working drawings of both a load-bearing wall with a window and a non load-bearing wall with a door must be presented on the drawing sheet. Include ALL relevant labels and dimensions.
- **Solid geometry:** A multi-view 1st angle drawing of an inclined sectioned solid that consists of a combination of geometrical solids. Include the true shape(s) of the sectioned plane(s).

- **Interpenetration and development:** An advanced drawing of two objects or solids that are joined together. Either parts, or relevant sections of each part, must be developed.
- **Development of a transition piece:** A drawing of an advanced polygon-to-polygon transition piece.
- **Loci (Helix):** An advanced application of a helix in either a civil or a mechanical context.
- **Loci (Cam):** An advanced application of a cam with a uniform motion. The follower must be wedge-shaped.
- **Electrical:** A circuit diagram with at least eight components.

GRADE 12 (15 'CDs'):

- **THREE mechanical assemblies (ONE PER TERM):** These must be multi-view working drawings of three **complex** mechanical assemblies that are completely different in terms of their design, their function and their parts. All three must have fasteners that are, if possible, presented in different ways.
- **Mechanical analytical exercise:** Tolerances, welding symbols and machining and surface treatment symbols must be included and there must be at least 20 questions.
NB: The same dwelling or civil project can be used for the following THREE civil exercises. However, the THREE civil exercises must be done on THREE separate drawing sheets.
- **Civil sectional elevations of 'foundation-to-roof':** A detailed working drawing, at an enlarged scale, of a complete section through a window, a door and the roof. Include ALL other visible features and ALL relevant dimensions and labels.
- **Civil floor plan and elevations:** A working drawing that shows the complete floor plan and at least THREE elevations of a dwelling that has at least two separate bedrooms, a separate bathroom, a separate kitchen and a separate living/working area. The complete **electrical wiring** diagram must be included on the floor plan and the **plumbing detail** must be included on all relevant views. ALL the other relevant fixtures and ALL the relevant drawing features are required.
- **Civil site plan:** A working drawing showing all the water, sewerage and electrical features. ALL other relevant features, as required for a site plan working drawing, must also be included.
- **Two-point perspective drawing:** The perspective must be of a complex civil object that has circular features, preferably horizontally and vertically, and other features on different planes.
- **Isometric drawing:** A complex drawing with an auxiliary view(s), constructed circles and a section.
- **Solid geometry:** A multi-view 1st angle drawing of an inclined sectioned solid that consists of a combination of geometrical solids. Include the true shape(s) of the sectioned plane(s).
- **Interpenetration and development:** A complex drawing of two or more objects or solids that are joined together. All the parts must be developed.
- **Development of a transition piece:** A drawing of a complex off-centred polygon-to-circle transition piece.
- **Loci of a Helix:** A complex application of a helix in either a civil or a mechanical context.
- **Loci of a Cam:** A complex application of a cam that could include different types of motion. The follower must be a roller.
- **Loci of points on a Mechanism:** An advanced application of the loci of two or more points on the moving parts of a mechanism.

4.12 GENERAL

This document should be read in conjunction with:

- 4.12.1 [National Protocol of Assessment] An addendum to the policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R – 12)
- 4.12.2 Progression and Promotion Requirements grades 1-12

4.12.3 Subject specific exam guidelines as contained in the draft policy document: *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement, Grades R - 12*