



**education**

Department:  
Education  
REPUBLIC OF SOUTH AFRICA

# **NATIONAL CERTIFICATES (VOCATIONAL)**

## **ASSESSMENT GUIDELINES**

# **ENGINEERING GRAPHICS AND DESIGN (CAD)**

## **NQF Level 3**

September 2007



# **ENGINEERING GRAPHICS AND DESIGN (CAD) – LEVEL 3**

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## SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

This document provides the lecturer with guidelines to develop and implement a coherent, integrated assessment system for Engineering Systems, Engineering Graphics and Design (CAD) and Applied Engineering Technology in the National Certificates (Vocational). It must be read with the *National Policy Regarding Further Education and Training Programmes: Approval of the Documents, Policy for the National Certificates (Vocational) Qualifications at Levels 2 to 4 on the National Qualifications Framework (NQF)*. This assessment guideline will be used for National Qualifications Framework Levels 2-4.

This document explains the requirements for the internal and external subject assessment. The lecturer must use this document with the *Subject Guidelines: Engineering Graphics and Design (CAD)* to prepare for and deliver Engineering Graphics and Design (CAD). Lecturers should use a variety of resources and apply a range of assessment skills in the setting, marking and recording of assessment tasks.

## SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

### 1 ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

Assessment in the National Certificates (Vocational) is underpinned by the objectives of the National Qualifications Framework (NQF). These objectives are to:

- Create an integrated national framework for learning achievements.
- Facilitate access to and progression within education, training and career paths.
- Enhance the quality of education and training.
- Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities.
- Contribute to the holistic development of the student by addressing:
  - social adjustment and responsibility;
  - moral accountability and ethical work orientation;
  - economic participation; and
  - nation-building.

The principles that drive these objectives are:

- **Integration**

To adopt a unified approach to education and training that will strengthen the human resources development capacity of the nation.

- **Relevance**

To be dynamic and responsive to national development needs.

- **Credibility**

To demonstrate national and international value and recognition of qualification and acquired competencies and skills.

- **Coherence**

To work within a consistent framework of principles and certification.

- **Flexibility**

To allow for creativity and resourcefulness when achieving Learning Outcomes, to cater for different learning styles and use a range of assessment methods, instruments and techniques.

- **Participation**

To enable stakeholders to participate in setting standards and co-ordinating the achievement of the qualification.

- **Access**

To address barriers to learning at each level to facilitate students' progress.

- **Progression**

To ensure that the qualification framework permits individuals to move through the levels of the national qualification via different, appropriate combinations of the components of the delivery system.

- **Portability**

To enable students to transfer credits of qualifications from one learning institution and/or employer to another institution or employer.

- **Articulation**

To allow for vertical and horizontal mobility in the education system when accredited pre-requisites have been successfully completed.

- **Recognition of Prior Learning**

To grant credits for a unit of learning following an assessment or if a student possesses the capabilities specified in the outcomes statement.

- **Validity of assessments**

To ensure assessment covers a broad range of knowledge, skills, values and attitudes (SKVAs) needed to demonstrate applied competency. This is achieved through:

- clearly stating the outcome to be assessed;
- selecting the appropriate or suitable evidence;
- matching the evidence with a compatible or appropriate method of assessment; and
- selecting and constructing an instrument(s) of assessment.

- **Reliability**

To assure assessment practices are consistent so that the same result or judgment is arrived at if the assessment is replicated in the same context. This demands consistency in the interpretation of evidence; therefore, careful monitoring of assessment is vital.

- **Fairness and transparency**

To verify that no assessment process or method(s) hinders or unfairly advantages any student. The following could constitute unfairness in assessment:

- Inequality of opportunities, resources or teaching and learning approaches
- Bias based on ethnicity, race, gender, age, disability or social class
- Lack of clarity regarding Learning Outcome being assessed
- Comparison of students' work with other students, based on learning styles and language

- **Practicability and cost-effectiveness**

To integrate assessment practices within an outcomes-based education and training system and strive for cost and time-effective assessment.

## **2 ASSESSMENT FRAMEWORK FOR VOCATIONAL QUALIFICATIONS**

The assessment structure for the National Certificates (Vocational) qualification is as follows:

### **2.1 Internal continuous assessment (ICASS)**

Knowledge, skills values, and attitudes (SKVAs) are assessed throughout the year using assessment instruments such as projects, tests, assignments, investigations, role-play and case studies. The internal continuous assessment (ICASS) practical component is undertaken in a real workplace, a workshop or a "Structured Environment". This component is moderated internally and externally quality assured by Umalusi. All internal continuous assessment (ICASS) evidence is kept in a Portfolio of Evidence (PoE) and must be readily available for monitoring, moderation and verification purposes.

### **2.2 External summative assessment (ESASS)**

The external summative assessment is either a single or a set of written papers set to the requirements of the Subject Learning Outcomes. The Department of Education administers the theoretical component according to relevant assessment policies.

A compulsory component of external summative assessment (ESASS) is the **integrated summative assessment task (ISAT)**. This assessment task draws on the students' cumulative learning throughout the year. The task requires **integrated application of competence** and is executed under strict assessment conditions. The task should take place in a simulated or "Structured Environment". The integrated summative assessment task (ISAT) is the most significant test of students' ability to apply their acquired knowledge.

The integrated assessment approach allows students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

External summative assessments will be conducted annually between October and December, with provision made for supplementary sittings.

### 3 MODERATION OF ASSESSMENT

#### 3.1 Internal moderation

Assessment must be moderated according to the internal moderation policy of the Further Education and Training (FET) college. Internal college moderation is a continuous process. The moderator's involvement starts with the planning of assessment methods and instruments and follows with continuous collaboration with and support to the assessors. Internal moderation creates common understanding of Assessment Standards and maintains these across vocational programmes.

#### 3.2 External moderation

External moderation is conducted by the Department of Education, Umalusi and, where relevant, an Education and Training Quality Assurance (ETQA) body according to South African Qualifications Authority (SAQA) and Umalusi standards and requirements.

The external moderator:

- monitors and evaluates the standard of all summative assessments;
- maintains standards by exercising appropriate influence and control over assessors;
- ensures proper procedures are followed;
- ensures summative integrated assessments are correctly administered;
- observes a minimum sample of ten (10) to twenty-five (25) percent of summative assessments;
- gives written feedback to the relevant quality assessor; and
- moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures for students who experience barriers to learning be customised and supported to enable these students to achieve their maximum potential.

### 4 PERIOD OF VALIDITY OF INTERNAL CONTINUOUS ASSESSMENT (ICASS)

The period of validity of the internal continuous assessment mark is determined by the *National Policy on the Conduct, Administration and Management of the Assessment of the National Certificates (Vocational)*.

The internal continuous assessment (ICASS) must be re-submitted with each examination enrolment for which it constitutes a component.

### 5 ASSESSOR REQUIREMENTS

Assessors must be subject specialists and should ideally be declared competent against the standards set by the ETDP SETA. If the lecturer conducting the assessments has not been declared a competent assessor, an assessor who has been declared competent may be appointed to oversee the assessment process to ensure the quality and integrity of assessments.

### 6 TYPES OF ASSESSMENT

Assessment benefits the student and the lecturer. It informs students about their progress and helps lecturers make informed decisions at different stages of the learning process. Depending on the intended purpose, different types of assessment can be used.

## 6.1 Baseline assessment

At the beginning of a level or learning experience, baseline assessment establishes the knowledge, skills, values and attitudes (SKVAs) that students bring to the classroom. This knowledge assists lecturers to plan learning programmes and learning activities.

## 6.2 Diagnostic assessment

This assessment diagnoses the nature and causes of learning barriers experienced by specific students. It is followed by guidance, appropriate support and intervention strategies. This type of assessment is useful to make referrals for students requiring specialist help.

## 6.3 Formative assessment

This assessment monitors and supports teaching and learning. It determines student strengths and weaknesses and provides feedback on progress. It determines if a student is ready for summative assessment.

## 6.4 Summative assessment

This type of assessment gives an overall picture of student progress at a given time. It determines whether the student is sufficiently competent to progress to the next level.

## 7 PLANNING ASSESSMENT

An assessment plan should cover three main processes:

### 7.1 Collecting evidence

The assessment plan indicates which Subject Outcomes and Assessment Standards will be assessed, what assessment method or activity will be used and when this assessment will be conducted.

### 7.2 Recording

Recording refers to the assessment instruments or tools with which the assessment will be captured or recorded. Therefore, appropriate assessment instruments must be developed or adapted.

### 7.3 Reporting

All the evidence is put together in a report to deliver a decision for the subject.

## 8 METHODS OF ASSESSMENT

Methods of assessment refer to who carries out the assessment and includes lecturer assessment, self-assessment, peer assessment and group assessment.

<b>LECTURER ASSESSMENT</b>	The lecturer assesses students' performance against given criteria in different contexts, such as individual work, group work, etc.
<b>SELF-ASSESSMENT</b>	Students assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
<b>PEER ASSESSMENT</b>	Students assess another student's or group of students' performance against given criteria in different contexts, such as individual work, group work, etc.
<b>GROUP ASSESSMENT</b>	Students assess the individual performance of other students within a group or the overall performance of a group of students against given criteria.

## 9 INSTRUMENTS AND TOOLS FOR COLLECTING EVIDENCE

All evidence collected for assessment purposes is kept or recorded in the student's Portfolio of Evidence (PoE).

The following table summarises a variety of methods and instruments for collecting evidence. A method and instrument is chosen to give students ample opportunity to demonstrate the Subject Outcome has been attained. This will only be possible if the chosen methods and instruments are appropriate for the target group and the Specific Outcome being assessed.

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	Task-based (Structured)	Test-based (More structured)
<b>Assessment instruments</b>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Class questions</li> <li>• Lecturer, student, parent discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Assignments or tasks</li> <li>• Projects</li> <li>• Investigations or research</li> <li>• Case studies</li> <li>• Practical exercises</li> <li>• Demonstrations</li> <li>• Role-play</li> <li>• Interviews</li> </ul>	<ul style="list-style-type: none"> <li>• Examinations</li> <li>• Class tests</li> <li>• Practical examinations</li> <li>• Oral tests</li> <li>• Open-book tests</li> </ul>
<b>Assessment tools</b>	<ul style="list-style-type: none"> <li>• Observation sheets</li> <li>• Lecturer's notes</li> <li>• Comments</li> </ul>	<ul style="list-style-type: none"> <li>• Checklists</li> <li>• Rating scales</li> <li>• Rubrics</li> </ul>	<ul style="list-style-type: none"> <li>• Marks (e.g. %)</li> <li>• Rating scales (1-7)</li> </ul>
<b>Evidence</b>	<ul style="list-style-type: none"> <li>• Focus on individual students</li> <li>• Subjective evidence based on lecturer observations and impressions</li> </ul>	<p><b>Open middle:</b> Students produce the same evidence but in different ways.</p> <p><b>Open end:</b> Students use same process to achieve different results.</p>	Students answer the same questions in the same way, within the same time.

## 10 TOOLS FOR ASSESSING STUDENT PERFORMANCE

**Rating scales** are marking systems where a symbol (such as 1 to 7) or a mark (such as 5/10 or 50%) is defined in detail. The detail is as important as the coded score. Traditional marking, assessment and evaluation mostly used rating scales without details such as what was right or wrong, weak or strong, etc.

**Task lists** and **checklists** show the student what needs to be done. These consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the student has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

**Rubrics** are a hierarchy (graded levels) of criteria with benchmarks that describe the minimum level of acceptable performance or achievement for each criterion. Using rubrics is a different way of assessing and cannot be compared to tests. Each criterion described in the rubric must be assessed separately. Mainly two types of rubrics, namely holistic and analytical, are used.

## 11 SELECTING AND/OR DESIGNING RECORDING AND REPORTING SYSTEMS

The selection or design of recording and reporting systems depends on the purpose of recording and reporting student achievement. **Why** particular information is recorded and **how** it is recorded determine which instrument will be used.

Computer-based systems, for example spreadsheets, are cost and time effective. The recording system should be user-friendly and information should be easily accessed and retrieved.

## 12 COMPETENCE DESCRIPTIONS

All assessment should award marks to evaluate specific assessment tasks. However, marks should be awarded against rubrics and not be simply a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) that a student must demonstrate to achieve each level of the rating scale.

When lecturers or assessors prepare an assessment task or question, they must ensure that the task or question addresses an aspect of a Subject Outcome. The relevant Assessment Standard must be used to create the rubric to assess the task or question. The descriptions must clearly indicate the minimum level of attainment for each category on the rating scale.



## 13 STRATEGIES FOR COLLECTING EVIDENCE

A number of different assessment instruments may be used to collect and record evidence. Examples of instruments that can be (adapted and) used in the classroom include:

### 13.1 Record sheets

The lecturer observes students working in a group. These observations are recorded in a summary table at the end of each project. The lecturer can design a record sheet to observe students' interactive and problem-solving skills, attitudes towards group work and involvement in a group activity.

### 13.2 Checklists

Checklists should have clear categories to ensure that the objectives are effectively met. The categories should describe how the activities are evaluated and against what criteria they are evaluated. Space for comments is essential.

## SECTION C: ASSESSMENT IN ENGINEERING GRAPHICS AND DESIGN (CAD)

### 1 SCHEDULE OF ASSESSMENT

At NQF levels 2, 3 and 4, lecturers will conduct assessments as well as develop a schedule of formal assessments that will be undertaken in the year. All three levels also have an external examination that accounts for 50 percent of the total mark. The marks allocated to assessment tasks completed during the year, kept or recorded in a Portfolio of Evidence (PoE) account for the other 50 percent.

The Portfolio of Evidence (PoE) and the external assessment include practical and written components. The practical assessment in Engineering Graphics and Design (CAD) must, where necessary, be subjected to external moderation by Umalusi or an appropriate Education and Training Quality Assurance (ETQA) body, appointed by the Umalusi Council in terms of Section 28(2) of the *General and Further Education and Training Quality Assurance Act, 2001 (Act No. 58 of 2001)*.

### 2 RECORDING AND REPORTING

Engineering Systems, Engineering Graphics and Design (CAD) and Applied Engineering Technology, as is the case for all the other Vocational subjects, is assessed according to five levels of competence. The level descriptions are explained in the following table.

#### **Scale of Achievement for the Vocational component**

RATING CODE	RATING	MARKS %
5	Outstanding	80-100
4	Highly competent	70-79
3	Competent	50-69
2	Not yet competent	40-49
1	Not achieved	0-39

The programme of assessment should be recorded in the Lecturer's Portfolio of Assessment for each subject. The following at least should be included in the Lecturer's Assessment Portfolio:

- A contents page
- The formal schedule of assessment
- The requirements for each assessment task
- The tools used for each assessment task
- Recording instrument(s) for each assessment task
- A mark sheet and report for each assessment task

The college must standardise these documents.

The student's Portfolio of Evidence (PoE) must include at least:

- A contents page
- The assessment tasks according to the assessment schedule
- The assessment tools or instruments for the task
- A record of the marks (and comments) achieved for each task

Where a task cannot be contained as evidence in the Portfolio of Evidence (PoE), its exact location must be recorded and it must be readily available for moderation purposes.

The following units of internal assessment must serve as a guide for Engineering Fundamentals NQF Level 3.

	Assessment	Coverage
2	Formal written tests	1 or more completed topics
1	Internal written exams	All completed topics
3	Practical assessments	Must cover the related subject outcomes  E.g. Assignments, Projects and Demonstrations.

**ASSESSMENT OF ENGINEERING GRAPHICS AND DESIGN  
(CAD)  
LEVEL 3**

### 3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN ENGINEERING GRAPHICS AND DESIGN (CAD) - LEVEL 3

#### Topic 1: Isometric Drawing

SUBJECT OUTCOME	
<b>1.1 Construct an isometric scale to be used in isometric drawings.</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>An isometric scale is explained.</li> </ul>	<ul style="list-style-type: none"> <li>Explain what an isometric scale is.</li> </ul>
<ul style="list-style-type: none"> <li>The use of isometric scale in isometric drawing is explained.</li> </ul>	<ul style="list-style-type: none"> <li>Explain how an isometric scale is used to construct isometric drawings.</li> </ul>
<ul style="list-style-type: none"> <li>Page usage is planned to maximise usage.</li> </ul>	<ul style="list-style-type: none"> <li>Plan the drawing to maximise page usage.</li> </ul>
<ul style="list-style-type: none"> <li>An isometric scale is produced using engineering drawing equipment.</li> </ul>	<ul style="list-style-type: none"> <li>Use engineering drawing equipment to produce an isometric scale. <i>Range: Triangles, flexi-curves, drawing sets, different pencils, rubber, dusters, scale ruler, T-square</i></li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Exercise to construct an isometric scale.	

SUBJECT OUTCOME	
<b>1.2 Construct an isometric drawing.</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>The differences between first and third angle drawings are seen.</li> </ul>	<ul style="list-style-type: none"> <li>Differentiate between first and third angle isometric drawings.</li> </ul>
<ul style="list-style-type: none"> <li>An ellipse is constructed by using the four centre method.</li> </ul>	<ul style="list-style-type: none"> <li>Use the four-centre method to construct an ellipse.</li> </ul>
<ul style="list-style-type: none"> <li>Dimensional drawings in the first and third angle projection are produced by using engineering drawing techniques.</li> </ul>	<ul style="list-style-type: none"> <li>Use engineering drawings techniques to produce 3-dimensional drawings in first angle projection.</li> <li>Use engineering drawing techniques to produce 3-dimensional drawings in third angle projection.</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Exercises and written test to construct isometric drawings.	

#### Topic 2: Assembly Drawing

SUBJECT OUTCOMES	
<b>2.1 Perform sectioning on engineering drawings using different methods.</b>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Methods of sectioning are identified.</li> </ul>	<ul style="list-style-type: none"> <li>Identify different methods of sectioning.</li> </ul>
<ul style="list-style-type: none"> <li>Correct techniques of sectioning are used to section engineering drawings.</li> </ul>	<ul style="list-style-type: none"> <li>Section engineering drawings using the correct techniques. <i>Range: Techniques refers but not limited to 30 degrees, 45 degrees, 60 degrees, staggered and scrap sectioning.</i></li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Written test and inclusive exercises on sectioning and assembly drawing.	

<b>SUBJECT OUTCOMES</b>	
<b>2.2 Perform engineering drawing assemblies.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Different parts are put together to form one single drawing in first angle.</li> </ul>	<ul style="list-style-type: none"> <li>• Assemble different parts to form one single drawing in first angle orthographic projection.</li> </ul>
<ul style="list-style-type: none"> <li>• Different parts are put together to form one single drawing in third angle.</li> </ul>	<ul style="list-style-type: none"> <li>• Assemble different parts to form one single drawing in third angle orthographic projection.</li> </ul>
<ul style="list-style-type: none"> <li>• Assembly drawings are sectioned and labelled according to instruction.</li> </ul>	<ul style="list-style-type: none"> <li>• Section the assembled drawing according to the given instruction.</li> <li>• Label the different parts of the assembled drawing.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Written test and inclusive exercises on sectioning and assembly drawing.	

### Topic 3: Detailed Drawings

<b>SUBJECT OUTCOME</b>	
<b>3.1 Perform dimensioning to a given drawing using the correct methods.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Different dimensioning methods are explained.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain different dimensioning methods.</li> </ul>
<ul style="list-style-type: none"> <li>• Dimensions are drawn and inserted to a given drawing according to the drawing code of standard.</li> </ul>	<ul style="list-style-type: none"> <li>• Draw and insert dimensions according to the drawing code of standard to a given drawing.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Exercises and assignments on correct methods of dimensioning.	

<b>SUBJECT OUTCOME</b>	
<b>3.2 Produce detailed drawings from the given assemblies.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Parts from an assembled drawing are identified and separated.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and separate parts from an assembled drawing.</li> </ul>
<ul style="list-style-type: none"> <li>• Detailed drawings are produced in both first and third angle projections.</li> </ul>	<ul style="list-style-type: none"> <li>• Produce detailed drawing in first angle orthographic projection.</li> <li>• Produce detailed drawing in third angle orthographic projection.</li> </ul>
<ul style="list-style-type: none"> <li>• Drawings are dimensioned and sectioned using the given instructions and correct techniques.</li> </ul>	<ul style="list-style-type: none"> <li>• Dimension the drawings using the correct techniques.</li> <li>• Section the drawing according to the given instruction.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Written test and assignments.	

**Topic 4: Development and inter-penetration**

<b>SUBJECT OUTCOME</b>	
<b>4.1 Developing by parallel line method.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• A parallel line method is identified and selected.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify, explain and select this method in the relevant context.</li> </ul>
<ul style="list-style-type: none"> <li>• Parallel lines are neatly drawn on template paper using appropriate scales to indicate the equal divisions of the object to be developed.</li> </ul>	<ul style="list-style-type: none"> <li>• Neatly draw parallel lines on template paper, using appropriate scales to indicate the equal divisions of the object to be developed.</li> </ul>
<ul style="list-style-type: none"> <li>• All relevant data such as angles, heights, diameters and circumferences are calculated.</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate all relevant data such as angles, heights, diameters and circumferences.</li> </ul>
<ul style="list-style-type: none"> <li>• A final template is produced using the principles of line projections.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the principles of line projections to produce the final template.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Assignment, test, inclusive project and exercises in parallel line method.	

<b>SUBJECT OUTCOME</b>	
<b>4.2 Developing by radial line method.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• The radial method is identified and selected in the relevant context.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify, explain and select this method in the relevant context.</li> </ul>
<ul style="list-style-type: none"> <li>• Radial lines are neatly drawn on template paper, using appropriate scales to indicate the equal divisions of the object to be developed.</li> </ul>	<ul style="list-style-type: none"> <li>• Neatly draw radial lines on template paper, using appropriate scales to indicate the equal divisions of the object to be developed.</li> </ul>
<ul style="list-style-type: none"> <li>• All relevant data calculations are done such as angles, heights, diameters and circumferences.</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate all relevant data such as angles, heights, diameters and circumferences.</li> </ul>
<ul style="list-style-type: none"> <li>• A final template is produced using the principles of line projections and stepping-off.</li> </ul>	<ul style="list-style-type: none"> <li>• Use the principles of line projections and stepping-off to produce the final template.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Inclusive project covering all subject outcomes in this topic.	

<b>SUBJECT OUTCOME</b>	
<b>4.3. Developing by using triangulation.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Triangulation is identified and selected the relevant context.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify, explain and select this method in the relevant context.</li> </ul>
<ul style="list-style-type: none"> <li>• The functions of bend lines are explained.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the functions of bend lines.</li> </ul>
<ul style="list-style-type: none"> <li>• The meaning of true length lines is explained</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the meaning of true length lines</li> </ul>
<ul style="list-style-type: none"> <li>• The theorem of Pythagoras is correctly applied when calculating bend lines</li> </ul>	<ul style="list-style-type: none"> <li>• Understand and apply the theorem of Pythagoras when calculating bend lines</li> </ul>
<ul style="list-style-type: none"> <li>• Top view measurements are transferred into true length measurements</li> </ul>	<ul style="list-style-type: none"> <li>• Transfer top view measurements into true length measurements</li> </ul>
<ul style="list-style-type: none"> <li>• Triangulation is used to develop templates</li> </ul>	<ul style="list-style-type: none"> <li>• Use the principles of triangulation to produce the final template</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Exercise to develop templates by using the triangulation method.	

### Topic 5: Computer Aided Design (CAD)

<b>SUBJECT OUTCOME</b>	
<b>5.1 Prepare the computer environment, and plan CAD scale production drawings.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• CAD program is selected.</li> </ul>	<ul style="list-style-type: none"> <li>• Select CAD program to suit the task.</li> </ul>
<ul style="list-style-type: none"> <li>• The size, scale and orientation of drawing on a newly created document are selected to suit the task.</li> </ul>	<ul style="list-style-type: none"> <li>• Select size, scale and orientation of drawing on a newly created document to suit the task.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
<ul style="list-style-type: none"> <li>• Written test</li> <li>• Inclusive exercise or a project using CAD</li> </ul>	

<b>SUBJECT OUTCOME</b>	
<b>5.2 Produce scale production drawings to line stage using a CAD program.</b>	
<i>Range: Examples are multi-view orthographic drawing including full, part, aligned and removed sections; fully detailed and dimensioned drawing with conventional symbols.</i>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Scale production drawings are produced to line stage using CAD.</li> </ul>	<ul style="list-style-type: none"> <li>• Project elevation outlines in accordance with final design.</li> <li>• Position elevation outlines in accordance with orthographic principles.</li> <li>• Project details of views completed, in accordance with final design.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Practical exercises using CAD for production of drawings	

<b>SUBJECT OUTCOME</b>	
<b>5.3 Complete and verify CAD scale production drawings.</b>	
<b>ASSESSMENT STANDARD</b>	<b>LEARNING OUTCOME</b>
<ul style="list-style-type: none"> <li>• Production drawings are checked to see if they meet the requirements.</li> </ul>	<ul style="list-style-type: none"> <li>• Title the production drawing to meet standards convention.</li> </ul>
	<ul style="list-style-type: none"> <li>• Title the production to meet site requirements in terms of typography.</li> </ul>
<ul style="list-style-type: none"> <li>• Drawings are saved to file according to site procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Title the production drawing for processing or manufacturing data.</li> </ul>
	<ul style="list-style-type: none"> <li>• Save drawings to file according to site procedures.</li> </ul>
<b>ASSESSMENT TASKS OR ACTIVITIES</b>	
Inclusive exercise/project on CAD scales production.	

SUBJECT OUTCOME	
5.4 Print CAD scale production drawings, and manage files.	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> <li>Paper size, orientation, scale and printer type is selected to meet task and site requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Select paper size, orientation, and scale and printer type to meet task and site requirements.</li> </ul>
<ul style="list-style-type: none"> <li>A copy is printed.</li> </ul>	<ul style="list-style-type: none"> <li>Print copy to meet task and site requirements.</li> </ul>
<ul style="list-style-type: none"> <li>The copy is verified.</li> </ul>	<ul style="list-style-type: none"> <li>Verify copy to meet task and site requirements.</li> </ul>
<ul style="list-style-type: none"> <li>The copy is corrected to meet task and site requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Correct copy as necessary to meet task and site requirements.</li> </ul>
ASSESSMENT TASKS OR ACTIVITIES	
Inclusive exercise/project on CAD scales production.	

#### 4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN ENGINEERING GRAPHICS AND DESIGN (CAD) - LEVEL 3

##### 4.1 : Integrated summative assessment task (ISAT)

A compulsory component of the external assessment (ESASS) is the **integrated summative assessment task (ISAT)**. The integrated summative assessment task (ISAT) draws on the students' cumulative learning achieved throughout the year. The task requires **integrated application of competence** and is executed and recorded in compliance with assessment conditions.

Two approaches to the integrated summative assessment task (ISAT) may be as follows:

- The students are assigned a task at the beginning of the year which they will have to complete in phases throughout the year to obtain an assessment mark. A final assessment is made at the end of the year when the task is completed.

**OR**

- Students achieve the competencies throughout the year but the competencies are assessed cumulatively in a single assessment or examination session at the end of the year.

The integrated summative assessment task (ISAT) is set by an externally appointed examiner and is conveyed to colleges in the first quarter of the year.

The integrated assessment approach enables students to be assessed in more than one subject with the same integrated summative assessment task (ISAT).

##### 4.2 National Examination

A National Examination is conducted annually in October or November by means of a paper(s) set and moderated externally. The following distribution of cognitive application is suggested.

LEVEL 3	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
	15%	75%	10%