



**education**

Department:  
Education  
REPUBLIC OF SOUTH AFRICA

# **NATIONAL CERTIFICATES (VOCATIONAL)**

## **ASSESSMENT GUIDELINES**

### **INTRODUCTION TO SYSTEMS DEVELOPMENT NQF LEVEL 2**

September 2007



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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 Introduction to Systems Development 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: Introduction to Systems Development* to prepare for and deliver Introduction to Systems Development. 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 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. They 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. It is a different way of assessment 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 simply be a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes (SKVAs) 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 INTRODUCTION TO SYSTEMS DEVELOPMENT

### 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 Introduction to Systems Development 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

Introduction to Systems Development, 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 should at least 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 at least include:

- 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 tasks 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.

**ASSESSMENT OF  
INTRODUCTION TO SYSTEMS DEVELOPMENT  
LEVEL 2**

### 3 INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN INTRODUCTION TO SYSTEMS DEVELOPMENT – LEVEL 2

#### Topic 1: Basic Concepts of Software

SUBJECT OUTCOME	
Explain what software is and categorise the types of software.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>An explanation of the term software is given.</li> <li>The explanation differentiates between the types of software and their purpose.</li> <li>The explanation identifies the differences between basic and advanced software tools.</li> <li>The explanation outlines the reasons why there are different versions within the same software.</li> <li>The explanation outlines the installation processes for application software.</li> </ul>	<ul style="list-style-type: none"> <li>Explain the term software.</li> <li>Differentiate between the types of software and their purposes.</li> <li>Differentiate between basic and advanced software tools.</li> <li>Outline the reasons for different versions within the same software.</li> <li>Outline the processes for installing application software.</li> </ul>

SUBJECT OUTCOME	
Describe some features common to all types of application software.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description identifies the different features common to all types of applications software.</li> <li>The description explains the purpose and use of features common to all types of application software.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and demonstrate the different features common to all types of application software.</li> <li>Explain the purpose and use of the types of features common to all types of application software.</li> </ul>

SUBJECT OUTCOME	
Define system software.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>System software is defined.</li> <li>Operating system is defined in terms of tasks it performs.</li> <li>Utility programs are defined in terms of their use.</li> <li>Language translators are defined in terms of their purpose, with examples.</li> </ul>	<ul style="list-style-type: none"> <li>Briefly describe the term system software.</li> <li>Define the operating system in terms of the tasks it performs in a computer.</li> <li>Define utility programs in terms of their use.</li> <li>Define language translators in terms of their purpose, with examples.</li> </ul>

SUBJECT OUTCOME	
Name and describe microcomputer operating systems and operating environments.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>Different operating systems and the environment in which they operate are named and described.</li> <li>The description outlines the history of the different operating systems.</li> </ul>	<ul style="list-style-type: none"> <li>Name and describe different operating systems.</li> <li>Describe the environment in which the operating system operates.</li> <li>Outline the history of the different operating systems.</li> </ul>

ASSESSMENT TASKS OR ACTIVITIES FOR TOPIC 1
<ul style="list-style-type: none"> <li>Class test</li> <li>Assignment</li> <li>Group work</li> </ul>

## Topic 2: Software Development and Programming Languages Concepts

SUBJECT OUTCOME	
Describe the generations of programming languages.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description lists the generations of programming languages in which they have evolved.</li> <li>The description outlines programming languages in terms of technicality, flexibility, user-friendliness and speed.</li> <li>The description includes strengths and limitations of programming languages.</li> </ul>	<ul style="list-style-type: none"> <li>List the generations of programming languages in which they have evolved.</li> <li>Outline programming languages in terms of technicality, flexibility, user-friendliness and speed.</li> <li>Compare the strengths and limitations of programming languages.</li> </ul>

SUBJECT OUTCOME	
Describe the uses for some of the most popular high-level programming languages.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description lists some of the most popular high-level programming languages.</li> <li>The uses of high-level programming languages are described.</li> <li>The advantages and disadvantages of high-level programming languages are described.</li> </ul>	<ul style="list-style-type: none"> <li>List and describe the most popular high-level programming languages.</li> <li>Explain the uses of high-level programming languages.</li> <li>Compare the advantages and disadvantages of high-level programming languages.</li> </ul>

SUBJECT OUTCOME	
Describe concepts relating to object-oriented and visual programming.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>Object-oriented and visual programming concepts are described.</li> <li>Object-oriented programming is described in terms of the recycling technique steps.</li> <li>Object-oriented programming language is described in terms of the concepts involved.</li> <li>Object-oriented programming language is explained using examples.</li> <li>The visual programming language is explained in terms of its goals.</li> </ul>	<ul style="list-style-type: none"> <li>Describe object-oriented and visual programming concepts.</li> <li>Explain object-oriented programming in terms of recycling technique steps.</li> <li>Explain object-oriented programming language in terms of the concepts involved.</li> <li>List examples of object-oriented programming languages.</li> <li>Explain the visual programming language in terms of its goals.</li> </ul>

SUBJECT OUTCOME	
Name and discuss basic steps in developing a computer program.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The basic steps to develop a computer program are named.</li> <li>The basic steps involved in a computer program development cycle are briefly discussed.</li> </ul>	<ul style="list-style-type: none"> <li>Name the basic steps for developing a computer program.</li> <li>Discuss briefly the basic steps involved in a computer program development cycle.</li> </ul>

SUBJECT OUTCOME	
Describe software development tools.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>Examples of software development tools are named.</li> <li>Software development tools are briefly described.</li> </ul>	<ul style="list-style-type: none"> <li>Name examples of software development tools.</li> <li>Briefly describe these software development tools.</li> </ul>

### ASSESSMENT TASKS OR ACTIVITIES FOR TOPIC 2

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Class tests</li> <li>• Discussions</li> </ul> | <ul style="list-style-type: none"> <li>• Group work</li> <li>• Assignments</li> </ul> |
|--|---|

### Topic 3: Concepts of Artificial Intelligence

#### SUBJECT OUTCOME

#### Define artificial intelligence and how it is used.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>• The term artificial intelligence is defined.</li> <li>• Artificial intelligence is defined in terms of its development of technology.</li> <li>• The definition of artificial intelligence includes its uses in the business environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Define the term artificial intelligence.</li> <li>• Define artificial intelligence in terms of its development of technology.</li> <li>• List the uses of artificial intelligence in the business environment.</li> </ul>

#### SUBJECT OUTCOME

#### Describe how robots are used.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>• The term robot is described in simpler terms.</li> <li>• Robots are described in terms of past, present and future.</li> <li>• Robots are described in detail in terms of perception systems.</li> <li>• The uses of robots are described.</li> <li>• Robots are described in terms of its impact on technology.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the term robot in simpler terms.</li> <li>• Describe robots in terms of the past, present and future.</li> <li>• Describe robots in terms of perception systems.</li> <li>• Describe the uses of robots.</li> <li>• Explain the impact of robots on technology.</li> </ul>

#### SUBJECT OUTCOME

#### Define natural language and fuzzy logic.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>• The term fuzzy logic is defined.</li> <li>• Fuzzy logic is defined in terms of its development.</li> <li>• Fuzzy logic is defined in terms of advantages and disadvantages.</li> </ul>	<ul style="list-style-type: none"> <li>• Define the term fuzzy logic.</li> <li>• Define fuzzy logic in terms of its development.</li> <li>• List the advantages and disadvantages of fuzzy logic.</li> </ul>

#### SUBJECT OUTCOME

#### Describe an expert system.

ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>• An explanation of expert systems is given. The explanation includes who are the users of expert systems.</li> <li>• The essential components of expert systems are described. The description outlines major program components of expert systems.</li> <li>• The description outlines the implications for businesses using expert systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain expert systems.</li> <li>• List the users of expert systems.</li> <li>• Describe the major components of an expert system.</li> <li>• Outline the implications for businesses using expert systems.</li> </ul>

SUBJECT OUTCOME	
Explain neural networks.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The term neural network is explained.</li> <li>The explanation of neural networks includes problems being addressed.</li> <li>The explanation includes the categories of neural networks.</li> <li>The explanation defines the three main parts found in a neuron in neural networks.</li> <li>The explanation includes a definition of synapses.</li> </ul>	<ul style="list-style-type: none"> <li>Explain the term neural network.</li> <li>Explain problems addressed by neural networks.</li> <li>Explain the categories of neural networks.</li> <li>Name and explain the three main parts found in a neuron in neural networks.</li> <li>Define the term synapses.</li> </ul>

SUBJECT OUTCOME	
Define virtual reality and its applications.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The term virtual reality is defined.</li> <li>The definition describes the applications of virtual reality.</li> </ul>	<ul style="list-style-type: none"> <li>Explain what virtual reality is.</li> <li>Describe the applications of virtual reality.</li> </ul>

ASSESSMENT TASKS OR ACTIVITIES FOR TOPIC 3	
<ul style="list-style-type: none"> <li>Class tests</li> <li>Discussions</li> <li>Group work</li> </ul>	<ul style="list-style-type: none"> <li>Assignments</li> <li>Research</li> <li>Projects</li> </ul>

#### Topic 4: Computer of Data Storage

SUBJECT OUTCOME	
Demonstrate an understanding of computer data types.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The demonstration distinguishes between data types and includes examples.</li> <li>The description of the use of coding systems in a business environment distinguishes categories of coding systems and includes examples.</li> <li>The demonstration illustrates how data manipulation operations are performed on data types.</li> </ul>	<ul style="list-style-type: none"> <li>Distinguish between data types and their examples.</li> <li>Distinguish categories of coding systems and their uses in a business environment.</li> <li>Explain and illustrate how data manipulation operations are performed on data types.</li> </ul>

SUBJECT OUTCOME	
Describe computer data structures.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description distinguishes types of computer data structures and identifies examples.</li> <li>The description distinguishes types of computer files and identifies examples.</li> <li>The description distinguishes types of computer databases and identifies examples.</li> </ul>	<ul style="list-style-type: none"> <li>Distinguish types of computer data structure.</li> <li>List examples of computer data structure types.</li> <li>Distinguish types of computer file and identify their examples.</li> <li>Distinguish types of computer database.</li> <li>List examples of computer databases.</li> </ul>

ASSESSMENT TASKS OR ACTIVITIES FOR TOPIC 4	
<ul style="list-style-type: none"> <li>Class tests</li> <li>Discussions</li> <li>Group work</li> </ul>	<ul style="list-style-type: none"> <li>Assignments</li> <li>Practical tests</li> </ul>

## Topic 5: Principles of Computer Programming

SUBJECT OUTCOME	
Describe problem analysis and program design techniques.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description provides an appreciation of the steps and techniques of program maintenance. <i>Range: Understand the problem, devise a plan, carry out the plan, review the solution, apply changes and test and implement the plan.</i></li> <li>The description identifies different problem analysis techniques. <i>Range (at least two): Problem definition, hierarchical (top-down) approach, stepwise refinement and modularity</i></li> <li>Different programming design techniques are described. <i>Range: Flow charts and structured use of language (pseudo code)</i></li> </ul>	<ul style="list-style-type: none"> <li>Name and describe the steps and techniques of program maintenance.</li> <li>Identify different problem analysis techniques.</li> <li>Identify different programming design techniques.</li> </ul>

SUBJECT OUTCOME	
Describe the different data representations used in computers programs.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description distinguishes between different numeric data types. <i>Range: Binary, decimal, hexadecimal and octal</i></li> <li>The description identifies different logical data types. <i>Range: Numeric, alphabetic, alphanumeric and Boolean</i></li> <li>The description distinguishes between different internal representations of data types. <i>Range: Bit, byte and word</i></li> <li>The description identifies different logical operators. <i>Range: And, or, not</i></li> </ul>	<ul style="list-style-type: none"> <li>Distinguish between different numeric data types.</li> <li>Describe the different logical data types.</li> <li>Distinguish between different internal representations of data types.</li> <li>Describe the different logical operators.</li> </ul>

SUBJECT OUTCOME	
Describe the basic principles of computer programming.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description identifies different algorithmic structures of programming languages. <i>Range: Sequential, selection and loops</i></li> <li>The description identifies good program documentation principles. <i>Range (at least three): General readability, meaningful variable names, indentation and program comments</i></li> <li>The description identifies programming quality assurance (QA) principles. <i>Range: Syntax checking, test data and test plan</i></li> <li>The description distinguishes between validation and verification.</li> <li>The description explains the relationship between file, records and fields.</li> </ul>	<ul style="list-style-type: none"> <li>Describe the different algorithmic structures of programming languages.</li> <li>Explain the principles of good program documentation.</li> <li>Explain the principles of programming quality assurance (QA).</li> <li>Distinguish between validation and verification.</li> <li>Explain the relationship between file, records and fields.</li> </ul>



SUBJECT OUTCOME	
Describe the principles used in designing a computer program.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The description identifies methods of specifying problems. <i>Range: Program structure diagrams, decision trees, decision tables, use cases and pseudo code</i></li> <li>The description explains techniques used to research problems in terms of inputs and outputs. <i>Range: HIPO, object-event diagrams and UML actors</i></li> <li>The description includes an evaluation of the viability of developing computer programs to solve problems and identifies the critical issues in assessing viability.</li> <li>The description explains the features of a computer program that can solve a given problem. <i>Range: Batch or online, user interface type and keyboard or mouse driven</i></li> </ul>	<ul style="list-style-type: none"> <li>Explain the methods of specifying problems.</li> <li>Explain the techniques used to research problems in terms of inputs and outputs.</li> <li>Explain how to evaluate the viability of developing computer programs to solve problems.</li> <li>Identify the issues involved in assessing the viability of developing computer programs.</li> <li>Explain the features of a computer program that can solve a given problem.</li> </ul>

ASSESSMENT TASKS OR ACTIVITIES FOR TOPIC 5	
<ul style="list-style-type: none"> <li>Class tests</li> <li>Discussions</li> </ul>	<ul style="list-style-type: none"> <li>Group work</li> <li>Assignments</li> </ul>

#### Topic 6: Principles of the Internet and Worldwide Web (WWW)

SUBJECT OUTCOME	
Explain the principles of the Internet and worldwide web.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The explanation outlines the origins and history of the Internet.</li> <li>The explanation identifies the major applications of the Internet.</li> <li>The explanation demonstrates the use of major Internet applications.</li> <li>The explanation describes the history and development of the worldwide web.</li> </ul>	<ul style="list-style-type: none"> <li>Outline the origin and history of the Internet.</li> <li>Identify the major applications of the Internet.</li> <li>Explain the use of major Internet applications.</li> <li>Explain the history and development of the worldwide web.</li> </ul>

SUBJECT OUTCOME	
Explain how the worldwide web incorporates various Internet applications.	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> <li>The explanation provides a comprehensive understanding of the physical context of web pages.</li> <li>The explanation identifies how the worldwide web can be applied in an intranet and extranet.</li> <li>The explanation describes the latest Internet applications, including web-based e-mails, instant messaging and Voice over IP (VoIP).</li> </ul>	<ul style="list-style-type: none"> <li>Explain in detail the physical context of web pages.</li> <li>Explain how the worldwide web can be applied in an intranet and extranet.</li> <li>Explain the latest Internet applications, including web-based e-mails, instant messaging and Voice over IP (VoIP).</li> </ul>

ASSESSMENT TASKS OR ACTIVITIES FOR TOPIC 6	
<ul style="list-style-type: none"> <li>Class tests</li> <li>Discussions</li> <li>Group work</li> </ul>	<ul style="list-style-type: none"> <li>Assignments</li> <li>Demonstrations</li> <li>Observations</li> </ul>

## 4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN INTRODUCTION TO SYSTEMS DEVELOPMENT – LEVEL 2

### 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 should be followed:

LEVEL 2	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
	40%	40%	20%

MARK ALLOCATION PER QUESTION		
<b>Section 1: Compulsory (must cover all topics)</b>		
Two questions of 25 marks each, covering short questions, e.g. true or false, leave out words and monkey puzzles.		<b>50 marks</b>
<b>Section 2: Compulsory</b>		
Six compulsory application questions covering all the topics.		
Question 1:	Basic Concepts of Software	10 marks
Question 2:	Software Development and Programming Languages Concepts	10 marks
Question 3:	Concepts of Artificial Intelligence	10 marks
Question 4:	Computer of Data Storage	25 marks
Question 5:	Principles of Computer Programming	25 marks
Question 6:	Principles of the Internet and Worldwide Web (WWW)	20 marks
		<b>100 marks</b>
<b>GRAND TOTAL</b>		<b>150 marks</b>