education

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REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SUBJECT GUIDELINES

SYSTEMS ANALYSIS AND DESIGN

NQF level 4

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SYSTEMS ANALYSIS AND DESIGN – LEVEL 4

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INTRODUCTION

A. What is Systems Analysis and Design?

Systems Analysis and Design provides the student with an understanding of how to conduct a systems analysis, and based on the findings, how to design and implement systems.

B. Why is the subject important in the Information Technology programme?

Systems Analysis and Design is an integral component of Information Technology and is often seen as the starting point of many decisions that occur not only in the ICT department but in the organisation as a whole.

C. The link between the Systems Analysis and Design Learning Outcomes and the critical and developmental outcomes

The student will be able to identify and solve problems, collect, analyse, organise, critically evaluate information that is related to information systems. The student will also be able to demonstrate an understanding of the world as a set of related systems by recognizing that problem solving contexts do not exist in isolation.

D. Factors that contribute to achieving the Systems Analysis and Design Learning Outcomes

- The ability to think logically and analytically, as well as holistically and laterally; and
- Be able to transfer skills from familiar to unfamiliar situations
- Keen powers of observation
- Meticulous attention to detail,
- Interest in computers and related topics.

1 DURATION AND TUITION TIME

This is a one year instructional programme comprising 200 teaching and learning hours. The subject may be offered on a part-time basis provided the candidate meets all the assessment requirements.

Course preparation should consider students with special education needs.

2 SUBJECT LEVEL FOCUS

Apply knowledge and understanding of information technology systems analysis and design.

3 ASSESSMENT REQUIREMENTS

3.1 Internal assessment (50 percent)

3.1.1 Theoretical Component

The theoretical component will form 60 percent of internal assessment.

Internal assessment of the theoretical component of Systems Analysis and Design Level 4 will take the form of observation, class questions, group work, (informal group competitions with rewards), individual discussion with students, class, topic and semester tests, and internal examinations. Daily observation can be made when marking exercises of the previous day and conducting questioning in class.

Assignments, case studies and tests can be done at the end of a topic. Tests and internal examinations must form part of internal assessment.

3.1.2 Practical component

The practical component will form 40 percent of internal assessment.

The practical component includes applications and exercises. All practical components must be indicated in a Portfolio of Evidence (PoE).

Internal assessment of the practical component of Systems Analysis and Design Level 4 will take form of assignments, practical exercises, case studies, practical examination in a simulated business environment.

Students may complete practical exercises on a daily basis. Assignments and case studies can be done at the end of a topic. The practical examination can form part of the internal practical assessment.

- **Some examples of practical assessments include, but are not limited to:**
  - Presentations (lectures, demonstrations, group discussions and activities, practical work, observation, role play, self activity, judging and evaluation)
  - Use of aids
  - Exhibitions
  - Visits
  - Guest speaker presentations
  - Research
  - Task performance in a simulated/structured environment

- **Definition of "Structured environment"**

"Structured environment" for the purposes of assessment refers to an actual or simulated workplace, or workshop environment.

- **Evidence in practical assessments**

All evidence pertaining to evaluation of practical work must be reflected in the student's PoE. The assessment instruments used for the purpose of conducting such assessments must be part of the evidence contained in PoE.

3.1.3 Processing of internal assessment mark for the year

A year mark out of 100 is calculated by adding the marks of the theoretical component and the practical component of the internal continuous assessment.

3.1.4 Moderation of internal assessment mark

Internal assessment is subject to both internal and external moderation procedures as contained in the *National Examinations Policy for FET College Programmes.*

3.2 External assessment (50 percent)

A national examination is conducted annually in October or November by means of *a* paper set externally and marked and moderated internally.

Details in respect of external assessment are contained in the *Assessment Guidelines: Systems Analysis and Design* (Level 4).

4 WEIGHTED VALUES OF TOPICS

TOPICS	WEIGHTED VALUE
1. Ethics and professionalism for the computer industry in South Africa	10%
2. ICT risks and threat management	20%
3. Information gathering techniques for computer systems development	20%
4. Analysing information systems	10%
5. Principles of designing computer system inputs and outputs	10%
6. Implementing and maintaining an information system	20%
7. Concepts of artificial intelligence	10%
TOTAL	**100**

5 CALCULATION OF FINAL MARK

Continuous assessment:	Student's mark/100 x 50/1 = a mark out of 50	(a)
Theoretical examination mark:	Student's mark/100 x 50/1= a mark out of 50	(b)
Final mark:	**(a) + (b) = a mark out of 100**	

All marks are systematically processed and accurately recorded to be available as hard copy evidence for, amongst others, purposes of moderation and verification, as well as for purposes of reporting.

6 PASS REQUIREMENTS

The student must obtain at least fifty (50) percent in ICASS and fifty percent (50) in the examination.

7 SUBJECT AND LEARNING OUTCOMES

On completion of Systems Analysis and Design Level 3 the student should have covered the following topics:

Topic 1: Ethics and professionalism for the computer industry in South Africa
Topic 2: ICT risks and threat management
Topic 3: Information gathering techniques for computer systems development
Topic 4: Analysing information systems
Topic 5: Principles of designing computer system inputs and outputs
Topic 6: Implementing and maintaining an information system
Topic 7: Concepts of artificial intelligence

7.1 Topic 1: Ethics and professionalism for the computer industry in South Africa

7.1.1 Subject Outcome 1: Describe professionalism for the computer industry in South Africa.

Learning Outcomes

The student should be able to:

- Discuss acceptable and unacceptable professional practices found in the computer industry.
- Identify and briefly describe known professional bodies available for the computer industry in South Africa.

7.1.2 Subject Outcome 2: Describe the codes of practice for professionalism in the IT industry in South Africa.

Learning Outcomes

The student should be able to:

- Identify general codes of practice for the IT industry in South Africa.
- Discuss the codes of practice identified.

7.1.3 Subject Outcome 3: Describe the code of ethics of the computer industry in South Africa.

Learning Outcomes

The student should be able to:

- Explain how the computer industry supports the concept of equal opportunity.
- Explain the policy against computer software piracy.
- Identify ways in which piracy is addressed in South Africa.

7.2 Topic 2: ICT risks and threat management.

7.2.1 Subject Outcome 1: Describe risk management.

Learning Outcomes

The student should be able to:

- Describe the term risk assessment.
- Explain the term risk management.
- Describe the implications of risk and threats to IT project development.
- Identify the reasons for the failure of project(s).
- Identify major risk factors.
- Define the term contingency plan.
- List possible actions that can be taken relevant to various risks and threats identified.

7.2.2 Subject Outcome 2: Recommend simple security solutions.

Learning Outcomes

The student should be able to:

- Define the term computer security.
- Explain the purpose of security controls within software environments.
- Describe the main security control areas.
- Describe and recommend hardware and software controls to enforce security controls.
- Explain security and usage policies and procedures.
- Explain acceptable and unacceptable ICT usage.
- Explain the penalties for unacceptable use of ICTs.

7.3 Topic 3: Information gathering techniques for computer systems development

7.3.1 Subject Outcome 1: Design and conduct an interview for gathering information for computer system development.

Learning Outcomes

The student should be able to:

- Design a section that explains the objectives of the interview to the interviewee.
- Explain and demonstrate how the interviewee's understanding of the interview questions will be confirmed.
- Explain and demonstrate how to ensure that the interviewee's provision of answers will meet the interview objectives.
- Explain and demonstrate how to ensure that the presentation of the interview is appropriate for the interviewee.

7.3.2 Subject Outcome 2: Design and use a questionnaire for gathering information.

Learning Outcomes

The student should be able to:

- Design a section that explains the objectives of the questionnaire to respondents.
- Explain and demonstrate how the respondents' understanding of the questionnaire will be confirmed.
- Explain and demonstrate how to ensure that the respondents' provision of answers will meet the questionnaire objectives.
- Explain and demonstrate how to summarise the questionnaire responses.
- Compare actual questionnaire responses to expected responses.
- Draw justifiable conclusions about the population sample.

7.3.3 Subject Outcome 3: Gather data from documents for computer system development.

Learning Outcomes

The student should be able to:

- Identify documents that meet the specified information requirements using an industry recommended format.
- Identify documents that show characteristics of the data and relationships between data items.
- Identify documents that show data items and facilitate access to those data items.

7.3.4 Subject Outcome 4: Observe personnel behaviour to gather information for computer system development.

Learning Outcomes

The student should be able to:

- Identify a record of behaviour of events that meet the specified information requirements and outline those events.
- Compile a report on the observation.
- Compare the outcome of the observation with original objectives.

7.3.5 Subject Outcome 5: Consolidate the information gathered via different techniques.

Learning Outcomes

The student should be able to:

- Compare information gathered through different techniques for similarities and differences.
- Demonstrate how the differences are resolved and justified by reviewing the information gathering techniques.

7.4 Topic 4: Analysing information systems

7.4.1 Subject Outcome 1: Describe information systems analysis.

Learning Outcomes

The student should be able to:
- Explain the purpose of information systems analysis.
- Outline the functions of the information systems analyst.
- Define and describe the purpose of joint application development (JAD).

7.4.2 Subject Outcome 2: Identify and explain different techniques and tools used for documenting system analysis.

Learning Outcomes

The student should be able to:
- Identify and explain different techniques used for systems analysis in industry.
- Identify and explain different techniques used for describing data structures.
- Identify and explain different techniques used for documenting business process flows.
- Identify and explain different techniques used for documenting data flows.
- Identify and explain different analysis tools used to assist with documentation.

7.4.3 Subject Outcome 3: Describe the purpose, deliverables from and contractual implications of the systems requirements document.

Learning Outcomes

The student should be able to:
- Describe the purpose of the systems requirements document.
- Identify the deliverables from the systems requirements document.
- Identify and explain the elements of the systems requirements document that could have contractual implications.

7.5 Topic 5: Principles of designing computer system inputs and outputs

7.5.1 Subject Outcome 1: Explain the principles of computer input and output design.

Learning Outcomes

The student should be able to:
- Distinguish between the appearance and the underlying structure and processes.
- Identify the purpose of user involvement in creating designs.
- Compare the online computer functions with manual forms and offline data entry.
- Discuss input and output.
- Compare graphical input and output functions with text based input and output functions.

7.5.2 Subject Outcome 2: Design input and output functions.

Learning Outcomes

- Create a design that meets the specification for the function.
- Ensure that the design can be implemented in the specified computer environment.
- Explain how the design conforms to an industry recommended format for the function.

7.5.3 Subject Outcome 3: Create system input and output functions.

Learning Outcomes

- Explain and demonstrate how to ensure that the format of system input and output functions corresponds to the design.
- Explain and demonstrate how to ensure that the function behaviour corresponds to the design.

7.6 Topic 6: Implementing and maintaining an information system

7.6.1 Subject Outcome 1: Describe systems testing, installation and changeover.

Learning Outcomes

The student should be able to:

- Describe the types of testing, and the goal of each type, that should be concluded before a system is installed.
- Identify appropriate test data and test procedures that should be performed successfully before the user accepts a system.
- Explain the steps in installing information systems and who is responsible for each step.
- Explain the advantages and disadvantages of the types of systems conversion/methods of changeover.

7.6.2 Subject Outcome 2: Describe post-implementation.

Learning Outcomes

The student should be able to:

- Determine and justify appropriate time frames to follow different types of post implementation review procedures.
- Explain the factors which must be considered during a post implementation review.
- Compare the actual performance of system components with their expected performance.
- Measure the success of the system

7.6.3 Subject Outcome 3: Describe system maintenance.

Learning Outcomes

The student should be able to:

- Name the causes of changes that may need to be made to installed systems.
- Identify and describe the types of maintenance and when each type is appropriate.
- Explain the interrelation between maintenance and design.
- Describe and determine the financial implications of maintenance.

7.7 Topic 7: Concepts of artificial intelligence

7.7.1 Subject Outcome 1: Define artificial intelligence and its uses.

Learning Outcomes

- Define the term artificial intelligence.
- Define artificial intelligence in terms of its development of technology.
- List the uses of artificial intelligence in the business environment.

7.7.2 Subject Outcome 2: Describe how robots are used.

Learning Outcomes

- Describe the term robot in simple terms.
- Describe robots in terms of the past, present and future.
- Describe robots in detail in terms of perception systems.
- Describe the uses of robots.
- Explain the impact of robots on technology.

7.7.3 Subject Outcome 3: Explain fuzzy logic.

Learning Outcomes

- Define the term fuzzy logic.
- Define fuzzy logic in terms of its development.
- Explain the advantages and disadvantages of fuzzy logic.

7.7.4 Subject Outcome 4: Explain expert systems.

Learning Outcomes

- Define expert systems.
- List the users of expert systems.
- Describe the essential components of an expert system, outlining major program components.
- Outline the implications of using expert systems in businesses.

7.7.5 Subject Outcome 5: Explain neural networks.

Learning Outcomes

- Define the term neural network.
- Explain problems addressed by neural networks.
- Explain the categories of neural networks.
- Name and explain the main parts found in a neuron in neural networks.
- Define the term synapses.

7.7.6 Subject Outcome 6: Explain virtual reality.

Learning Outcomes

- Define virtual reality.
- Describe the applications of virtual reality.

8 RESOURCE NEEDS FOR THE TEACHING OF SYSTEMS ANALYSIS AND DESIGN LEVEL 4

8.1 Physical resources

The following teaching aids should be made available, if possible:

- Lecture room
- Computer library

8.2 Human resources

- The facilitator must have Information Technology related subjects at NQF level 5.
- It will be to the advantage of facilitator if they have already beendeclared competent as assessor and/or moderator.
- Training in Outcomes Based Education (OBE).

8.3 Other resources

- File per leaner for PoE
- Printing paper