



education

Department:
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NATIONAL CERTIFICATE (VOCATIONAL)

SUBJECT GUIDELINES

CIVIL AND CONSTRUCTION TECHNOLOGY

NQF Level 4

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CIVIL AND CONSTRUCTION TECHNOLOGY – LEVEL 4

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INTRODUCTION

A. What is Civil and Construction Technology?

Civil and Construction Technology provides training to construction students on how to set out construction work using setting out equipment. The subject deals with the interpretation and application of reinforced concrete drawings in so far as concrete, foundations, floor finishing and erection of structural steel structures are concerned.

B. Why is Civil and Construction Technology important in the Building and Civil Construction programme?

Most civil engineering construction structures require reinforced concrete in the foundations where structural steel beams are needed. This subject provides students with the ideal preparation for this purpose.

C. The link between the Learning Outcomes for Civil and Construction Technology and the Critical and Developmental Outcomes

Students will be able to identify different types of tools, equipment and machinery for performing various construction activities. They will work effectively with teams in activities such as the interpretation of health and safety programmes, interpretation of drawing and sketches and appropriate use of technology.

D. Factors that contribute to achieving the Civil and Construction Technology Learning Outcomes

- Thorough preparation for teaching and learning activities
- An environment conducive to teaching and learning through effective student support, motivation, commitment and a positive attitude
- An interest in Civil and Construction Technology

1 DURATION AND TUITION TIME

This is a one year learning programme comprising of 200 teaching and learning hours. The subject may be offered on a part-time basis provided all assessment requirements set out hereunder are adhered to.

Students with special educational needs (LSEN) must be catered for in a way that eliminates any barriers to learning.

2 SUBJECT LEVEL FOCUS

- Set out construction work
- Interpret and apply reinforced concrete drawings for concrete work in foundations, and the erection, use and dismantling of access equipment and erection of steel beams
- Explain and apply relevant health and safety procedures and practices

3 ASSESSMENT REQUIREMENTS

3.1 Internal assessment (50 percent)

Internal assessment refers to continuous assessment which is college based. The achievement of all Learning Outcomes contributes towards the achievement of the qualification.

3.1.1 Theoretical Component

The theoretical component forms 40 percent of the internal assessment mark.

Internal assessment of the theoretical component in Civil and Construction Technology Level 4 takes the form of observation, class questions, group work, informal group competitions with rewards, individual discussions with students, class, topic and semester tests and internal examinations. Lecturers can observe students when marking exercises from the previous day and asking class questions.

Assignments, case studies and tests can be completed at the end of a topic. Tests and internal examinations must form part of the internal assessment. Evidence of theoretical assessment must also reflect in the Portfolio of Evidence (PoE).

3.1.2 Practical Component

The practical component forms 60 percent of the internal assessment mark.

Practical components include applications and exercises. All practical components must be indicated in a PoE.

Internal assessment of the practical component in Civil and Construction Technology Level 4 takes the form of assignments, practical exercises, case studies and practical examinations in a simulated construction environment.

Students may complete practical exercises daily. Assignments and case studies can be completed at the end of a topic. Practical examinations can form part of 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
 - Structured environment

- **Definition of the term “Structured Environment”**

For the purposes of assessment “structured environment” refers to an actual or simulated workplace, or workshop environment.

Activities in the simulated workplace or environment must be documented in a logbook with a clear listing of the competencies to be assessed. The following information must be contained in the logbook:

- Nature of department or environment in which practical component was achieved
- Learning Outcomes
- Activities in the environment with which to achieve the Learning Outcomes
- Date of completion of the task
- Time spent on activities
- Signature of lecturer or supervisor and student

For the logbook to be regarded as valid evidence it must be reflected in the student’s Portfolio of Evidence. An officially assigned supervisor must sign this off.

- **Evidence in practical assessments**

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

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 subjected to internal and external moderation procedures as set out in the *National Examinations Policy for Further Education and Training College Programmes*.

3.2 External assessment (50 percent)

A national examination is conducted annually in October or November by means of a paper(s) set and moderated externally.

External assessment details are set out in the *Assessment Guidelines: Civil and Construction Technology* (Level 4).

4 WEIGHTED VALUES OF THE TOPICS

TOPICS/TOPICS	WEIGHTED VALUE
1. Set out construction working areas	10%
2. Interpret and apply reinforced concrete drawings	20%
3. Construction concrete technology	20%
4. Foundation work used to support and transmit loads	10%
5. Erect structural steel for beams, slabs and columns	15%
6. Floor and wall finishing used in domestic, school and large factory floors	10%
7. Electrical work in a single level building	15%
TOTAL	100

5 CALCULATION OF FINAL MARK

Continuous assessment: Student's mark/100 x 50/1 = a mark out of 50 (a)

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.

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 Civil and Construction Technology Level 4, the student should have covered the following topics:

- Topic 1: Setting out construction working areas
- Topic 2: Interpret and apply reinforced concrete drawings
- Topic 3: Construction concrete technology
- Topic 4: Foundation work used to support and transmit loads
- Topic 5: Erect structural steel for beams, slabs and columns
- Topic 6: Floor and wall finishing used in domestic, school and large factory floors
- Topic 7: Electrical work in a single level building

7.1 Topic 1: Set out construction working areas

7.1.1 Subject Outcome: Do setting out for various construction structures according to drawings.

Learning Outcomes

Students are able to:

- Perform setting out using and applying instruments for setting out and procedures and methods according to the drawing.
- Explain and perform setting out of drainage trenches.
- Explain and apply various methods of foundation checks.

7.2 Topic 2: Interpret and apply reinforced concrete drawings

7.2.1 Subject Outcome 1: Identify and describe types and features of reinforcing drawings.

Learning Outcomes

Students are able to:

- Identify from the drawing descriptions functions in terms of intended use for reinforcing on a construction site.
- Identify and explain abbreviations and symbols in accordance with project requirements.
- Interpret information given on scale drawings to full size layout of structures.
- Identify and describe lines and services in terms of horizontal location and depth of service

7.2.2 Subject Outcome 2: Use plans to locate features and structures on site.

Learning Outcomes

Students are able to:

- Orientate drawings in terms of site landmarks and the North indicator.
- Extract information from drawings in terms of setting out requirements on site.
- Locate features and structures on site in accordance with elevation, longitudinal section and cross section.
- Locate lines and services in terms of horizontal location and depth of service.

7.2.3 Subject Outcome 3: Determine project requirements.

Learning Outcomes

Students are able to:

- Confirm the extent and nature of work from specifications, drawings and schedules according to company requirements.
- Determine types of materials and calculate quantities of materials from working drawings and specifications.

Range: Order list for single project.

- Produce a cutting list according to bending schedule.
- Determine quantity for the requirements of materials from drawings and specifications.
- Identify and plan opening and lifts in accordance with drawings.
- Identify skills and knowledge required for the project from working drawings and specifications according to company procedures.

7.2.4 Subject Outcome 4: Plan work sequences.

Learning Outcomes

Students are able to:

- Identify materials in terms of ordering requirements.
- Determine times for delivery of resources from drawings and specifications.
- Plan sequence of work in accordance with availability of resources.
- Allocate tasks and delivery times on timeline in accordance with specified project completion dates.

7.3 Topic 3: Construction concrete technology

7.3.1 Subject Outcome 1: Describe the uses of concrete in structural applications.

Learning Outcomes

Students are able to:

- Describe properties of concrete at all stages, in terms of strengths and weaknesses.
- Explain the uses of concrete, in terms of its structural applications.
- Describe factors affecting concrete strength.
- Explain optimum durability of concrete, in terms of quality and costs.
- Describe appearance of concrete, in terms of colour, texture and time-related changes.

7.3.2 Subject Outcome 2: Explain the use and different mixes of concrete.

Learning Outcomes

Students are able to:

- Describe mixing of concrete, in terms of sequencing and duration.
- Explain the consequences of incorrect mixing of concrete, in terms of affect on durability and strength of the structure.
- Describe the usage of different grade and size of aggregate, in terms of workability of concrete.
- Describe the use of different types of cement, in terms of early and late strength of concrete.
- Describe different materials and quantities of material used in foundations, slabs and beams.
- Explain purpose and functions of concrete, in terms of dimensions and appearance of finished products.
- Explain the purpose and functions of steel reinforcement, in terms of concrete strength and durability.

7.3.3 Subject Outcome 3: Explain concrete installation.

Learning Outcomes

Students are able to:

- Describe appropriate placing methods for different situations.
- Describe transporting and placing of concrete, in terms of equipment used and sequencing.
- Describe compaction of concrete, in terms of equipment used and sequencing.
- Explain consequences of insufficient compaction, in terms of appearance and strength of finished products.
- Explain process of adding fresh concrete to hardened concrete, in terms of normal concreting practice.
- Explain consequences of not preparing joints, in terms of affect on structural strength.

7.3.4 Subject Outcome 4: Explain specialized concrete.

Learning Outcomes

Students are able to:

- Explain purpose for specialized concrete, in terms of abnormal demand on concrete.
- Define different types of specialized concrete, in terms of characteristic requirements and describe their uses.
- Explain the benefits of using different types of specialized concrete, in terms of designed purpose of concrete.
- Explain difference between normal concrete and specialized concrete, in terms of mixing, placing and curing requirements.
- Explain the consequences of not treating specialized concrete with the required care, in terms of potential structural weakness and costs.

7.4 Topic 4: Foundation work used to support and transmit loads

7.4.1 Subject Outcome 1: Explain and investigate foundation works.

Learning Outcomes

Students are able to:

- Explain reasons for casting foundations in building structures.
- Explain the appearance of various soil conditions that must be considered when casting foundations.
- Explain various reinforced concrete and concrete foundations used in building structures.
Range: Strip, raft column, cantilevered foundations.
- Explain reasons for underpinning of foundations.
- Investigate various soil conditions and indicate appropriate foundations to cast on each.
- Investigate and report on different concrete foundations and underpinning completed in building structures.

7.5 Topic 5: Erecting structural steel for beams, slabs and columns

7.5.1 Subject Outcome 1: Explain and perform structural steel erection.

Learning Outcomes

Students are able to:

- Explain different types of structural profiles and their uses.
- Explain and construct various beam connections.
- Explain and perform erection of steel structures in beams, slabs and columns.

7.6 Topic 6: Floor and Wall finishing used in domestic, school and large factory floors.

7.6.1 Subject Outcome 1: Explain and perform floor finishing.

Learning Outcomes

Students are able to:

- Describe the characteristics of floor finishing.
Range: Clay tiles, glazed tiles, granolithic floors.
- Explain and perform various floor finishes.
Range: Clay and quarry tiles, wooden granolithic floors, glazed tiles and PVC tiles.
- Describe and perform various wall finishes.
Range: Plastering, painting, glazed wall tiles.
- Adhere to safety standards safety standards when performing finishing activities.

7.7 Topic 7: Electrical work in a single level building.

7.7.1 Subject Outcome 1: Explain electrical work in a single level building.

Learning Outcomes

Students are able to:

- Identify and explain electrical symbols, wiring and switch gear in a building.
Range: Distribution board, earth leakage relay, pipes, plugs, switch boxes.
- Explain the importance and function of an earth leakage relay.

7.7.2 Subject Outcome 2: Use an elementary electrical plan of a building to install electrical wiring and switch gear in a building.

Learning Outcomes

Students are able to:

- Identify the layout and distribution of electrical wiring and switch gear needed according to an elementary electrical plan of a building.
Range: Electrical PVC pipes, electrical plugs and switch boxes, distribution board installed in floor, roof and walls of a small building.
- Install electrical wiring and switch gear according to an elementary electrical plan of a building.
Range: Electrical PVC pipes, electrical plugs and switch boxes, distribution board installed in floor, roof and walls of a small building.

7.7.3 Subject Outcome 3: Investigate a variety of distribution boards in various buildings and report on it.

Learning Outcomes

Students are able to:

- Investigate the location of distribution boards in various buildings and obtain a circuit diagram of a distribution board.
- Study a circuit diagram, compare various circuit diagrams and report on the specifics of the diagram.

8 RESOURCE NEEDS FOR THE TEACHING OF CIVIL AND CONSTRUCTION TECHNOLOGY - LEVEL 4

8.1 Human resources

A lecturer with at least the minimum educator qualifications, an acceptable NQF level qualification, registered assessor qualification, and on-going top-up training and upskilling requirements

Physical resources

Suitable venue to conduct classes, with teaching aids and contract documents, specifications work tables, chairs, chalkboards.

Equipment

- Overhead projector,
- Chalkboard;
- Plans
- Sections
- Elevations
- Work sketches
- General Conditions of Contract SABS 1200 Specifications
- Work plan components including scope of work
- Resources
- Start to earliest finish date.
- Bending schedule
- Teaching and learning materials and resources.
- Concrete mixer
- Cement
- Different sizes of aggregate
- Wheel barrows
- Shovels
- Reinforced steel
- Scaffolding
- Scaffold planks
- Tandem lifts
- Different floor coverings
- Protective clothing
- First Aid boxes