



**education**

Department:  
Education  
REPUBLIC OF SOUTH AFRICA

# **NATIONAL CERTIFICATES (VOCATIONAL)**

## **SUBJECT GUIDELINES**

### **CONCRETE STRUCTURES**

#### **NQF LEVEL 2**

September 2007



## INTRODUCTION

### **A. What is Concrete Structures?**

Concrete Structures teaches students about concrete composition and production and its application in various building, dam, bridge and road structures.

### **B. Why is Concrete Structures important in the Building and Civil Construction Programme?**

Concrete is used in most building structures to strengthen the edifice. Therefore, students who are interested in a career in the building and civil construction industry must understand the properties of concrete and concrete structures to optimally and safely build new communities.

### **C. The link between Concrete Structures Learning Outcomes and the Critical and Developmental Outcomes**

Students will be able to identify different types of concrete structures to perform various construction activities. They will work effectively with the other team members to complete activities such as identifying and describing different concrete structures. Concrete Structures also prepares students to communicate understanding of the different uses of concrete structures in required circumstances.

### **D. Factors that contribute to achieving the Concrete Structures Learning Outcomes**

- Thorough preparation for teaching and learning activities
- An environment conducive to teaching and learning through effective learner support, motivation, commitment and a positive attitude
- An interest in Concrete Structures

# **CONCRETE STRUCTURES – LEVEL 2**

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## 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 student meets all the assessment requirements.

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

## 2 SUBJECT LEVEL FOCUS

The student will be able to:

- Understand and describe basic principles of concrete and concrete structures.
- Explain the properties of concrete.
- Interpret and describe elements of concreting drawings.
- Identify and describe the use of tools and materials to produce concrete.
- Describe appropriate methods for mixing concrete.

## 3 ASSESSMENT REQUIREMENTS

### 3.1 Internal assessment (50 percent)

Internal assessment refers to continuous assessment which is college based. The achievement of Learning Outcomes counts towards the achievement of a qualification. All internal assessments must be finalised by an assessor who has been declared competent by an accredited service provider.

#### 3.1.1 Theoretical component

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

Internal assessment of the theoretical component in Concrete Structures Level 2 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.

#### 3.1.2 Practical component

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

Practical components include applications and exercises. All practical components must be indicated in a Portfolio of Evidence (PoE).

Internal assessment of the practical component in Concrete Structures Level 2 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:**

- A. Presentations (lectures, demonstrations, group discussions and activities, practical work, observation, role-play, independent activity, synthesis and evaluation)
- B. Exhibitions by students
- C. Visits undertaken by students based on a structured assignment task
- D. Research
- E. Task performance in a "Structured Environment"

### • Definition of the term “Structured Environment”

For the purposes of assessment, “Structured Environment” refers to a 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
- Time spent on activities
- Signature of lecturer or supervisor and student

For the logbook to be regarded as valid evidence, it must be signed by an officially assigned supervisor.

### • Evidence in practical assessments

All evidence pertaining to evaluation of practical work must be reflected in the students’ Portfolio of Evidence (PoE). The tools and instruments constructed and used to conduct these assessments must be clear from the evidence contained in the Portfolio of Evidence (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 (60 percent) and the practical component (40 percent) of the internal continuous assessment (ICASS).

#### 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 FET 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. A practical component will also be assessed.

External assessment details and procedures are set out in the *Assessment Guidelines: Concrete Structures (Level 2)*.

## 4 WEIGHTED VALUES FOR TOPICS

TOPIC	WEIGHTED VALUE
1. Explain the Composition of Concrete	10
2. Erect Purpose made Circular Steel Formwork	10
3. Erect Steel Formwork for Walls	15
4. Prepare and erect Timber Formwork for Rectangular Column	20
5. Prepare and Erect Timber Formwork for L-Shape Walls	30
6. Procure Materials, Tools and Equipment	15
<b>TOTAL</b>	<b>100</b>

## 5 CALCULATION OF FINAL MARK

Internal assessment mark: Student’s mark/100 x 50 = a mark out of 50 (a)

Examination mark: Student’s mark/100 x 50 = 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, reporting, moderation and verification purposes.

## 6 PASS REQUIREMENTS

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

## 7 SUBJECT AND LEARNING OUTCOMES

On the completion of Concrete Structures Level 2, the student should have covered the following topics:

- Topic 1: Explain the Composition of Concrete
- Topic 2: Erect Purpose made Circular Steel Formwork
- Topic 3: Erect Steel Formwork for Walls
- Topic 4: Prepare and erect Timber Formwork for Rectangular Column
- Topic 5: Prepare and Erect Timber Formwork for L-Shape Walls
- Topic 6: Procure materials, tools and equipment

### 7.1 Topic 1: Explain the Composition of Concrete

**Subject Outcome:** Describe materials or ingredients used for concrete and mix concrete.

**Learning Outcomes:**

The student should be able to:

- Describe materials used for mixing concrete.  
*Range: Fine aggregates, coarse aggregates, water and cement*
- Explain methods for mixing concrete.
- Explain properties of concrete.
- Explain various common mixes of concrete.
- Explain methods of batching.
- Perform concrete mixing using different methods of mixing.

### 7.2 Topic 2: Erect Purpose-made Circular Steel Formwork

**Subject Outcome 1:** Erect steel shuttering for a purpose-made circular steel formwork.

**Learning Outcomes:**

The student should be able to:

- Set out position of column according to the drawing.
- Place the reinforcement in position.
- Use stays to erect plumb formwork.
- Tie an adequate cover block to the steel reinforcement to ensure that the reinforcement is uniformly covered.  
*Range: Cover block of 40 mm*
- Place clips and wedges in sufficient numbers to secure the formwork.
- Ensure that the interior area of the column is clean.
- Determine the height of the column using a concrete depth gauge rod.
- Ensure that all dimensions conform to specifications

### 7.3 Topic 3: Erect Steel Formwork for Walls

**Subject Outcome 1:** Set out and erect steel formwork for the wall according to drawing.

**Learning Outcomes:**

The student should be able to:

- Set out the wall according to the drawing specifications.
- Place the steel reinforcement in position.
- Align and plumb the walls of the formwork.
- Use tubular walers on the formwork according to the drawing specifications.
- Secure position of the stop-end and adjustable stays and tighten keys and wedges.
- Tie adequate cover blocks to the steel reinforcement to ensure that the reinforcement is uniformly covered.  
*Range: Blocks of 40 mm*
- Mark the height of the proposed wall on the inside of the formwork with a depth gauge batten.
- Secure ferrules on both sides of the wall structure

#### 7.4 Topic 4: Prepare and Erect Timber Formwork for a Rectangular Column

**Subject Outcome 1:** Prepare the work area and set out, construct and erect timber formwork for a rectangular column.

**Learning Outcomes:**

The student should be able to:

- Set out the position of the column according to the drawing and starter cast.
- Place the steel reinforcement in position.
- Tie adequate cover blocks to the steel reinforcement to ensure that reinforcement is uniformly covered.
- *Range: Blocks of 40 mm*
- Use stays and adequate cleats to erect formwork.
- Tighten column clamps.
- Plumb and square the column box.
- Fix the sides of the column or box parallel to the sides of the slab.
- Mark the height of the column on the inside of the box using a nail marker.
- Ensure that the interior of the formwork is free of debris.

#### 7.5 Topic 5: Prepare and Erect Timber Formwork for L-Shape Walls

**Subject Outcome 1:** Prepare the work area and set out, construct and erect timber formwork for L-shape walls.

**Learning Outcomes:**

The student should be able to:

- Set out the walls according to the drawing.
- Cast a concrete starter.
- Construct and erect the timber formwork according to the drawing.
- Place the steel in position.
- Tie adequate cover blocks of 40 mm to the steel reinforcement to ensure that the reinforcement is uniformly covered.
- Make up the formwork and firmly support and brace it.
- Fit adequate spacers and tighten ferrules.
- Plumb the formwork.
- Fix and plumb the stop-end in position.
- Make sure that the corner is true 90°.
- Fix the sides of the formwork parallel to the sides of the slab.
- Clear the interior of the formwork of debris.
- Mark the height of the proposed concrete on the inside of the formwork with nails at 800 mm centres

#### 7.5 Topic 6: Procure Materials, Tools and Equipments

**Subject Outcome:** Measure and order correct materials, tools and equipment for concrete work.

**Learning Outcomes:**

The student should be able to:

- Explain the correct measuring and ordering of materials for concrete work.
- Purchase the necessary material and ensure that the correct tools and equipment are available.
- Store tools and equipment according to housekeeping requirements.
- Adhere to health and safety requirements.

### 8 RESOURCE NEEDS FOR TEACHING CONCRETE STRUCTURES – LEVEL 2

#### 8.1 Physical resources

- Classroom and suitable venue to carry out practical assessments
- Teaching aids and pre-designed models and structures
- Work tables, work area, chairs and chalkboards

- Overhead projector

## **8.2 Human resources**

The lecturer should have an acceptable NQF level qualification and should preferably be a registered assessor. The lecturer should be committed to continually improving and expanding his or her knowledge and skills.