UNIVERSITY OF CAPE TOWN

Eurocode Design for Civil & Structural Engineers

Johannesburg • Durban • Port Elizabeth • Cape Town

Buildings • Bridges • Viaducts • Industrial Structures • Frames • Towers • Masts • Stadiums • Exhibition Halls • Roofs • Foundations • Underground Structures • Retaining Walls • Embankments • Tunnels • Dams • Marine Structures • Containment Structures • Tanks • Silos • Pipelines

The Eurocode 2011 Programme

Course 1 (July):	**Basis of Eurocode Design and Actions on Structures (1 Day)**
Presenter:	Professor R.S. Narayanan, United Kingdom
Course Dates:	JHB: 04 Jul 2011; DBN: 05 Jul 2011; PE: 07 Jul 2011; CPT: 08 Jul 2011
CPD Credits:	1 (ECSA Validation Number: UCTCIVECCIND01-11)
Course 2 (Aug):	**Eurocode Design of Concrete Structures (2 Days)**
Presenter:	Professor J.C. Walraven, The Netherlands
Course Dates:	JHB: 22 & 23 Aug 2011; CPT: 25 & 26 Aug 2011
CPD Credits:	2 (ECSA Validation Number: UCTCIVECCIND02-11)
Course 3 (Sept):	**Eurocode Design of Steel Structures (2 Days)**
Presenter:	Professor F.S.K. Bijlaard, The Netherlands
Course Dates:	JHB: 12 & 13 Sep 2011; CPT: 15 & 16 Sep 2011
CPD Credits:	2 (ECSA Validation Number: UCTCIVECCIND03-11)
Course 4 (Oct):	**Eurocode Design of Timber Structures (1 Day)**
Presenter:	Dr. K. Ranasinghe, United Kingdom
Course Dates:	JHB: 17 Oct 2011; DBN: 18 Oct 2011; PE: 20 Oct 2011; CPT: 21 Oct 2011
CPD Credits:	1 (ECSA Validation Number: UCTCIVECCIND04-11)
Course 5 (Nov):	**Eurocode Geotechnical & Foundation Design (1 Day)**
Presenter:	Dr. A. Bond, United Kingdom
Course Dates:	JHB: 14 Nov 2011; DBN: 15 Nov 2011; PE: 17 Nov 2011; CPT: 18 Nov 2011
CPD Credits:	1 (ECSA Validation Number: UCTCIVECCIND05-11)

A. General Information

1. Why Eurocode Design?

The Eurocodes are generally considered to be the most technically advanced suite of structural design codes in the world today. They officially replaced the national design standards in all countries of the European Union in April 2010. Several countries outside Europe have also begun putting together

measures and resources for the implementation of the Eurocodes, or the adaptation of their own national codes to take advantage of the technical benefits of the Eurocodes. In South Africa, the majority of structural design standards have been based on the British Standards (BS), and now that these have been replaced by the Eurocodes, it makes sense to adopt the "more international" Eurocodes (reflecting the collective wisdom of many countries) as a new basis of our national standards. Attempting to develop our own standards from scratch is far too costly; we do not have the resources for such a major undertaking.

2. Objectives & Scope of the Eurocode Courses

The University of Cape Town inaugurated a series of short courses on the Structural Eurocodes in 2007, and since then, many civil and structural engineers in South Africa have attended the courses. The objectives of these courses has been to prepare South African designers for the anticipated shift in design basis, and to transfer knowledge and expertise in the use of the Eurocodes, thus enhancing the international competitivenes of South African structural engineering. In view of the success of previous courses, we are pleased to announce an expanded programme of Eurocode Courses for 2011, which will cover concrete, steel and geotechnical design as in the past, and include (for the first time) timber design. The courses on *Design of Concrete Structures* (Eurocode 2) and *Design of Steel Structures* (Eurocode 3) will each be of duration 2 days, and will be more detailed than the 1-day courses of the past. These two expanded courses may be attended by those who have previously attended the 1-day concrete and steel courses in the past (to gain a deeper and more comprehensive understanding of Eurocode design), as well as those who have never attended these courses before.

3. Who Should Attend the Courses?

- All engineers concerned with the analysis and design of all types of structures in any of the commonly used structural materials (concrete, steel, composite, timber, masonry or aluminium)
- Structural, Civil and Geotechnical Engineers from consulting practices, the construction industry, the mining industry, municipal authorities, government departments and parastatals
- The courses are relevant for all levels of professional development, from recent engineering graduates and trainee engineers, to registered professional engineers, senior engineers and principals

4. Schedule for 2011

Delegates will have a choice of attending the courses either in Johannesburg (JHB), Cape Town (CPT), Durban (DBN) or Port Elizabeth (PE). Course 1 will run in July, Course 2 in August, Course 3 in September, Course 4 in October and Course 5 in November. Courses 1, 4 & 5 are each of duration 1 day, and will be offered in all 4 cities; Courses 2 & 3 are each of duration 2 days, and will be offered in Johannesburg and Cape Town only. All 5 courses are accredited with ECSA, and full attendance attracts one CPD credit for a 1-day course and 2 CPD credits for a 2-day course (attendance on all 5 courses would give 7 CPD credits).

5. Course Presenters

Presenters on all 5 courses will be world-renowned authorities who have been at the forefront of the development of the Eurocodes. **Prof. R.S. Narayanan** (UK), who will present Course 1, has been closely involved with the development of the Eurocodes for the past 20 years, and has been Chairman of the Eurocode Committee TC250/SC2 responsible for all the structural Eurocodes on concrete. **Prof. J.C. Walraven** (Netherlands), who will present Course 2, is a world authority on many aspects of concrete design, and has been Convenor of the Project Team for Eurocode 2. **Prof. F.S.K. Bijlaard** (Netherlands), who will present Course 3, is a world authority on the stability of steel

structures and the behaviour of joints in steel structures; he has been Chairman of Eurocode Committee TC250/SC3 responsible for all the structural Eurocodes on steel. **Dr. K. Ranasinghe** (UK), who will present Course 4, is the UK representative on the Eurocode Committee TC250/SC5 responsible for all the structural Eurocodes on timber, and (through TRADA) has been driving the transition to the Eurocodes of the UK timber industry. **Dr. A. Bond** (UK), who will present Course 5, has played a prominent role in the development of the geotechnical Eurocodes, and is now Chairman of Eurocode Committee TC250/SC7 responsible for all the geotechnical Eurocodes.

6. How to Register for the Courses

Persons intending to attend the above courses should complete the attached ***Registration Form*** and fax/email this to the Convenor, at the same time making arrangements for the remittance of the applicable registration fee. The deadline for registration is **31 May 2011.** Places on the courses are limited, and will be reserved on a first-come-first-served basis. Interested persons are advised to book as early as possible. The registration fee for attendance on the courses is R3750 for a 1-day course and R6250 for a 2-day course. The fee covers tuition by world-renowned speakers on the Eurocodes, comprehensive course notes, a certificate of attendance, as well as lunches, teas and refreshments throughout. Participants may register to attend as many courses as they wish (simply tick the required courses on the form). For new participants involved with the design of structures in any of the common materials, attendance on all 5 courses is strongly recommended.

7. Contact Details for Further Information

Prof. A. Zingoni, PrEng, CEng, PhD, FIStructE, FSAAE
Convenor - Eurocode Design Courses
Head - Dept. of Civil Engineering, Univ. of Cape Town
Rondebosch 7701, Cape Town, South Africa
Tel: (27) (21) 650 2588/2601; Fax: (27) (21) 650 5864
Email: alphose.zingoni@uct.ac.za
UCT Eurocodes website: http://www.eurocodes.uct.ac.za

B. Course Outlines

Note: The treatment in all courses will be interspersed with worked examples. The material will not necessarily be treated in the order given below, and while it will be endeavoured to cover all topics, the Presenters (in consultation with the Convenor) reserve the right to modify the content in the interests of making the best use of the available time.

Course 1: Basis of Eurocode Design & Actions on Structures: 1 Day

Introduction
- Background to the Eurocodes: Historical and Political Context
- Overall Structure of the Eurocode System: The 10 Eurocodes
- Features and Format of the Eurocodes
- Benefits of Using the Eurocodes
- Application of the Eurocodes outside Europe
- Case Studies of Projects Designed Using the Eurocodes

EN 1990: Basis of Design: The Lead Eurocode
- Basic Requirements for Design
- Resistance to Actions, Robustness, Serviceability and Durability
- Limit State Design Philosophy
- Ultimate Limit State & Serviceability Limit State Verifications
- Persistent and Transient Design Situations

- Values of Actions and Principle of Combining Actions
- Partial Factors for Loads for Various Load Combinations
- Verifications for Strength and Equilibrium
- Design Situations Involving Geotechnical Actions
- Examples: Footings, Continuous Beams, Multi-Storey Frames
- Accidental Design Situations
- Reliability Differentiation

EN 1991: Actions on Structures: Eurocode 1

- Overview of the Parts of EN 1991

EN 1991 Part 1-1: Densities, Self-Weight and Imposed Loads for Buildings

- Densities of Construction and Stored Materials
- Self-Weight of Construction Works
- Imposed Loads on Buildings
- Load Arrangements for Beams, Floors, Roofs, Columns and Walls

EN 1991 Part 1-2: Actions on Structures Exposed to Fire

EN 1991 Part 1-4: Wind Actions

- Wind Loads on Surfaces and on Whole Structures
- Procedure for Obtaining Peak Velocity Pressure
- Altitude Correction and Orography

EN 1991 Part 1-7: Accidental Actions from Impact and Explosions

EN 1991 Part 2: Traffic Loads on Bridges

EN 1991 Part 4: Actions in Silos and Tanks

Course 2: Eurocode Design of Concrete Structures: 2 Days

- Overview of Parts of EN 1992: Eurocode 2: Design of Concrete Structures
- Terminology and Notation of Eurocode 2

EN 1992 Part 1-1: General Rules for all Concrete Structures and Rules for Buildings

- Specification of Concrete to EN 206
- Materials: Concrete; Reinforcing Steel; Prestressing Steel
- Durability and Cover to Reinforcement
- Structural Analysis: Load Cases; Elastic Analysis; Plastic Analysis; Stability Analysis; Prestressing
- Ultimate Limit State Design: Bending; Shear; Torsion; Punching; Strut & Tie Models
- Serviceability Limit State Design: Crack Control; Deflection Control; Stress Limitation
- Detailing of Reinforcement and Prestressing Tendons: Spacing of Bars; Bond; Anchorage of Bars; Laps; Tendons
- Detailing of Concrete Members: Beams; Slabs; Columns; Walls; Footings; Pile Caps; Foundations
- Precast Concrete Elements
- Plain and Lightly-Reinforced Concrete Structures
- Concrete Structures made of Lightweight Aggregate Concrete

EN 1992 Part 1-2: Structural Fire Design for Concrete Structures

- Basis of Fire Design; Material Properties
- Design Procedure for Fire Resistance
- Simplified and Advanced Calculation Methods

EN 1992 Part 2: Design of Concrete Bridges

EN 1992 Part 3: Design of Liquid Retaining and Containment Structures

- Material Specifications for Water Tightness
- Partial Factors and Design Loads
- Durability and Cover to Reinforcement
- Ultimate Limit States for Containment Structures
- Serviceability Checks: Cracking & Crack Control
- Joints in Water-Retaining Concrete Structures
- Detailing of Water-Retaining Structures and Silos
- Inspection and Testing of Liquid-Retaining Structures

Course 3: Eurocode Design of Steel Structures: 2 Days

- Overview of Parts of EN 1993: Eurocode 3: Design of Steel Structures
- Terminology and Notation of Eurocode 3

EN 1993 Part 1-1: General Rules for all Steel Structures and Rules for Buildings

- Materials: Structural Steel; Connecting Devices; Durability
- Structural Analysis:
  - Structural Modelling; Joint Modelling
  - Structural Stability; Accounting for Imperfections
  - Elastic Analysis; Plastic Analysis
- Ultimate Limit State Design:
  - Resistance of Cross Sections
  - Buckling Resistance of Members
  - Design of Built-Up Compression Members
- Serviceability Limit States: Vertical Deflections; Horizontal Deflections; Dynamic Effects

EN 1993 Part 1-8: Design of Steel Joints

- Bolted Connections
- Welded Connections
- Connections with Rivets and Pins
- Classification of Joints; Modelling of Beam-to-Column Joints
- Joint Rotational Stiffness; Rotational Capacity; Design Resistance of Joints
- Joints Connecting H or I Sections
- Hollow Section Joints

EN 1993 Part 1-2: Structural Fire Design for Steel Structures

EN 1993 Part 1-5: Plated Structural Elements

- Modelling of Plated Structures; Effective Width
- Shear Lag in Member Design: Elastic Shear Lag; Shear Lag at the Ultimate Limit State
- Plate Buckling at the Ultimate Limit State: Unstiffened/Stiffened Plates; Design Resistance; Verification
- Resistance to Shear: Web and Flange Contributions; Design Resistance; Verification
- Resistance to Transverse Forces: Design Resistance; Verification
- Interaction Betweeen Shear Force, Bending Moment and Axial Force
- Interaction Betweeen Transverse Forces, Bending Moment and Axial Force
- Detailing of Stiffened Plates

EN 1993 Part 1-6: Strength and Stability of Shell Structures

- Types of Shell Analysis; Membrane & Bending Effects; Modelling; Geometric Imperfections
- Ultimate Limit States to be considered in the Design of Steel Shells
- Design Concepts for the Limit State Design of Steel Shells
- Designing for the Plastic Limit State: LS1
- Designing for the Cyclic Plasticity Limit State: LS2
- Designing for the Buckling Limit State: LS3
- Designing for the Fatigue Limit State: LS4

EN 1993 Part 2: Design of Steel Bridges

EN 1993 Part 4: Design of Steel Silos, Tanks and Pipelines

Course 4: Eurocode Design of Timber Structures: 1 Day

- Overview of Parts of EN 1995: Eurocode 5: Design of Timber Structures
- Terminology and Notation of Eurocode 5

EN 1995 Part 1-1: General Rules for all Timber Structures and Rules for Buildings

- Materials: Solid Timber; Glue-Laminated Timber; Wood-Based Panels; Adhesives
- Durability; Resistance to Biological Organisms; Resistance to Corrosion
- Structural Analysis: Members; Connections; Assemblies (Frames; Trusses; Arches)
- Ultimate Limit States: Design of Cross Sections; Stability of Members
- Notched Members; Members with Holes; System Strength
- Serviceability Limit States: Joint Slip; Deflections; Vibrations
- Connections with Metal Fasteners:
  - Bolted Connections; Screwed Connections
  - Nailed Connections; Dowelled Connections
  - Stapled Connections; Plate Connectors
- Components and Assemblies
  - Glued Beams; Glued Columns
  - Trusses; Bracing; Wall, Roof and Floor Diaphragms

- Detailing of Timber Connections
- Assembly, Transportation and Erection

EN 1995 Part 1-2: Structural Fire Design for Timber Structures
EN 1995 Part 2: Design of Timber Bridges

Course 5: Eurocode Geotechnical & Foundation Design: 1 Day

- Overview of Parts of EN 1997: Eurocode 7: Geotechnical Design
- Terminology and Notation of Eurocode 7
- Basis of Geotechnical Design
- Design and Construction Considerations
- Supervision, Monitoring and Maintenance
- Ground Investigation and Testing; Ground Investigation Report
- Ground Characterisation; Determination of Design Parameters
- Verification of Strength; Verification of Stability; Uplift; Hydraulic Failure
- Verification of Serviceability; Foundation Settlements
- Slopes and Embankments
- Spread Foundations
- Retaining Structures
- Pile Foundations
- Anchorages
- The Geotechnical Design Report
- Execution of Geotechnical Works; The Geotechnical Execution Standards

End of Listing