

# Foundation Design

*A Practical Perspective*



**A block release course over 5 days**

**09 - 13 April 2018**



Presented by: **Dr Peter Day**

Adjunct Professor of Geotechnical Engineering and Consultant, Jones & Wagener

## Course Objectives

This course is presented from the perspective of a practicing geotechnical engineer.

The objective of this course is to provide a practical understanding of:

- ◆ Extending the theories of bearing capacity and settlement as taught at undergraduate level to practical design of foundations
- ◆ Obtaining and selecting design parameters from site investigation data
- ◆ Selection of appropriate foundation types for various types of development and soil profiles
- ◆ Design of spread footings, piled foundations and raft foundations
- ◆ Principles of limit states design in geotechnical Engineering
- ◆ Applicable standards and statutory requirements.

## Course Outcomes

At the end of the course, the participants should be able to:

- ◆ Define and specify site investigation requirements for types of development and soil conditions
- ◆ Select appropriate methods of design for common types of foundations
- ◆ Determine the load bearing capacity and settlement of foundations
- ◆ Better understand practical issues that need to be considered in foundation design
- ◆ Identify and conform to applicable standards and statutory requirements.

**Course Fees: R5000.00**

*US students / course notes only R1000*

**CPD: 5 credits (ECSA and SACNASP)**

## Course Assessment

The participants taking the course as part of their post-graduate studies will be assessed by means of an open-book examination and/or a practically-orientated design assignment.

The examination and design assignment take place after completion of the course. Participants attending the course for non-degree purposes are welcome to write the exam and submit the assignment.

## Course Material

Reference material to be used during the lectures and tutorials will be distributed in the form of printed notes. Other reference material and background reading will be distributed electronically to all participants to the extent permitted by copyright.

***Applications close: 02 April 2018***

***Details of course content available on request***

**Enquiries Janine / Tsholo      Tel 021 808 2080      Email [civilcourses@sun.ac.za](mailto:civilcourses@sun.ac.za)**

# Foundation Design

*A Practical Perspective*



## REGISTRATION FORM

09 - 13 April 2018

Please note there is also an online registration process. Link will be sent once this form has been received

Title		Surname		Name	
Student No.	<i>(if applicable)</i>				
Company					
Address					
Meal preference (X)	(all food is halaal)	Vegan:	Vegetarian:	Other:	
Tel			Cell		
Fax			Your E-mail		
Invoice for attention:			Inv E-mail		

**Please read and sign below**

Cancellations will be accepted in writing and without penalty, up to 5 working days prior to commencement of the course. Participants cancelling in writing less than 5 working days prior to commencement of the course will be liable for a 50% cancellation fee. Following registration without attendance and without written cancellation, delegates will be held responsible for the full course cost.

**I HAVE READ AND AGREE TO THE CONDITIONS OF REGISTRATION AS STIPULATED ABOVE**

**SIGNATURE:** \_\_\_\_\_

**DATE:** \_\_\_\_\_



UNIVERSITEIT·STELLENBOSCH·UNIVERSITY  
jou kennisvennoot • your knowledge partner

## Department of Civil Engineering

### Foundation Design 811

## FOUNDATION DESIGN – A PRACTICAL PERSPECTIVE

A block release course over 5 days

**09 – 13 April 2018**

Presented by: Dr **Peter Day**,

Adjunct Professor of Geotechnical Engineering and Consultant, Jones & Wagener

**Registration: 09 April 08:00 – 08:30**

**PLEASE E-MAIL [civilcourses@sun.ac.za](mailto:civilcourses@sun.ac.za) SHOULD YOU WISH TO REGISTER**

**CLOSING DATE FOR REGISTRATIONS: 02 April 2018**

#### Course Objectives

This course is presented from the perspective of a practicing geotechnical engineer.

The objective of this course is to provide a practical understanding of:

- Extending the theories of bearing capacity and settlement as taught at undergraduate level to practical design of foundations
- Obtaining and selecting design parameters from site investigation data
- Selection of appropriate foundation types for various types of development and soil profiles
- Design of spread footings, piled foundations and raft foundations
- Principles of limit states design in geotechnical Engineering
- Applicable standards and statutory requirements.

#### Course Outcomes

At the end of the course, the participants should be able to:

- Define and specify site investigation requirements for types of development and soil conditions
- Select appropriate methods of design for common types of foundations
- Determine the load bearing capacity and settlement of foundations
- Better understand practical issues that need to be considered in foundation design
- Identify and conform to applicable standards and statutory requirements.

#### Course Assessment

The participants taking the course as part of their post-graduate studies will be assessed by means of a design assignment and a written examination as follows:

- Design assignment: 50%
- Examination: 50%

or an assignment only as elected by the delegates.

Both the design assignment and examination take place after completion of the course. Participants attending the course for non-degree purposes are welcome to write the exam and submit the assignment.

## Course Material

Reference material to be used to during the lectures and tutorials will be distributed in the form of printed notes. Other reference material and background reading will be distributed electronically to all participants to the extent permitted by copyright.

**Table 1: Course Content**

Topic	Subject matter
Foundation Types	<p>Types of foundations in common use in South Africa</p> <ul style="list-style-type: none"><li>• Spread footings</li><li>• Various types of piled foundations</li><li>• Raft foundations</li></ul> <p>Selection of appropriate foundation types for various developments and soil profiles</p>
Site Investigation and Soil Properties	<p>Soil, rock and groundwater</p> <ul style="list-style-type: none"><li>• Typical South African soil profile</li><li>• Soil types and characteristics</li><li>• Effect of climate on soils and rocks</li><li>• Description of soil profiles</li><li>• Problem soil types and their distribution</li><li>• Significance of water table and fluctuations thereof.</li></ul> <p>Site investigation</p> <ul style="list-style-type: none"><li>• Common methods of investigation</li><li>• Soil sampling for laboratory testing</li><li>• Common in-situ testing methods and their limitations</li><li>• Other field tests.</li></ul> <p>Determination of soil properties</p> <ul style="list-style-type: none"><li>• Soil properties relevant to various ground and foundation types</li><li>• Soil classification tests</li><li>• Soil characterisation tests</li><li>• Soil and rock strength</li><li>• Soil and rock compressibility.</li></ul> <p>Statutory requirements and applicable standards</p> <ul style="list-style-type: none"><li>• Housing projects (NHBC and National Building Regulations)</li><li>• Dolomites</li><li>• National standards</li><li>• Other standards.</li></ul> <p>Reference material</p> <ul style="list-style-type: none"><li>• Maps and other resources</li><li>• CGS database</li><li>• Essential references</li></ul>
Analysis and Design of Spread Footings	<p>Design approaches (WLD and LSD)</p> <p>Applicable codes and standards</p> <p>Bearing capacity of shallow foundations</p> <ul style="list-style-type: none"><li>• Review of design methods for drained and undrained soils</li><li>• Influence factors (shape, depth, load inclination)</li><li>• Load eccentricity</li></ul>

	<ul style="list-style-type: none"> <li>• Factors of safety for WLD</li> <li>• Determination of design parameters</li> <li>• Factors affecting bearing capacity</li> <li>• Design examples using WSD and LSD</li> </ul> <p>Settlement of spread footings</p> <ul style="list-style-type: none"> <li>• Components of settlement (elastic, consolidation, creep, collapse)</li> <li>• Review of consolidation settlement calculation methods</li> <li>• Basic elastic settlement calculations</li> <li>• Simplified methods</li> <li>• Creep settlement</li> <li>• Non-linear stress-strain behaviour of soils</li> <li>• Determination of stiffness parameters from laboratory, field and in situ tests</li> <li>• Design examples</li> </ul>
Basic design of raft foundations	<p>Typical applications of raft foundations</p> <p>Types of foundation rafts (slab on grade, stiffened rafts, waffle rafts)</p> <p>Design criteria for heave and collapse</p> <p>Lytton's method for heaving soils</p>
Deep Foundations	<p>Types of deep foundations and applications</p> <p>Deep spread footings</p> <p>Design of piled foundations</p> <ul style="list-style-type: none"> <li>• Load capacity of piles and pile groups</li> <li>• Settlement of single piles and pile groups</li> <li>• Laterally loaded piles</li> <li>• Basic concepts in pile group design</li> <li>• Reinforcement of piles</li> </ul>
Subgrade Reaction	<p>Modulus of subgrade reaction</p> <p>Beam on elastic foundation methods v analysis of elastic continua.</p>
Limit States Design using SANS 10160-5  Note: Overview only – covered by Course G04	<p>Bearing capacity</p> <p>Settlement</p> <p>Piles</p> <p>Selection of parameters</p>
Statutory Requirements and Applicable Standards	<ul style="list-style-type: none"> <li>• Township investigations (GFHS-2, SANS 634)</li> <li>• Dolomite investigations (SANS 1936-2, SANS 633)</li> <li>• Housing (NHBRC Home Building Manual)</li> <li>• National Building Regulations (SANS 10400A, B &amp; H)</li> <li>• Bases of Design (SANS 10160-1 and SANS 10160-5)</li> <li>• Construction Regulations</li> </ul>



UNIVERSITEIT·STELLENBOSCH·UNIVERSITY  
jou kennisvenoot • your knowledge partner

**REGISTRATION FORM**

**Foundation Design 811**

**FOUNDATION DESIGN – A PRACTICAL PERSPECTIVE**

A block release course over 5 days

**09 – 13 April 2018**

Title		Surname		Name	
<b>Student No.</b>	<i>(if applicable)</i>				
Company					
Address					
Tel			Cell		
Fax			Your E-mail		
Invoice for attention:			Inv E-mail		

**FEE: R5 000** (includes course notes)

**US registered students or course notes only: R1 000**

**Please read and sign below**

**“Cancellations will be accepted in writing and without penalty, up to 5 working days prior to commencement of the course. Participants cancelling in writing less than 5 working days prior to commencement of the course will be liable for a 50% cancellation fee. Following registration without attendance and without written cancellation, delegates will be held responsible for the full course cost.”**

I HAVE READ AND AGREE TO THE CONDITIONS OF REGISTRATION AS STIPULATED ABOVE

SIGNATURE .....

DATE: .....

Contact Person:

**Janine or Tsholo  
021 808 2080**

[jmyburghcivilcourses@sun.ac.za](mailto:jmyburghcivilcourses@sun.ac.za)

**Closing date for applications: 29 March 2018**