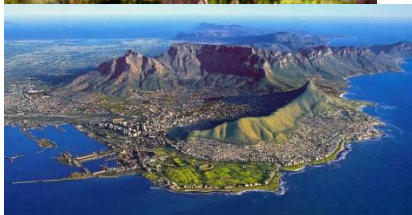
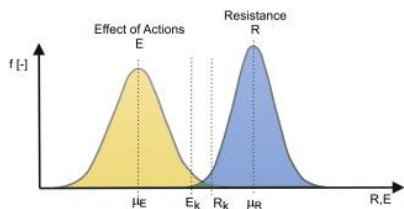


# Joint Committee on Structural Safety

## Continuing Education & Advanced School

### Structural Reliability and JCSS Probabilistic Model Code

04.04.2018 to 11.04.2018, Stellenbosch University, South Africa



## Increased interest in Risk and Reliability

Methods of reliability, risk and safety assessment are increasingly gaining importance as decision support tools in various fields of engineering. The JCSS Continuing Education & Advanced School is intended to be world leading in the field of risk analysis. A deep understanding of the fundamental principles of structural reliability is provided; application is foreseen to a number of realistic cases in practice. The Advanced School helps engineers to better play the important role they have for society in establishing the basis for decision making.

## JCSS

The JCSS is a committee in the field of Structural related Risk and Reliability, acting on behalf of the Liaison Committee of the following six international professional associations:

- CIB International Council for Research and Innovation in Building and Construction
- ECCS European Convention for Constructional Steelwork
- fib International Federation for Structural Concrete
- IABSE International Association for Bridge and Structural Engineering
- RILEM Reunion internationale des Laboratoires et Experts des Matériaux
- IASS International Association for Shell and Spatial Structures

The goals of the JCSS are:

- To improve the general knowledge and understanding within the fields of safety, risk, reliability and quality assurance, for all types of civil engineering and building structures, on the basis of sound scientific principles and with an open eye for the applications in practice.
- To take care that inter-associational pre-normative research in the field of Risk and Reliability is performed in an effective and adequate way
- To strive for coordination between the interassociational prenormative research and normalization activities in ISO, Eurocode etc.
- To provide appropriate support and technical co-ordination for the work of the Member Associations

## Advanced School description

The JCSS Continuing Education and Advanced School provides a deep and thorough insight in the latest developments in the concepts and tools for probabilistic structural reliability engineering and risk informed decision making.

## Who should attend?

Engineers directly involved in probabilistic structural analysis, design and reliability assessment, as well as engineering supervisors and managers responsible for such projects will benefit from this course.

The educational offers are also directed towards PhD students and academics working in the field of risk assessment of structures. Participants are expected to have a solid knowledge on basic probability theory and statistics, including necessary prerequisites on linear algebra, corresponding to the themes included in the course on statistics and probability theory. Moreover the participants should be trained in elementary structural analysis (static/dynamic).

## Learning methods and activities

Lectures, practical exercises and self-studies. Self-study assignments will typically consist of calculations that develop understanding of the materials presented in class. Participants will be made familiar with the state-of-the-art computational methods and software in this field.

## Evaluation and Diploma

Course diplomas are issued by the JCSS on the basis of an active course participation and a positive evaluation.

## Course materials

Course compendium, books, selected research reports and papers from journals and conferences.

## Course leaders and teachers

**Leaders:** Raphaël Steenbergen, Robby Caspeele, Celeste Viljoen

**Teachers:**

- Prof. A.C.W.M. Vrouwenvelder (TNO),
- Prof. J. D. Sørensen (Aalborg University),
- Prof. A. der Kiureghian (Berkeley; American University of Armenia),
- Prof. R. Caspeele (Ghent University),
- Prof. R.D.J.M. Steenbergen (TNO and Ghent University).

## Location

Stellenbosch University  
South Africa  
www.eng.sun.ac.za

## Course plan

**Start: 4 April 10.00 h**

**Finish: 11 April 12.00 h**

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### DAY 1 Wednesday 4 April

**Morning 10.00-12.00**

**Raphaël Steenbergen**

- Introduction
- Basic aspects of structural safety, safety formats and partial factors
- Life-cycle optimization and target reliabilities
- Probability theory, distribution types, extreme value distributions

**Afternoon 13.00-18.00**

**Robby Caspeeie**

- Time Independent Reliability Methods
- Level III calculations (numerical integration, various types of Monte Carlo)

Exercises

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### DAY 2 Thursday 5 April

**Morning 09.00-12.30**

**Robby Caspeeie**

- Time Independent Reliability Methods
- Level II calculations (FORM, SORM)
  - Simplified level II calculations

Exercises

**Afternoon 13.00-16.00**

**Ton Vrouwenvelder**

- Reliability analysis of structural systems
- Time Dependent Reliability Methods,
  - Ferry Borges-Castanheta model
  - Outcrossing approach

**16:00-17:00**

**Celeste Viljoen**

Case study introduction

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**DAY 3 Friday 6 April**

**Morning 09.00-12.30**

**Ton Vrouwenvelder**

- Resistance modeling, probabilistic model code
  - Concrete
  - Steel/Fatigue
  - Timber
- Fire
- Probabilistic modeling of deterioration

**Afternoon 13.00-17.00**

**Raphaël Steenberg**

- Loads, probabilistic model code
- Life loads
  - Impact loads
  - Wind loads
  - Snow loads
  - Traffic loads

Work on Cases

**Evening:**

**Course dinner at Wine Farm**



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**DAY 4 Saturday 7 April**

**Morning 09.00-12.30**

**John Sørensen**

- Level I calculations, partial factors, combination of actions

**Afternoon 13.00-17.00**

**John Sørensen**

- Code calibration

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**Sunday 8 April: Tour**

**Morning 07.30 – 13.00:**

*Optional activity (+70 euro):  
Trip to Grabouw – zipline  
through world heritage fynbos  
gorges. [capecanopytour.co.za](http://capecanopytour.co.za)  
Voted 2nd best new activity in the  
world by Lonely Planet (2015).*



**Afternoon 14.00 – 20.00:**

*Round trip to Cape Town:  
Table Mountain,  
V&A Waterfront,  
Chapmans Peak &  
Boulders Beach.*



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**DAY 5 Monday 9 April**

**Morning 08.30-12.00**

**Armen der Kiureghian**

Time Dependent System Reliability  
Methods, random vibrations

- Introduction to random processes
- Spectral analysis
- Time domain analysis

**Afternoon 13.00-15.00**

**Armen der Kiureghian**

- Probabilistic seismic hazard analysis
- Performance-based earthquake engineering

**15.00-17.30**

Presentation cases by the groups

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**DAY 6 Tuesday 10 April**

**Morning 09.00-12.30**

**Armen der Kiureghian**

Bayesian Parameter Estimation  
and Reliability Analysis Under  
Parameter and Model  
Uncertainties

**Afternoon 13.00-22.00**

13h30 – 15h00 Transfer to Aquila  
Game Reserve

16h00 – 22h00 Safari Game viewing  
drive, Buffet dinner, Star gazing and  
marshmallow roasting around the  
fire.



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**DAY 7 Wednesday 11 April**

*\*Optional early morning safari game viewing drive 06.00 – 08.00*

**Morning 09.00-12.00 Raphaël**

**Steenbergen, Robby Caspeeie**

- Safety assessment of existing structures
- Robustness analysis of structures

*Transfer back to Stellenbosch or  
Cape Town International Airport;  
If participant schedules allow take  
the scenic route around Montague,  
stop for wine tasting in Robertson.*

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## Laptop

Participants are kindly requested to bring their own laptop with MS Word and Excel installed. Exercises will be provided for which Excel is needed. Also small reliability programs will be provided on the spot to install.

## Catering

Coffee, snacks and lunches will be provided to the participants.

## Hotel

Hotel accommodation is not provided by the organization. Participants are kindly requested to arrange this themselves.

Book accommodation in Stellenbosch from Wednesday 4 April up to and including the night of Monday 9 April.

Accommodation for Tuesday night 10 April is provided at Aquila Safari Game Reserve and is included in the seminar fee.

## Fee

1950 Euro for regular participants and 950 Euro for PhD students.

This fee includes accommodation for Tuesday night 10 April at Aquila Safari Game Reserve, the course dinner and transfers.

## Discounts

The following discounts are offered to both regular participants and students, additive up to a maximum of 40%.

Early bird registration by 15w February 2018:	10 %
Delegates from developing countries:	20 %
2 <sup>nd</sup> delegate from a single organization:	10 %
3 <sup>rd</sup> delegate from a single organization:	20 %
4 <sup>th</sup> and additional delegates:	30 %



## **Registration**

For registration email your details to [jcss-school@matrisk.com](mailto:jcss-school@matrisk.com)

- Participants will receive a separate email with details regarding payment of the course fee.

Contact persons for enquiries

- General details: <https://jcsseducation.wordpress.com/>
- Payments: Matthias Schubert [jcss-school@matrisk.com](mailto:jcss-school@matrisk.com)
- Logistics (Stellenbosch): Janine Myburgh [civilcourses@sun.ac.za](mailto:civilcourses@sun.ac.za)
- Aquila Game Reserve (for booking of additional nights or companions):  
Elzanne Chambers [corporate@aquilasafari.com](mailto:corporate@aquilasafari.com)