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.
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 Materiaux
- **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 Kiureghan (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

<table>
<thead>
<tr>
<th>Start:</th>
<th>Finish:</th>
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<tr>
<td>4 April</td>
<td>11 April</td>
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<td>12.00 h</td>
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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 Caspeele  
- Time Independent Reliability Methods  
- Level III calculations (numerical integration, various types of Monte Carlo)

### DAY 2  Thursday 5 April

**Morning 09.00-12.30**  
Robby Caspeele  
- Time Independent Reliability Methods  
- Level II calculations (FORM, SORM)  
- Simplified level II calculations

**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
DAY 3  Friday 6 April
Morning 09.00-12.30
Ton Vrouwenvelder
• Resistance modeling, probabilistic model code
  o Concrete
  o Steel/Fatigue
  o Timber
• Fire
• Probabilistic modeling of deterioration

Afternoon 13.00-17.00
Raphaël Steenbergen
• Loads, probabilistic model code
  • Life loads
  • Impact loads
  • Wind loads
  • Snow loads
  • Traffic loads

Work on Cases

Evening:
Course dinner at Wine Farm

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
**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

**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
### 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.

### DAY 7  Wednesday 11 April

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

**Morning 09.00-12.00**  
Raphaël Steenbergen, Robby Caspeele  
- 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.
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\textsuperscript{nd} delegate from a single organization: 10 %
3\textsuperscript{rd} delegate from a single organization: 20 %
4\textsuperscript{th} and additional delegates: 30 %
Registration

For registration email your details to 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
- Logistics (Stellenbosch): Janine Myburgh civilcourses@sun.ac.za
- Aquila Game Reserve (for booking of additional nights or companions): Elzanne Chambers corporate@aquilasafari.com