## JCSS Continuing Education & Advanced School Structural Reliability and JCSS Probabilistic Model Code 31.08.2015 to 05.09.2015, Ghent University, Belgium

Organized by the Joint Committee on Structural Safety (JCSS): www.jcss.byg.dtu.dk

#### 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. In order to utilize these methods and to exploit their potential in industrial applications, an understanding of the fundamental principles is necessary. The Advanced School aims at educating engineers and researchers to work more efficiently in supporting decision makers and clients for a sustainable societal development.

#### **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 five 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

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

### JCSS 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. The advanced school consists of 3 courses: Probabilistic Modelling and Risk Analysis in Engineering; Structural Reliability and the JCSS Probabilistic Model Code; Risk Informed Decision Making and Decision Analysis. The 2<sup>nd</sup> course will take place in the summer of 2015:

Part 2: Structural Reliability and JCSS Probabilistic Model Code 31.08.2015 to 05.09.2015, Ghent University, Belgium

Price: 1800,00 € special price for PhD students: 450,00 €

#### **Benefits**

The participants benefit by becoming able to master the methods of reliability, risk and safety assessment for engineering projects. Furthermore, the participants can offer clients new services in the perspective of benefit and risk informed decision support.

#### Who should attend?

Engineers involved in probabilistic structural analysis, design and reliability assessment, as well as engineering supervisors and managers will benefit from this course. Further, PhD students and academics working in the field of structural risk assessment will profit from this course. Participants are expected to have basic knowledge on basic probability theory, statistics, linear algebra and elementary structural analysis (static/dynamic).

# **Information and course plan** Structural Reliability and JCSS Probabilistic Model Code

#### **Time and Location**

The course on Structural Reliability and JCSS Probabilistic Model Code will be held from 31.08.2015 to 05.09.2015. The course location is Ghent University, Belgium.

#### Learning methods and activities

Learning methods and activities comprise lectures, practical exercises and self-studies. Self-study assignments will typically consist of calculations that develop understanding of the materials presented in class. Participants should bring their own case study. 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 of the provided material by the participant.

#### **Course materials**

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

#### Lecturers

A. Der Kiureghian Professor of Civil Engineering, University of California, Berkeley, USA

A.C.W.M. Vrouwenvelder TNO Department Structural Reliability, Emeritus Professor TU Delft The Netherlands

J. D. Sørensen Professor, Department of Civil Engineering Aalborg University, Denmark

R.D.J.M. Steenbergen TNO Department Structural Reliability, Visiting Professor Ghent University The Netherlands / Belgium

R. Caspeele Professor of Structural Reliability, Ghent University, Belgium

#### **Costs and registration**

The price is 1800,00 € per participant and includes lecture materials. Food and drinks between the lectures are provided. A special reduced price of 450,00 € is foreseen for PhD students. **Registration is required via e-mail to R.D.J.M. Steenbergen (raphael.steenbergen@tno.nl) until 15.06.2015.** 

### Course plan

DAY 1	
Morning	Afternoon
<ul> <li>Basic aspects of structural safety, safety formats and partial factors</li> <li>Life-cycle optimization and target reliabilities</li> </ul>	<ul> <li>Time Independent Reliability Methods</li> <li>Level III calculations (numerical integration, Monte Carlo)</li> <li>Level II calculations (FORM, SORM)</li> </ul>

Afternoon
Time Independent System Reliability Methods
Stochastic Finite Element Method
<u>Case studies</u>

DAY 3	
Morning	Afternoon
Time Dependent System Reliability Methods, random vibrations	Time Dependent System Reliability Methods, static analysis
Spectral analysis	Outcrossing Approach
Response spectra of linear systems	Ferry Borges-Castanheta
Response spectra of non-linear systems	Implementation in Codes
Finite Element Methods (FEM)	
Time domain analysis	

DAY 4	
Morning	Afternoon
Codes	
<ul> <li>Level I calculations, partial factors,</li> </ul>	
combination of actions	<u>Case studies</u>
Code calibration	

DAY 5	
Morning	Afternoon
Seismic risk analysis	Wind load
	Snow Load
Case studies	<u>Case studies</u>

DAY 6	
Morning	Afternoon
Loads:	Resistance modeling
Life loads	o Concrete
Impact loads	<ul> <li>Steel/Fatigue</li> </ul>
Traffic loads	o Timber
• Fire	Probabilistic modeling of deterioration
<ul> <li>Safety assessment of existing structures</li> </ul>	Robustness of structures