

JCSS Continuing Education & Advanced School

Structural Reliability and Probabilistic Model Code

Organized by the Joint Committee on Structural Safety (JCSS): www.jcss.byg.dtu.dk and PAO Techniek en Management.

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, a deep understanding of the fundamental principles is necessary. 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 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:

- Part 1: Probabilistic Modelling and Risk Analysis in Engineering
- Part 2: Structural Reliability and the JCSS Probabilistic Model Code (this course)
- Part 3: Risk Informed Decision Making and Decision Analysis

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 27.01.2025 to 31.01.2025. The course location is Delft, The Netherlands. The course will be co-organised by the JCSS and the Dutch Organisation for Post Academic Education PAO Techniek and Management.

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 PAO and 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.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

J. Köhler
Professor NTNU, Trondheim

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

P. Franchin (teams)
Structural Design and Earthquake Engineering, Sapienza University of Rome
Italy

N. Meinen
University of Southern Denmark | SDU · Faculty of Engineering
Denmark

C. Caprani (teams)
Monash University, Melbourne,

Australia

Costs and registration

The price is 2600,00 € per participant and includes lecture materials. Food and drinks between the lectures are provided. A special reduced price of 650,00 € is foreseen for PhD students. Registration is required via e-mail to PAO: N.Friedeman@paotm.nl.

Course plan

DAY 1 27-01-2025	
Morning: Raphael Steenbergen, Nadieh Meinen	Afternoon: Jochen Köhler
<ul style="list-style-type: none"> • Basic aspects of structural safety, safety formats and partial factors • Life-cycle optimization and target reliabilities 	Target reliability and design for sustainability
DAY 2 28-01-2025	
Morning: Robby Caspeepe	Afternoon 1: Ton Vrouwenvelder
Time Independent Reliability Methods <ul style="list-style-type: none"> • Level III calculations (numerical integration, Monte Carlo) • Level II calculations (FORM, SORM) <u>Case studies (Rein de Vries)</u>	Time Dependent Reliability Methods <ul style="list-style-type: none"> • Outcrossing Approach • Ferry Borges-Castanheta • Implementation in Codes <u>Case studies (Rein de Vries)</u>
	Afternoon 2: Raphael Steenbergen, Nadieh Meinen
	Time Independent System Reliability Methods <ul style="list-style-type: none"> • Parallel systems • Series systems • Combined systems
DAY 3 29-01-2025	
Morning Raphael Steenbergen, Colin Caprani (teams)	Afternoon Robby Caspeepe
Probabilistic description loads <ul style="list-style-type: none"> • Wind load • Snow Load • Life loads • Impact loads • Traffic loads 	<ul style="list-style-type: none"> • Resistance modeling <ul style="list-style-type: none"> ○ Concrete ○ Steel ○ Timber • Probabilistic modeling of deterioration
DAY 4 30-01-2025	
Morning John Sorensen	Afternoon John Sorensen, Colin Caprani (teams)
<ul style="list-style-type: none"> • Level I calculations, partial factors, combination of actions 	Code calibration
DAY 5 31-01-2025	
Morning Robby Caspeepe, Raphael Steenbergen	Afternoon 1 Ton Vrouwenvelder
<ul style="list-style-type: none"> • Safety Assessment of Existing Structures 	Time Dependent System Reliability Methods, random vibrations <ul style="list-style-type: none"> • Spectral analysis • Response spectra of linear systems • Response spectra of non-linear systems
	Afternoon 2 Paolo Franchin (teams)
	Probabilistic seismic risk analysis