OPTIMIZATION UNDER UNCERTAINTY: THEORETICAL INSIGHTS AND ENGINEERING APPLICATIONS

Overview

Optimization under uncertainty (OUU) is a framework that gives robust design solutions of practical problems considering variability in the design parameters of interests, like material/section properties, loading, and boundary conditions. This course gives an overview of structural optimization and uncertainty quantification (UQ) to address different philosophies to deal with optimization under uncertainty. In presence of uncertainty, the gradient based optimization formulations usually fail to provide feasible optimal solution in the design domain. The focus of this course is on introducing unbaised gradient estimator and stochastic simulation-based algorithms. The primary idea here is to have the theory and background in the lectures, and then, apply it to academic/practical problems in the tutorials. Application will stem from wide range of large-scale structural engineering problems (transmission towers, bridges) considering uncertainty in wind and earthquake loads.

Dates	**30 October to 10 November, 2023**
Place	**Department of Civil Engineering, National Institute of Technology Silchar, Assam, India**
Modules	A: Unconstrained and Constrained Optimization Problems, Multiobjective Optimization Problems, Computational Implementation: Oct 30 - Nov 01 B: Uncertainty Quantification, Reliability Analysis, Numerical Simulation: Nov 02 - Nov 06 C: Optimization under Uncertainty, Reliability-based Optimization, Risk Optimization, Problem Solving Sessions: Nov 07 - Nov 10
Who can attend	I) Students at all levels (BTech/MSc/MTech/PhD), both undergraduate as well as postgraduate of NIT Silchar and other technical institutions. ii) Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry/ Research Organizations: Rs. 10000** **Academic Institutions: Rs.5000(Faculty)|Rs.1000 (Students)** **NIT Silchar: Rs. 500 (PhD & PG) | NIL (UG)** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants may be provided with accommodation on payment basis.
Benefits from the courses	I) Participants will learn the concepts of optimization under uncertainty framework and uncertainty quantification in practical engineering problems. ii) Participants will develop and implement learning algorithms for optimization, uncertainty quantification and reliability analysis under OUU framework iii) Participants will able to interpret and analyze the properties of optimization/UQ algorithms iv) Participants will perform OUU study for large-scale structural engineering problems and report on their findings

The Faculty

Rafael Holdorf Lopez is a Professor in the Department of Civil Engineering at the Federal University of Santa Catarina (UFSC), Brazil, since 2011. He obtained his undergraduate degree in Civil Engineering from the Universidade Tecnológica Federal do Paraná (Brazil), in 2006, and received his PhD in Mechanical Engineering from the Institut National des Sciences Appliquées de Rouen (France) in 2010. In 2012, Dr. Lopez founded the Center for Optimization and Reliability in Engineering (CORE) of UFSC, which nowadays is comprised by 6 full professors and over 20 full time graduate students. Currently, Dr. Lopez has a Level 2 CNPq Researcher Fellowship and conducts research on the development of algorithms for engineering optimization and optimization under uncertainty, reliability and uncertainty quantification, with applications to structural systems. With cooperation of the Brazilian industry, he develops R&D projects sponsored by the Brazilian Road Department (DNIT) and the Energy Company of Paraná (COPEL). Dr. Lopez has published over 50 papers in international journals, and currently has under his supervision 5 PhD candidates and 5 master students.

Subhrajit Dutta is an Assistant Professor in the Department of Civil Engineering at National Institute of Technology Silchar. He completed his PhD in Civil Engineering from Indian Institute of Technology Bombay in 2017, where he was a recipient of the MHRD (GoI) scholarship for Graduate study. Subhrajit received his Bachelor of Technology degree in Civil Engineering from National Institute of Technology Silchar in 2010. He was working as an Assistant Professor in NIT Meghalaya after his PhD, and joined his position at NIT Silchar in June, 2018. Subhrajit's research group (Risk & Uncertainty Group) is currently working in the domain of computational science and engineering towards achieving few sustainable development and goals.Subhrajit is the Associate Editor of Practice Periodical on Structural Design and Construction, ASCE and the Guest Editor for ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering, and Remote Sensing, MDPI.

Course Co-ordinator

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Registration Guidelines (Step-by-Step):

1. First, 'web register' at GIAN 'Courses Registration Portal': http://www.gian.iitkgp.ac.in/GREGN/index by paying the requisite fees in the GIAN portal. If you're already registered, skip this step.

2. Then, log in, click 'Course Registration' tab on the GIAN Portal, and 'check box' to select this course **(#191031L02) "Optimization under Uncertainty: Theoretical Insights and Engineering Applications"** from the list. Click 'save' to register, and 'Confirm Course(s)' to confirm.

3. Now, pay the requisite Course Fee online in favour of the Director, NIT Silchar, A/C No: 10521277057, IFSC Code: SBIN0007061, MICR Code: 788002004. OR You can obtain DD in favour of Director NIT Silchar, Assam, India. Keep the payment info (DD details, transaction # & date) handy. You'll need this during the next step. Also, please retain the receipt for on-spot submission.

4. Next, fill out the Registration form given below, sign it. Send the scan copy of the filled in form with scanned copy of course fee transaction slip/DD to the course coordinator e-mail address (`subhrajit.nits@gmail.com` or `subhrajit.dutta@civil.nits.ac.in`). This is for the Course Coordinator's record. Now, await the Course Coordinator's confirmation.

P.S: Registering on the GIAN portal does not guarantee participation in the course. Please do not confuse with web registration with course registration. You might have been 'shortlisted' after paying the 500/-, but your selection is subject to paying the requisite course fee to NIT. For successful enrolment, make sure you've made both the payments. Number of participants for the course is limited to 50, and the registration will be open till the seats are filled. For queries and clarifications, write to the Course Coordinator at: `subhrajit.nits@gmail.com` or `subhrajit.dutta@civil.nits.ac.in`.

GIAN: Global Initiative of Academic Network

Name of the course: Optimization under Uncertainty: Theoretical Insights and Engineering Applications

(Course ID: 191031L02)

Dates: 30 Oct – 10 Nov, 2023

Department of Civil Engineering, NIT Silchar, Assam, India

REGISTRATION FORM

GIAN Portal Application Number:

Full Name: Category (Industry/Academic/Student):

Organization:

Address:

Email Id:

Mobile Number:

Highest Academic qualification:

Payment option and details:

a. **Demand draft:**

Draft No.	Bank	Date	Amount

b. **Online transaction**

Transaction Id/Ref No	Bank	Date	Amount

Accommodation Required: Yes/No (please tick in the applicable field)

Date:

Place:

Signature of Applicant