



3D Printing in Geoscience and Engineering: Emerging Technology in Education, Research, and Communication

Instructors: Sergey Ishutov, Kevin Hodder, Rick Chalaturnyk, University of Alberta

Post-Meeting Course– 1 Day: Thursday May 14, 2020

Course Outline:

The course is designed to introduce 3D printing and its application to accommodate a broad range of participant groups. Therefore, it is divided into several modules. The introductory module represents an overview of 3D printing techniques and methods. The interactive module allows participants to acquire skills in CAD modeling of 3D objects. In addition, we will hold virtual lab tours through GeoPrint facilities where participants can take advantage of watching the 3D printing process in real time and learn about experiments with 3D-printed models. The last module is aimed at gaining hands-on experience with 3D-printed models manufactured in various materials and discussing specific applications of 3D printing in geomechanics, porous media, and geomorphology.

Course Objectives:

- Understand capabilities and limitations of different 3D printing techniques;
- Demonstrate how to digitally design 3D-printable models using CAD software, web platforms, and computed tomography data;
- Provide the assessment of digital models and their relative replicas 3D-printed from geoscience data;
- Characterize how 3D printing can increase the effectiveness of data communication;
- Apply 3D printing in current or future research, teaching, and communication.

Who Should Attend:

This course can be beneficial for geologists, petrophysicists, stratigraphers, geophysicists, geomorphologists, reservoir and geomechanical engineers, and geomodelers. It is also useful for students, postdoctoral fellows, and professors interested in current advances of 3D printing in research and teaching. In addition, managers and stakeholders can learn the application of 3D printing in a technical communication. No specific skills or prior knowledge of CAD modeling and 3D printing are required, because the course level is foundation.

*Meeting registration is **NOT** required to sign-up for this course*

Registration Rates: (rates do not include GST)

- Early-bird CSPG member rate: \$575
- Early-bird non-member rate: \$775
- CSPG Student rate: \$475

Early Bird Ends: **April 23, 2020**

- CSPG Member rate: \$775
- Non-member rate: \$975

Registration Close: **May 7, 2020**

CPD: 7.5

Registration includes: Coffee breaks & lunch. Each registrant will be entered to win a 3D Printer! Draw to take place at end of course.

Computer requirements: This course requires a laptop. Each participant needs to pre-download the software Meshmixer.com) and create a free account at Autodesk Tinkercad (Tinkercad.com).

Time: 9:00am-4:30pm

Location: geoLOGIC systems Classroom, +15 level Aquitaine Tower, 540-5 avenue, Calgary



About the Instructors



Dr. Sergey Ishutov is currently a postdoctoral fellow with [RG]2 - at the University of Alberta. He earned a PhD in geology at Iowa State University, with a specialization in 3D printing geological models. He has received MSc in geology from California State University Long Beach and BSc in petroleum geology from the University of Aberdeen in Scotland. Dr. Ishutov received multiple awards and research grants from American Association of Petroleum Geologists, Geological Society of America, and the Society for Petroleum Engineers as well as industry grants for research in 3D printing porous media. Having a work experience with ExxonMobil, Aramco, Shell, and Oxy, Dr. Ishutov is one of the world pioneers in integrating 3D printing for reproduction of porous rock models and publishing this research in geoscience journals..



Dr. Kevin Hodder is currently a postdoctoral fellow with [RG]2, while also holding a position as an adjunct professor in Chemical and Materials Engineering. He earned a PhD in Materials Engineering at the University of Alberta, studying the microstructure and mechanical properties of 3D-printed rock from sand. Dr. Hodder is one of the very few researchers in the world who has expertise in silica sand printing for geomechanical experiments and sand casting. With almost 10 years of experience working with 3D printers, Dr. Hodder has collaborated with many institutions and companies such as the University of Queensland, The Royal Military Academy in Belgium, and Norwood Foundry. Prior to academia, Dr. Hodder spent several years in the oil and gas sector performing research and development for Packers Plus Energy Services.



Dr. Rick Chalaturnyk is a Professor of Geotechnical Engineering at the University of Alberta and has held the Energi Simulation Chair in Reservoir Geomechanics as well as the AITF Industry Chair in Reservoir Geomechanics for Unconventional Resources over the past 5 years. Academically and professionally, Dr. Chalaturnyk has applied geomechanics principles to improve our understanding of how hydrocarbon reservoirs behave and ensure that these resources are recovered in a safe, economic, and environmentally sustainable manner. He has created [RG]2, working primarily in the area of unconventional resource geomechanics and the geological storage of CO₂ and has established four unique Geoinnovation Environments: the Geomechanical Reservoir Experimental Facility (GeoREF); the Geotechnical Centrifuge Experimental Research Facility (GeoCERF); 3D Printing of Geological Media for Reservoir Geomechanics (GeoPRINT); and the Geomechanical Reservoir Modelling Technology platform (GeoRMT).