

## Fundamentals of Tailings Geotechnics

*(English-Spanish Simultaneous Interpretation will be available for this course)*

**When:** Tuesday July, 5<sup>th</sup> 2.00pm-6.00pm EDT

**Presenter(s):** Jorge Macedo, Assistant Professor, Georgia Institute of Technology

Chris Bareither, Associate Professor, Colorado State University

Jonathan Bray, Professor, University of California Berkeley

Scott Olson, Professor, University of Illinois at Urbana Champaign

**Language:** English

**Length:** 4 hours (Expected)

**Description:** This course discusses fundamental and applied concepts of tailings geotechnics, emphasizing their role in the design, construction, and operation of tailings storage facilities. The course will discuss general aspects of tailings engineering, fundamentals of static liquefaction, characterization of mine tailings at different scales (i.e., laboratory, field), and seismic design aspects of tailings storage facilities. The course aims to provide the participants with fundamental tailings geotechnics concepts needed to engage in conversations, projects, and subsequent learning opportunities on mine tailings geotechnics. This course is expected to be beneficial for civil and environmental engineers, geological engineers, geotechnical engineers, tailings engineers, mining engineers, risk managers, and other consulting engineers with interest in mine tailing.

### CONTENT AND PROGRAMME

13:45 - 14:00	Welcome and Introduction to the Course	Course Coordinator
14:00 - 14:50	Introduction to tailings engineering	Chris Bareither
14:50 - 15:00	Questions and discussion Lecture 1	
15:00 - 15:50	Fundamentals of static liquefaction in tailings storage facilities	Jorge Macedo

15:50 - 16:00	Questions and discussion Lecture 2	
16:00 - 16:50	Field and laboratory assessment of undrained behavior of tailings	Scott Olson
16:50 - 17:00	Questions and discussion Lecture 3	
17:00-17:50	Seismic response of tailings storage facilities	Jonathan Bray
17:50:18:00	Questions and discussion Lecture 4	
18:00 - 18:10	Conclusions and Closure of the Course	Course Coordinator

## TECHNICAL BACKGROUND

A general background in geotechnical engineering.

## GENERAL OBJECTIVES

- Introduce attendees to general aspects of tailings engineering with a focus on the geotechnical aspects.
- Introduce attendees to the mechanical characterization of mine tailings to evaluate phenomena such as static liquefaction.
- Introduce attendees to the characterization of mine tailings at different scales (Laboratory, field))
- Introduce attendees to the practices to assess the seismic performance of tailings storage facilities
- Illustrate the role of tailings geotechnics in the design, management, and closure of tailings storage facilities.

## LECTURER(S) BIO

### Jorge Macedo

Jorge Macedo, Ph.D., P.E. is an Assistant Professor in the School of Civil and Environmental Engineering at the Georgia Institute of Technology in Atlanta, Georgia, USA. Dr. Macedo received B.S (2007) and M.S (2011) degrees in civil engineering and soil mechanics, respectively, from the Peruvian National University of Engineering and M.S. and Ph.D. degrees in Geoengineering in 2014 and 2017 from the Department of Civil & Environmental Engineering at the University of California Berkeley. Before joining UC Berkeley, Dr. Macedo practiced for six years as a geotechnical engineer

working on a range of challenging geotechnical and geo-environmental multi-disciplinary projects for the mining sector. He worked on major mining projects in Peru, Argentina, and Brazil, from conception to detailed engineering design.

Dr. Macedo has expertise in the areas of Mining Geotechnics, Geotechnical earthquake engineering, advanced numerical modeling of geotechnical systems, performance-based design and risk assessment, and assessment and mitigation of seismically-induced hazards. Dr. Macedo's research combines performance-based engineering and data science tools with advanced numerical modeling (e.g., FEM, FDM, MPM) to support the implementation of risk and hazard assessment in geo-hazards engineering, which can lead to a more sustainable design of geotechnical systems.

### **Christopher Bareither**

Dr. Bareither is an Associate Professor of Civil and Environmental Engineering at Colorado State University. His expertise is in Geotechnical and Geoenvironmental Engineering. His education is all within the field of Geological Engineering; he received a BS from University of Idaho (2004) and MS (2006) and PhD (2010) from University of Wisconsin-Madison.

Dr. Bareither conducts research and teaches undergraduate and graduate courses in Geotechnical and Geoenvironmental Engineering. In addition, he is faculty adviser to the CSU chapter of Engineers Without Borders that is actively engaged in engineering challenges for developing communities, and is a licensed Professional Engineer in the state of Colorado.

### **Jonathan Bray**

Jonathan Bray is the Faculty Chair in Earthquake Engineering Excellence at the University of California, Berkeley. He earned engineering degrees from West Point, Stanford, and Berkeley. Dr. Bray is a registered professional civil engineer and has served as a consultant on several important engineering projects and peer review panels. He has authored more than 350 research publications. His expertise includes the seismic performance of earth structures, seismic site response, liquefaction and ground failure and its effects on structures, earthquake fault rupture propagation, and post-event reconnaissance. Dr. Bray was elected into the US National Academy of Engineering and is a Fellow in ASCE. He has received several other honors, including the Terzaghi Award, Ishihara Lecture, Peck Award, Joyner Lecture, Prakash Award, Huber Research Prize, Packard Foundation Fellowship, and NSF Presidential Young Investigator Award.

### **Scott Olson**

Scott M. Olson, Ph.D., P.E. is a Professor and Faculty Excellence Scholar in the Civil & Environmental Engineering Department at the University of Illinois, where he joined the faculty in 2004. Prior to joining the University of Illinois, Scott worked in practice for nearly 8 years for Woodward-Clyde Consultants and URS Corporation on infrastructure, energy, and mining projects worldwide. Prof.

Olson has researched static and seismic liquefaction for over 25 years, and has been involved in dozens of research and consulting projects involving geotechnical earthquake engineering; tailings dam engineering; in situ, laboratory, and centrifuge testing, soil-foundation-structure interaction; and paleoliquefaction and geohazards analysis. From these activities, Scott has published over 150 journal papers, conference articles, and reports and has received numerous awards, including the ASCE Walter L. Huber Civil Engineering Research Prize and the Canadian Geotechnical Society R.M. Quigley Award. Prof. Olson serves in various capacities for the Geo-Institute, USUCGER, EERI, the Transportation Research Board (TRB), and the Geotechnical Extreme Event Reconnaissance (GEER) Association. Most recently, he became a founding member of the U.S.-based Tailings and Industrial Waste Engineering (TAILENG) Center.