COLORADOSCHOOLOFMINES.
E A R T H ● E N E R G Y ● E N V I R O N M E N T

Course Code: **21MN1150A5: TSF Operation and Governance**
Semester Year: June 7 - 18, 2021
Class Meeting Times: MTWTh 4 pm (MDT, Denver time)
Class Location: Zoom and Canvas

Instructors:
  Mike Henderson, BGC and Mines Email: mhenderson@mines.edu or mhenderson@bgcengineering.ca
  Christopher Hatton, Golder Email: Christopher_Hatton@golder.com
Course Coordinator: Priscilla P. Nelson **Email:** pnelson@mines.edu
Cell Phone: 303-810-7875
Zoom link: https://mines.zoom.us/j/9404323929

Pre-requisites: Interest in Mining and Tailings Management

Required Technology: e.g., Canvas, computer and camera, Zoom

Profile in Canvas:
As part of the learning experience at the Colorado School of Mines, our class will be utilizing online learning resources and experiences through the Canvas learning management system. In order to help build community in this online learning environment, you are encouraged to upload your profile picture to Canvas.

Welcome to 21MN1150A5: TSF Operation and Governance
  This course that is focused on tailings storage facility (TSF) operation and governance. The course is coordinated by Dr. Priscilla Nelson (pnelson@mines.edu) and any questions or problems should be directed to her. The course is developed to provide a knowledge framework for you in TSF operations and governance, and the instructors are all chosen for their extensive and practical experience in the topics covered.

Course Topics:
  Lecture 1 – Introduction, Mike Henderson
    • Understanding and managing risk
    • Risks in tailings systems
    • Management systems – company and Project Management
    • Discuss roles, responsibilities
    • Review processes (QA/QC)
    • Understanding waste management with multiple stakeholders

  Lecture 2 – MAC and CDA, Charles Dumaresq
    • High-level review of MAC and CDA guidelines, including the development and current status of each
    • Discussion of how MAC guidelines are being applied

Lecture 3 – Global Industry Tailings Standard, Mike Henderson and Christopher Hatton
- Overview of the recently released:
  - Global Industry Standard for Tailing Management
  - Tailings Management: Good practice guide
  - Tailings Management: Good practice guide and performance protocol

Lecture 4 - OMS and EAP's, Christopher Hatton
- Operating a tailings facility and inventory of resources.
- Steps to develop an OMS
- Develop and practicing EAP's
- Continuous improvement

Lecture 5 – Soft Skills, Christopher Hatton
- Observational approach
- Operational considerations
- Interactions, bridging the gap, and working with operators
- Emotional IQ basics
- Developing and mentoring staff

Lecture 6 – Corporate Governance
- Plan, Do Check, Act framework practically applied
- Operational experience and challenges
- Prioritization based on risk management
- Partnering with EoRs
- Experience; what has worked well and what not
- GISTM planning challenges faced with existing programs
- Experiences developing a stewardship program.

Learning Outcomes
After completing this course, you will be able to:
- Understand the tailing dam design process and what is meant by the "observational approach."
- Obtain an overview of the project management aspects of tailings construction, including managing construction contractors, resident engineering, quality assurance and quality control, and documentation
- Understand the standards of care with regards to operating a tailings facility
- Manage development and implementation of an OMS (Operation, Maintenance and Surveillance) systems
- Manage the process of developing EAP (Emergency Action Plans; called Emergency Preparedness and Response Plans in the Global Industry Standard
- Understand the internal and external review processes and how they are implemented
- Understand the options and necessity of monitoring systems
- Gain an understanding of applicable international standards of care, including the Global Tailings Standard, the Mining Association of Canada (MAC) guidelines, The Canadian Dam Association (CDA) guidelines and other related references

- Understand how mining companies generally set up internal standards related to tailings facilities

Course Online Format:

15 to 20 total hours over a 2-week period
Activities:

- Assigned readings and interactive group discussions (2 each week, 4 hours total for discussion contributions including peer responses, time for readings not included)
- Synchronous 60 minute lectures + Q&A (with posted asynchronous recording access) incorporating case studies and polling (3 each week, 6 hours total)
- Live Expert Panels on THURSDAYS (90 minutes, 1 each week, 3 hours total) for discussion of discussions and Q&A, synchronous and recorded/posted.
- Assessments (1 each week, 2 hours total) through discussions, assigned essays on assigned topics, multiple choice and short answer questions.

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Note: Open Discussion sessions will be scheduled during the week				
	Assigned Reading 1 (related to Discussion 1).	Upload your "Let's get to Know Each Other" video	Assigned Reading 2 (related to Discussion 2).		Week Reflection Assessment (file upload through Canvas)
	Discussion 1 (on Canvas, text input)		Discussion 2 (on Canvas, text input)		Halfway course survey
	4 pm Lecture	4 pm Lecture	4 pm Lecture	4:00 to 5:30 pm Panel Discussion	Assessment 1 due
Week 2	Note: Open Discussion sessions will be scheduled during the week				
	8 am Assigned Reading 3 (related to Discussion 3).		Assigned Reading 4 (related to Discussion 4).		Week Reflection Assessment (file upload through Canvas)
	Discussion 3 (on Canvas, text input)		Discussion 4 (on Canvas, text input)		End of course survey
	4 pm Lecture	4 pm Lecture	4 pm Lecture	4:00 to 5:30 pm Panel Discussion	Assessment 2 due

Assessments:

The assessments for this course include the following:

1. Participation in Q&A for lectures and panel/round tables
2. Contributions to discussions related to lectures and readings
3. Completion of the reflective assessments on Friday at the end of each week

Required Text: no required text. Assigned readings will be provided.

Additional Suggested References will be provided.

Oredigger Promise: We Climb Together – you are now an Oredigger – meaning that you are part of the community of the Colorado School of Mines (Mines) and the Tailings Center (TC) of Mines, Colorado State University, and the University of Arizona.

Orediggers and TC colleagues climb together. Orediggers and TC colleagues look out for each other. We take great pride in being associated with three top engineering and applied sciences universities.

Therefore, as a member of the Oredigger and TC communities, we expect that you have promised to support classmates and colleagues, and:
- Be positive and gracious when others provide safety reminders and suggestions.
- Be attentive and helpful to anyone around who may be in need of support.

Expectations of online etiquette or netiquette:
Here are few do's and don'ts about communicating in your course through emails or in online discussion forums:

- **Do…**
  o Ask questions and engage in conversations as often as possible—feel free to contact the instructor via the discussion forum for questions or via email or other communication.
  o Be patient and respectful of others and their ideas and opinions they post online.
  o Remember to be thoughtful and use professional language. Keep in mind that things often come across differently in written text, so review your writing before posting.
  o Be prepared for some delays in response time, as "virtual" communication tends to be slower than "face-to-face" communication.
  o Contact the instructor if you feel that inappropriate content or behavior has occurred as part of the course.
  o Check the syllabus and course policies stated by your instructor to know what to expect about your instructor's turnaround time for responding.

- **Do NOT…**
  o Use inappropriate language—this includes, but is not limited to, the use of curse words, swearing, or language that is derogatory.
  o Post inappropriate materials—for example, accidentally posting/showing a picture that is not appropriate for the course content.
  o Post in ALL CAPS, as this is perceived as shouting and avoid abbreviations and informal language ("I'll C U L8R").
  o Send heated messages even if you are provoked. Likewise, if you should happen to receive a heated message, do not respond to it.
  o Send an email or post to the entire class, unless you feel that everyone must read it.

Diversity and Inclusion:
At Colorado School of Mines and at TC universities, we understand that a diverse and inclusive learning environment inspires creativity and innovation, which are essential to the engineering process. We also know that in order to address current and emerging national and global challenges, it is important to learn with and from people who have different backgrounds, thoughts, and experiences.

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Our students represent the U. S., and many countries around the world, and we continue to make progress in the areas of diversity and inclusion by providing Diversity and Inclusion programs and services to support these efforts.

Disability Support Services:
The Colorado School of Mines is committed to ensuring the full participation of all students in its programs, including students with disabilities. If you anticipate or experience any barriers to learning in this course, please feel welcome to discuss your concerns with me. Students with disabilities may also wish to contact Disability Support Services (DSS) to discuss options to removing barriers in this course, including how to register and request official accommodations. Please visit their website at disabilities.mines.edu for contact and additional information.

Accessibility within Canvas:
Read the Accessibility Statement from Canvas to see how the learning management system at the Colorado School of Mines is committed to providing a system that is usable by everyone. The Canvas platform was built using the most modern HTML and CSS technologies, and is committed to W3C's Web Accessibility Initiative and Section 508 guidelines.

Discrimination, Harassment, and Title IX:
All learning opportunities at Mines, including this course, require a safe environment for everyone to be productive and able to share and learn without fear of discrimination or harassment. Mines' core values of respect, diversity, compassion, and collaboration will be honored in this course, and the standards in this class are the same as those expected in any professional work environment. (More information can be found here.) Discrimination or harassment of any type will not be tolerated. As a participant in this course, we expect you to respect your instructor and your classmates. As your instructor, it is my responsibility to foster a learning environment that supports diversity of thoughts, perspectives and experiences, and honors your identities. To help accomplish this:
- Course rosters are provided to the instructor with the student's legal name. I will honor your request to address you by a preferred name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.
- If something is said or done in this course (by anyone, including myself) that made you or others feel uncomfortable, or if your performance in the course is being impacted by your experiences outside of the course, please report it to:
  - PPN (the course coordinator), or
  - Speak Up (https://www.mines.edu/speak-up/) - Anonymous Option

In this course, we will cultivate a community that supports survivors, prevents interpersonal violence, and promotes a harassment free environment. Title IX and Colorado State law protects individuals from discrimination based on sex and gender in educational programs and activities. Mines takes this obligation seriously and is committed to providing a campus community free from gender and sex-based discrimination. Discrimination, including sexual harassment, sexual violence, dating violence, domestic violence, and stalking, is prohibited and will not be tolerated within the Mines campus community. If these issues have affected you or someone you know, you can access the appropriate resources here: http://www.mines.edu/title-ix/. You can also contact the Mines Title IX Coordinator, Camille Torres, at 303.384.2124 or titleix@mines.edu for more information.

It's on us, all of the Mines and TC communities, to engineer a culture of respect.

If you feel overwhelmed, anxious, depressed, distressed, mentally or physically unhealthy, or concerned about your wellbeing overall, there are resources both on- and off-campus available to you. If you need assistance, please ask for help from the course coordinator or instructor.

If you are sick and can't come to class, need to isolate due to exposure, or care for a sick family member, you should notify the course developer or the course instructor as early as possible so arrangements can be made for remote accommodations and/or to make up missed coursework or assignments as needed.

Policy on Academic Integrity/Misconduct: Do Your Own Work!!!!!!!!!!!

The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining an fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student's academic achievements, and giving credence to the university's educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

Grading Policy

No grades will be assigned for this course, but a certificate of completion will be sent to you on completion of the course requirements (attending lectures, contributing to discussions, completing readings, and submission on the assignments by 5 pm Denver time on Friday of each course week).

On completion of all six short courses in this series, a student will be awarded a Certificate of Completion of the

Expectations for Participation

You are expected to engage in all course activities, tasks, and assignment as an emerging professional. You are expected to spend between **7.5 and 10** hours on this course each week including out-of-class time.

Course Schedule

The schedule is laid out in the table below. This course is conducted over a two week period. During

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each week, students will:

1. Upload your own video telling about yourself (Let's Get to Know Each Other) by 8 pm (Denver time) on Tuesday of the first week of class. This assignment will be active from 8 am on Monday of the week before class starts).
2. On the first day of class, complete a "Quiz" that asks you questions about yourself and your work history (due Monday of the first week at midnight Denver time).
3. Attend all lectures and the panel/round table.
4. Actively contribute to assigned discussions and to Q&A during or after each lecture or panel/round table.
5. Complete all readings and consider the content in the assigned discussions.
6. Complete the reflective assignment and submit by Friday (5 pm Denver time) each week.
7. Complete a halfway and end of course survey in which you provide your feedback on the quality of the course and its instruction.

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Week 1	Note: Open Discussion sessions will be scheduled during the week				
	Assigned Reading 1 (related to Discussion 1).	Upload your "Let's get to Know Each Other" video	Assigned Reading 2 (related to Discussion 2).		Week Reflection Assessment (file upload through Canvas)
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	4 pm Lecture	4 pm Lecture	4 pm Lecture	4:00 to 5:30 pm Panel Discussion	Assessment 1 due
Week 2	Note: Open Discussion sessions will be scheduled during the week				
	8 am Assigned Reading 3 (related to Discussion 3).		Assigned Reading 4 (related to Discussion 4).		Week Reflection Assessment (file upload through Canvas)
	Discussion 3 (on Canvas, text input)		Discussion 4 (on Canvas, text input)		End of course survey
	4 pm Lecture	4 pm Lecture	4 pm Lecture	4:00 to 5:30 pm Panel Discussion	Assessment 2 due