Welcome to the UCA and UC&T Fall Kick-Off and Info Session!

WEDNESDAY, August 20th
What is Underground Construction and Tunneling and what is UCA?

https://www.youtube.com/watch?v=KBgvBEtzQq4
What is the UCA?

- UCA is the Underground Construction Association
- Subsection of the Society for Mining, Metallurgy and Exploration (SME)
- CSM has the only student chapter in the nation
- Through the UCA student chapter you can:
  - Learn about projects and technologies in the tunneling industry
  - Network with industry professionals
  - Learn about tunneling research at CSM
New UCA officers for the 2014-2015 school year:

- President: Laura Porras
- Vice-president: Lisa Mori
- Treasurer: Stephen Semmens
- Secretary (fall): John Kuyt
- Secretary (spring): Jon Marts
- Outreach: Kevin Schaeffer
Plans for the 2014-2015 school year:

- Celebration of Mines
- Field trips to underground construction and tunneling projects
- 2 Community service events
- Networking event
- Biweekly seminars
Visit us at our table at Celebration of Mines!

Join us on OrgSync! (search for UCA)

Learn more about the UCA: http://uca.smenet.org/
Center of Excellence in Underground Construction & Tunneling (UC&T)

Developing Leaders. Advancing Knowledge.
UC&T = Caverns + Shafts + Adits + Excavations + Tunnels

Manhattan Caverns
New York City
(10 blocks long; under Grand Central Terminal)
Olympic Cavern Hall (Gjøvik, Norway)
UC&T = Caverns + Shafts + Adits + Excavations + Tunnels
UC&T = Caverns + Shafts + Adits + Excavations + Tunnels
Tunnels: Water Conveyance

Niagara Falls Hydroelectric Tunnel
Tunnels: Wastewater

Deep Rock Tunnel (Indianapolis)
Tunnels: Transportation

Road

Transit
Tunnels: Multiple Use

SMART Tunnel – Stormwater Management & Road Tunnel (Kuala Lumpur, Malaysia)
A Little Bit about Us…

We are a collaborative, interdisciplinary group of faculty and students from:

- Civil and Environmental Engineering
- Geology and Geological Engineering
- Mining Engineering

Additional involvement from:
Geophysics, Mechanical Engineering, Electrical Engineering, Computer Science, Economics and Business

Developing Leaders. Advancing Knowledge.
How Can U Get Involved in UC&T??

• Courses and Degrees
• Research Projects and Positions
• Field Trips
• Scholarships: Information and Deadlines at uct.mines.edu
• Internships: Career Center and Diggernet
Education

- 20+ UC&T Courses
- Undergraduate Minor
- M.S. (Thesis and Non-Thesis)
- Ph.D.
  (Only UC&T advanced degrees offered in North America!)
- See CSM Bulletin
  (link on uct.mines.edu)
Undergraduate Minor

The Underground Construction & Tunneling minor consists of a minimum of 18 credit hours

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credits</th>
<th>Offered This Semester</th>
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</thead>
<tbody>
<tr>
<td>CEEN312  SOIL MECHANICS</td>
<td>3.0</td>
<td>*Offered This Semester</td>
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<tr>
<td>MNGN321  INTRODUCTION TO ROCK MECHANICS</td>
<td>3.0</td>
<td>*Offered This Semester</td>
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<tr>
<td>MNGN404  TUNNELING</td>
<td>3.0</td>
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</tr>
<tr>
<td>GEGN466  GROUNDWATER ENGINEERING</td>
<td>3.0</td>
<td>*Offered This Semester</td>
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<tr>
<td>or GEGN467 GROUNDWATER ENGINEERING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEGN468  ENGINEERING GEOLOGY AND GEOTECHNICS</td>
<td>4.0</td>
<td>*Offered This Semester</td>
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Example Electives Offered This Semester

<table>
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<tr>
<th>Electives</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MNGN408 UNDERGROUND DESIGN AND CONSTRUCTION</td>
<td>2.0</td>
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<tr>
<td>MNGN598C GROUTING IN UNDERGROUND CONSTRUCTION</td>
<td>3.0</td>
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<tr>
<td>CEEN314 STRUCTURAL THEORY</td>
<td>3.0</td>
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<tr>
<td>CEEN415 FOUNDATIONS</td>
<td>3.0</td>
</tr>
<tr>
<td>CEEN523 ANALYSIS AND DESIGN OF TUNNELS IN SOFT GROUND</td>
<td>3.0</td>
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<tr>
<td>GEOL309 STRUCTURAL GEOLOGY AND TECTONICS</td>
<td>4.0</td>
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</table>
Required Minor Courses this Fall

- **Soil Mechanics (CEEN 312)** – Alexandra Wayllace
  - MWF 9-9:50 + Lab
  - Prerequisites: Mechanics of Materials

- **Intro to Rock Mechanics (MNGN 321)** – Ugur Ozbay
  - MW 9-9:50 + T 1-3:50
  - Prerequisites: Statics or Dynamics for Mining Engineers

- **Groundwater Engineering (GEGN466)** – Kamini Singha
  - TR 11-12:15
  - Prerequisites: Calculus, Differential Equations, Structural Geology, Sedimentology & Stratigraphy, Geologic Fluid Mechanics or Fluid Mechanics

- **Engineering Geology and Geotechnics (GEGN468)** – Jerry Higgins
  - MWF 10-10:50 + R 1-3:50
  - Prerequisites: Intro to Rock Mechanics and Soil Mechanics
Elective Minor Courses this Fall

- **Underground Design and Construction (MNGN408)** – Priscilla Nelson
  - F 8-9:50
  - Prerequisites: Soil Mechanics or Intro to Rock Mechanics

- **Grouting in Underground Construction (MNGN598C)** – Ray Henn
  - F 1-3:50
  - Prerequisites: none

- **Analysis and Design of Tunnels in Soft Ground (CEEN532)** – Mike Mooney
  - MW 2-3:15
  - Prerequisites: Soil Mechanics or similar, Structural Analysis, Reinforced Concrete Design (preferred)

- **Structural Theory (CEEN314)** – Susan Reynolds
  - MWF 11-11:50
  - Prerequisites: Mechanics of Materials

- **Foundations (CEEN415)** – Vaughan Griffiths
  - TR 12:30-1:45
  - Prerequisites: Soil Mechanics

- **Structural Geology and Geotechnics (GEOL309)** – Bruce Trudgill
  - MW 1-3:50
  - Prerequisites: Earth and Env. Systems, Engineering Terrain Analysis, Geologic Principles & Processes, Adv. Physical Geology Lab, and Earth Materials or Intro to Geophysics
# MS and/or PhD in UC&T

## Required Courses for M.S. Thesis, M.S Non-Thesis and Ph.D. Degrees

The following 21 credit hours are required. Students are required to attend the UC&T seminar series and M.S. non-thesis and Ph.D. students must complete an internship-related project, registering as an independent study in the home department of the faculty advisor (CEEN 599, GEGN 599, or MNGN 599).

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Offered Semester</th>
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<tbody>
<tr>
<td>GEGN468</td>
<td>ENGINEERING GEOLOGY AND GEOTECHNICS</td>
<td>4.0</td>
<td>*Offered This Semester</td>
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<tr>
<td>CEEN512</td>
<td>SOIL BEHAVIOR</td>
<td>3.0</td>
<td>*Offered This Semester</td>
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<tr>
<td>MNGN508</td>
<td>ADVANCED ROCK MECHANICS</td>
<td>3.0</td>
<td>*Offered This Semester</td>
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<tr>
<td>CEEN523</td>
<td>ANALYSIS AND DESIGN OF TUNNELS IN SOFT GROUND</td>
<td>3.0</td>
<td>*Offered This Semester</td>
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<tr>
<td>MNGN504</td>
<td>TUNNELING</td>
<td>3.0</td>
<td>*Spring 2015</td>
</tr>
<tr>
<td>CEEN520</td>
<td>EARTH RETAINING STRUCTURES / SUPPORT OF EXCAVATIONS</td>
<td>3.0</td>
<td>*Spring 2015</td>
</tr>
<tr>
<td>MNGN509</td>
<td>EXCAVATION PROJECT MANAGEMENT</td>
<td>2.0</td>
<td>*Spring 2015</td>
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## MS and/or PhD in UC&T

### Example Elective Courses

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<tr>
<td>CEEN510</td>
<td>ADVANCED SOIL MECHANICS</td>
<td>3.0</td>
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<tr>
<td>CEEN541</td>
<td>DESIGN OF REINFORCED CONCRETE STRUCTURES</td>
<td>3.0</td>
</tr>
<tr>
<td>GEGN466</td>
<td>GROUNDWATER ENGINEERING</td>
<td>3.0</td>
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<tr>
<td>GEGN573</td>
<td>GEOLOGICAL ENGINEERING SITE INVESTIGATION</td>
<td>3.0</td>
</tr>
<tr>
<td>GEGN581</td>
<td>ANALYTICAL HYDROLOGY</td>
<td>3.0</td>
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<tr>
<td>GEGN673</td>
<td>ADVANCED GEOLOGICAL ENGINEERING DESIGN</td>
<td>3.0</td>
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<tr>
<td>MNGN424</td>
<td>MINE VENTILATION</td>
<td>3.0</td>
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<tr>
<td>MNGN506</td>
<td>DESIGN AND SUPPORT OF UNDERGROUND EXCAVATIONS</td>
<td>3.0</td>
</tr>
<tr>
<td>MNGN507</td>
<td>ADVANCED DRILLING AND BLASTING</td>
<td>3.0</td>
</tr>
<tr>
<td>MNGN598C</td>
<td>GROUTING IN UNDERGROUND CONSTRUCTION</td>
<td>3.0</td>
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* *Offered This Semester*
Required UC&T Grad Degree Courses this Fall

- **Engineering Geology and Geotechnics (GEGN468)** – Jerry Higgins
  - MWF 10-10:50 + R 1-3:50
  - Prerequisites: Intro to Rock Mechanics and Soil Mechanics

- **Soil Behavior (CEEN512)** – Judith Wang
  - TR 12:30-1:45
  - Prerequisites: Soil Mechanics

- **Advanced Rock Mechanics (MNGN508)** – Ugur Ozbay
  - MW 9-9:50 + T 1-3:50
  - Prerequisites: Intro to Rock Mechanics

- **Analysis and Design of Tunnels in Soft Ground (CEEN532)** – Mike Mooney
  - MW 2-3:15
  - Prerequisites: Soil Mechanics or similar, Structural Analysis, Reinforced Concrete Design (preferred)
Elective UC&T Grad Degree Courses this Fall

• **Design of Reinforced Concrete Structures (CEEN541)** – Joseph Crocker
  - MWF 8-8:50
  - Prerequisites: Design of Reinforced Concrete

• **Groundwater Engineering (GEGN466)** – Kamini Singha
  - TR 11-12:15
  - Prerequisites: Calculus, Differential Equations, Structural Geology, Sedimentology & Stratigraphy, Geologic Fluid Mechanics or Fluid Mechanics

• **Grouting in Underground Construction (MNGN598C)** – Ray Henn
  - F 1-3:50
  - Prerequisites: none
New Faculty

- PPN
- Rennie Kaunda
- Elizabeth Holley

- Hope to search for 2 or 3 additional faculty members during Fall 2014
Classes in MNGN

- 333 - Explosives Engineering (Petr)
- 350A - Geothermal Energy (Nakagawa)
- 404 - UG Design and Construction (Nelson)
- 498 - Water and Environment in Mining (Kaunda)
- 598 - Heat Mining (Nakagawa)
- 598 - Grouting for Tunneling and Underground Construction (Henn)
MN and UC&T

- MN Graduate Seminar – Thursdays at 4 pm
- Special Lectures by Dr. Charlie Li, Visiting Scientist from Norwegian University of Science and Technology on In Situ Stress measurement.

  September 2 and 4, 9 to 10:15 am in BB206, in the Heat Mining Class)
Short Courses (check SPACE for agenda, students invited but do not eat or drink anything)

- Sept. 3 – 5: Shotcrete
  - Field Demo Thursday the 4th, 1:30 – 5 pm, EMI

- Sept. 15 – 17: Tunneling
Earth Mechanic Institute
Mining Engineering Department
Brian Asbury

Mechanical Excavation
   Tunneling, Mining, Drilling, etc.
Rock Mechanics Testing
Laboratory Full-Scale Testing
Machine Performance Modeling
Novel Excavation Methods (water jet, thermal/chemical/laser)
Research Projects – UC&T Undergraduates Fall 2014

Undergraduates in Civil, Geological, Mining, Mechanical, Electrical, Geophysics, Computer Science, etc. - join us and participate in applied research such as site investigation and characterization, ground imaging, numerical modeling, tunnel boring machine performance prediction and more!

5-15 hours per week; $11-$14/hr; flexible schedule; possible site visits

See flyer for full information, sign up for email notification or email uct@mines.edu

Applications due August 28, 2014
Scholarships – UC&T Students

Scholarships related to the field of UC&T will be listed on the website at uct.mines.edu.

Examples:

UCA of SME Scholarship - Application Deadline January 8, 2014
Established to encourage undergraduate and graduate academic pursuits and careers in the field of tunneling and underground construction and associated disciplines involved in the development, planning, design, and construction of underground infrastructure.

ASA Graduate Scholarship – Application Deadline November 3, 2014
The purpose of the ASA Graduate Scholarship Program is to attract, identify, and assist outstanding graduate students pursuing careers within the field of concrete with a significant interest in the shotcrete process.
Internships

Ten UC&T students were employed this summer by ten companies!

- Kiewit
- J.F. Shea Construction
- Jay Dee
- Traylor Bros.
- Arup
- Golder Associates
- Atkinson Construction
- Moretrench
- USGS
- CTL Thompson

Please work with the CSM Career Center and our UC&T Center Coordinator to find your opportunity, and let’s increase that number!
Next Seminar: Wednesday 8/27 @ Noon

UC&T Student Research Presentations

Rick Bearce – PhD, Civil
Jet Grout Monitoring

Jacob Grasmick – PhD, Civil
Ground Deformation Monitoring

Lisa Mori – PhD, Mining
Soil Conditioning