

# Universal Design in Earth Education: Approaches to Access and Accommodation for a More Inclusive STEM Experience

Thursday, July 19<sup>th</sup> at 8:30 am - 11:30 am

## Conveners



[Wendi J.W. Williams](#), Northwest Arkansas  
Community College



[Ivan Carabajal](#), University of Cincinnati–Main  
Campus

*Participants in this workshop will:*

- Learn about Common Barriers to Access and Inclusion within the Geosciences and Broader STEM Education
- Be Introduced to the Principles of Universal / Inclusive Design for Learning
- Explore Accommodations for Both Physical and Non-Apparent Disabilities



# EER 2018 Thursday July 19 Universal Design in the Earth Sciences

## 08:30 Welcome and Introductions

International Association for Geoscience Diversity –  
An Inclusive Community and Wealth of Resources  
Chris Atchison, Executive Director will “Zoom” in to start us off.

## 09:15 Focus - Introduction for Universal Inclusive Design for Learning (UDL/IDL)

National Center on Universal Design for Learning  
DO-IT  
AccessSTEM

## 10:00 *Brain Break*

## 10:15 Focus - Learn about Barriers to the STEM and Geosciences Curriculum

Learning Environments (Classroom, Laboratory and Field)  
Fieldwork Audit  
Modes of Delivery (Face2Face, Hybrid / Blended, and Online)

## 11:20 Thursday Roadcheck for Next Steps for Friday

11:30 Adjourn for the day

Special Invitation: If you would like to continue this inclusive discussion, you are invited to join the **IAGD Working Group** during our **Thursday, July 19** session from **12:00 PM to 1:00 PM (Ritchie 254G)**. Grab your lunch and join us for a brown bag.

# 8:30 Welcome and Introductions

International Association for Geoscience Diversity  
A Community and Wealth of Resources

[www.theIAGD.org](http://www.theIAGD.org)



Alt Tag: Banner image for The IAGD. Wheelchair accessible trail with trip participants observing young mafic volcanic deposits.



*We are shaping the future of the Earth sciences.*

**Are YOU ready to make an impact?**

**The IAGD can help!**



- **Instructional Development Workshops**

Host a departmental or a regional workshop for your faculty instructors and graduate teaching assistants. Learn to identify common barriers preventing full participation and design inclusive coursework through universally-designed instructional strategies. These workshops are facilitated by experienced IAGD members.

- **Inclusive Activity and Course Design**

Be paired with an IAGD member who will help you modify existing coursework, or create new courses and activities with inclusively-designed strategies that will accommodate all disability types.

- **Field Site Evaluation**

An IAGD field site assessor will travel to and evaluate the accessibility of your field course or camp locations. A report of the evaluation will be provided including recommendations on accommodating different disability types.

- **Accessible Field Courses**

IAGD members lead accessible field courses and trips for your organization's event, regional or national society meeting. Courses can be pre-designed, or created collaboratively based on the content experience and abilities of your participants.

- **Student and Faculty Mentoring**

IAGD members are paired with faculty and students to support access and work together to overcome barriers to participation in academic settings and workforce development programs.

For more information about the IAGD Support and Services, contact us at: [info@theiagd.org](mailto:info@theiagd.org)





# SAGE 2YC

*2YC Faculty as Agents of Change*

SAGE 2YC > Support 2YC Students with Disabilities

## Support 2YC Students with Disabilities

This module was developed by Virginia McLaughlin, Sharon deFur, Elizabeth Auguste, and Amanda Armstrong. (2015). School of Education, The College of William & Mary.

<https://serc.carleton.edu/sage2yc/disabilities/>

The above web link will take you to the content depicted below...providing four main topical links that take you to excellent guiding thoughts and resources:



### Who are Students with Disabilities in Your Courses?

Regardless of the disability, each student has a unique set of strengths, talents, and needs. Understanding something about the range of disability and treating

each student as an individual will help you support them toward success.



### What are Your Legal and Professional Obligations?

The Americans with Disabilities Act (ADA), in concert with other laws, directs college and university faculty to provide eligibility-based and reasonable accommodations to college students with documented

disabilities.



### What are Common Challenges and Successful Strategies?

Understanding challenges associated with disabilities in the classroom as well as potential strategies to help students learn will increase your confidence that your teaching can reach all students and contribute to their success in your course.

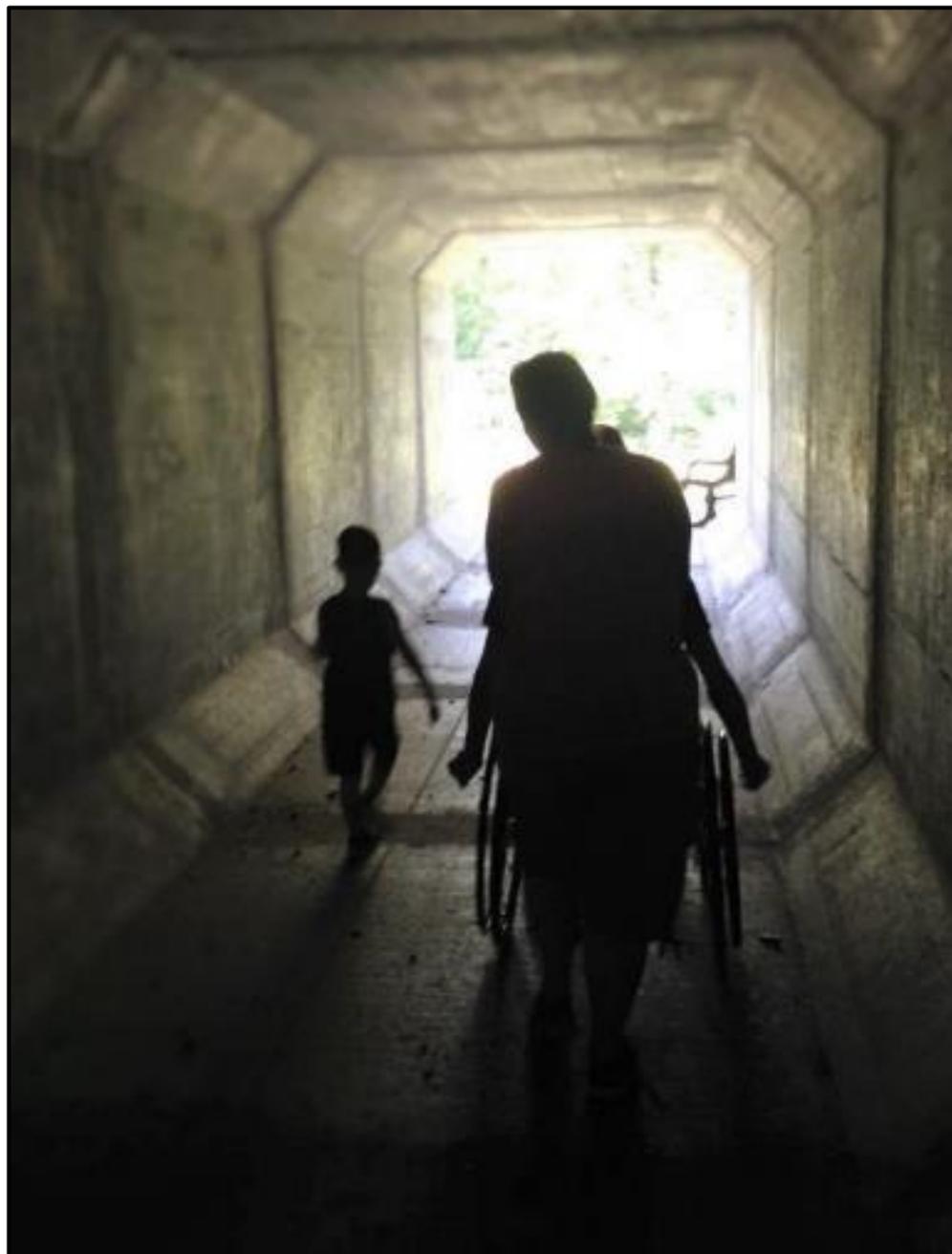


### How Can You Design and Adapt Instruction to Make Your Courses Accessible?

Students with disabilities can be successful in college courses, programs, and careers when performance expectations are conceptualized inclusively. Your willingness to incorporate Universal Design practices will ensure access for a broad range of learners and minimize the need for additional individual accommodations. This webpage describes instructional adaptations you might make.

**Ways of “doing” are particularly important when designing to diminish barriers to learning and to support successful access to technical career fields.**

**As you are aware, there are many *kinds* of diversity represented in our formal and informal educational settings.**



# **There usually is overlap in these representations:**

- **Learning Preferences**
- **Level of College “Readiness”**
- **First Generation College-Bound**
- **Age**
- **Persons with Varying Abilities / Disabilities**
- **English Language Learners**
- **Military (Active Duty, Reservist or Veteran Status)**
- **Sexual Orientation**
- **Gender Identity**
- **Ethnic/racial Demographics**



## 9:15 Focus - Universal / Inclusive Design for Learning

National Center on Universal Design for Learning

DO-IT

AccessSTEM

### *Multimodal by Purposeful Design*

Pedagogical/Andragogical approach in addressing diversity is to utilize *Universal Design or Inclusive Design* (UD, UDL, UDI, IDL, etc.) as a broadly inclusionary tool for both students with and without disabilities. And faculty.



# UDL / IDL and Learning

UD/ID guidelines naturally include many of the suggested "best practices" for learner-centered instruction, such as use of *appropriate*\* :

- visual and auditory media
- tactile representations
- interpersonal strategies
- routines
- blended instructional techniques

*\*remembering that what is one person's appropriate may be another person's barrier...*

Go to <http://www.theiagd.org/idl/> for details.



# IDL Guidelines

## IDL Guidelines: (modified from the National Center on UDL)

multiple means of representation:

(recognition) presents information and content in many different ways, the “what” of learning

multiple means of engagement:

(affective) supports a variety of ways for challenging, and motivating students, the “why” of learning

multiple means of action & expression:

(strategic) allows many different ways of organizing, planning, performing, or expressing, the “how” of learning

adaptable accommodation strategies:

design can be adapted to changing needs of specific contexts or individual learners, recognizes that some learners will not be fully included by design, builds in comprehensive awareness of and plans for accommodation strategies, materials and technology

Screenshots of <http://www.theiagd.org/idl/> :



## IDL Principles

equitable use:	design is equally useful and appealing to all, providing the same means of use for all (identical when possible, equivalent when not)
flexibility in use:	design is adaptable to a wide range of contexts, individual preferences and abilities
perceptible information:	design communicates necessary information effectively for a wide range of perceptual abilities and ambient conditions
simple & intuitive:	design is easily understandable for a wide range of backgrounds, language skills, and concentration levels
tolerance for error:	design minimizes adverse consequences of unintended actions, allows multiple attempts, or provides room for improvement
optional physical effort:	design can be used efficiently and comfortably, allowing for a range of physical abilities
size and space for approach & use:	appropriate size and space is provided for reach, manipulation, or use for a wide range of mobility
class climate:	design is positive, promotes interaction and supports learning on a variety of levels
community of learners:	design promotes purposeful collaboration and fosters meaningful learning

( <http://www.theiagd.org/idl/> )



▷ **National Center on Universal Design for Learning**

<http://www.udlcenter.org/>



▷ **DO-IT**

**Disabilities, Opportunities, Internetworking, and Technology**

<http://www.washington.edu/doit/>



▷ **AccessSTEM**

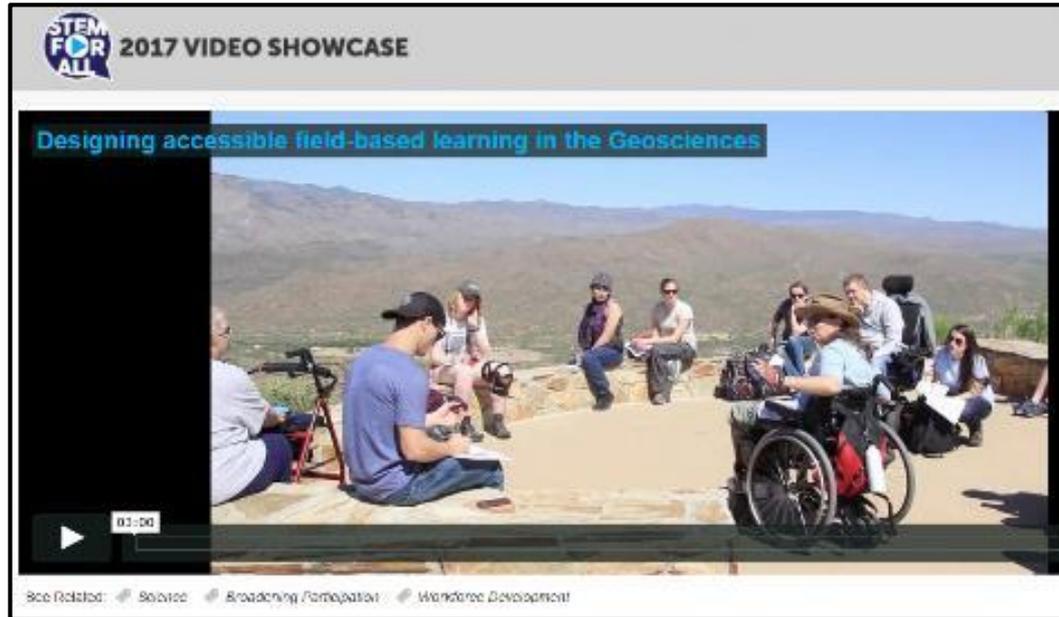
<http://www.washington.edu/doit/programs/accesstem/overview>

## **10:15 Focus - Learn about Barriers to Geoscience and STEM Curriculum**

- **Learning Environments  
(Classroom, Laboratory and Field)**
- **Modes of Delivery  
(Face2Face, Hybrid / Blended, and Online)**



# Learning Environments



<http://stemforall2017.videohall.com/presentations/920>  
(Run Time: 3 Minutes Audio and Captioned)



# Accessibility in STEM Classrooms



Photo courtesy of the University of Cincinnati Magazine



# **Accessibility in STEM Classrooms**

- **Physical Environments Present Many Barriers**
  - **Classroom Layout**
  - **Classroom Activities**
  - **How Information is Presented**
- **Think about how the physical environment impacts other students.**



# Accessibility in STEM Classrooms

## Optimal classroom arrangement

Arranging student desks in a U shape allows deaf students to have continuous visual contact with the teacher, and to see how other (hearing) students are responding.

Screen

Teacher's desk  
(Space in front and behind for instruction and/or dialogue)

Projector



Image courtesy of <https://www.ncpedia.org>

# Accessibility in STEM Classrooms

## Preferential Seating is Different for All Learners

- encourage deaf or hard-of-hearing students to sit *where they are comfortable*
- Where can a student sit that will:
  - increase their line of sight to teacher
  - increase their line of sight to ASL interpreters
  - reduce distractions

**Note: Seating arrangements are primarily dependent on the needs of students in the given environment.**



# Accessibility in STEM Labs

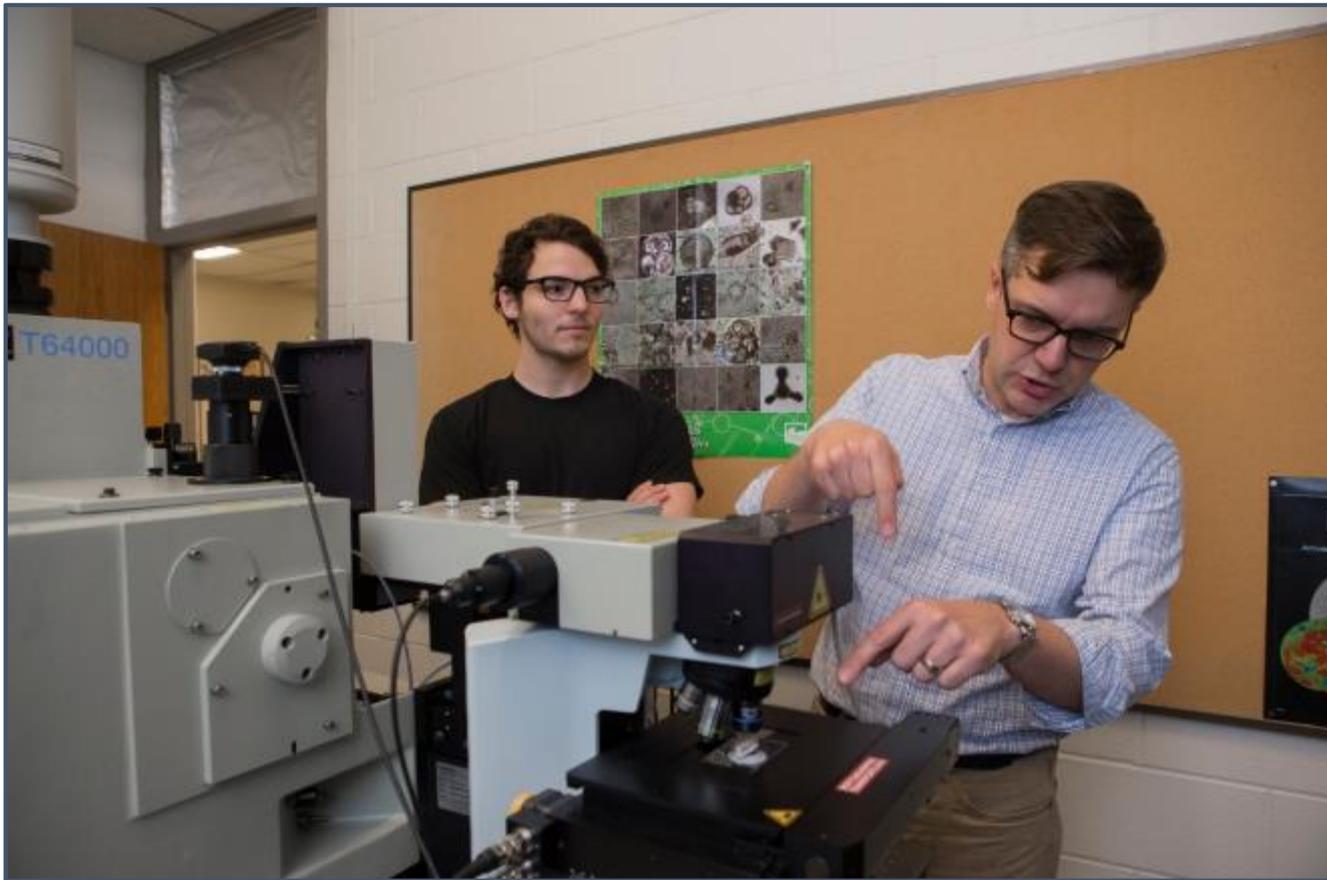


Photo courtesy of the University of Cincinnati Magazine



# Accessibility in STEM Labs

- **Extra Risk from Hazardous Materials**
- **Barriers from Physical Environment and Equipment**
  - **tools emit sound, lights or present digital readouts**
  - **workbenches may not be wheelchair accessible**
  - **lighting conditions may affect vision**
  - **color-vision deficiencies in the lab**
- **Ask students how to best accommodate their abilities in the lab**



# Accessibility in the Field



Photo courtesy of the IAGD



# Accessibility in the Field

- **Extra risk from hazardous materials**
- **Barriers from physical environment and equipment**
  - **Tools emit sound or present digital readouts**
  - **Workbenches may not be wheelchair accessible**
  - **Lighting conditions may affect vision**
  - **Color-vision deficiencies in the lab**
- **Ask students how to best accommodate their abilities in the lab**



**Also today at the EER 2018: 1:30 PM | Ritchie Hall: 368**

Developing active student engagement and collaboration through the use of mobile technologies in inclusively-designed field courses



**Ivan Carabajal and Christopher Atchison**  
University of Cincinnati

Collaborators:

Steve Whitmeyer, James Madison University  
Eric Pyle, James Madison University  
Helen Crompton, Old Dominion University  
Jennifer Piatek, Central Connecticut University  
Trevor Collins, The Open University  
Martin Feely, National University of Ireland  
Anita Marshall, University of South Florida



Award # 1540652

# Fieldwork Audit to Anticipate Barriers

**Clark, H., & Jones, J. (2011). The use of a fieldwork audit to anticipate barriers to fieldwork for disabled students. Planet, 1835(24), 42–49.**

**<https://doi.org/10.11120/plan.2011.00240042>**

**Use the audit in the above citation (Table 1 on page 44) and identify barriers in field courses you've experienced!**

**How can those barriers be removed?**



## **11:20 Thursday Roadcheck**

Next on deck for **Friday**

*Highlight accommodations for physical disabilities*

*Highlight Accommodations for Non-Apparent Disabilities*

*Reflection and Workshop Evaluation*



## **Special Invitation:**

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***Bring your lunch* and join us!**

