



THE OHIO STATE UNIVERSITY

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# Diversity in STEMM at Ohio State

4th Annual meeting



# Welcome!

## Remarks from James Moore, Vice Provost for Diversity and Inclusion.

### Agenda

<b>Research: Department of Engineering Education Research Related to Equity and Diversity in STEMM</b>	Emily Dringenberg
<b>Research: Using professional career experiences to strengthen pathways into the geoscience workforce</b>	Anne-Marie Nunez
<b>College Approach: CFAES initiatives</b>	Leo Taylor
<b>Graduate Level: Chemistry Bridge Program</b>	Tom Magliery
<b>Departmental Example: SciAccess: Promoting Disability Inclusion in Astronomy and STEM</b>	Anna Voelker
<b>Group Discussion: Challenges and opportunities during COVID-19</b>	Yolanda Zepeda / Marcela Hernandez



## Logistics

- Each presentation will be 10 min
- Speakers will introduce themselves
- We'll allow a few questions after each presentation
- Discussion and additional questions at the end



**THE OHIO STATE UNIVERSITY**

COLLEGE OF ENGINEERING

# Department of Engineering Education: Research Related to Equity and Diversity in STEMM

Emily Dringenberg, PhD

Assistant Professor

May 7, 2020





## Department of Engineering Education

Department Chair: Dr. Monica F. Cox  
[cox.1192@osu.edu](mailto:cox.1192@osu.edu)

Associate Chair: Dr. Lisa Abrams  
[abrams.34@osu.edu](mailto:abrams.34@osu.edu)

Design Thinking | Diversity & Inclusion | Faculty Development | Engineering Thinking | P-12 Education | Entrepreneurial Education | Learning | Research Methods | Pedagogies, Assessment, and Evaluation | Partnerships | Professional Development | Technical Communication | Teaching

### UNDERGRADUATE



#### FIRST-YEAR ENGINEERING

- Learning engineering design, analysis, and ethics
- Developing an entrepreneurial mindset and professional skills.
- Teamwork experience
- Over 2300 students taught each semester



#### MULTIDISCIPLINARY CAPSTONE

- Giving students hands-on experience through direct contact with industry professionals
- 14 different engineering departments collaborating with over 20+ non-engineering majors



#### TECHNICAL COMMUNICATIONS

- 36+ Class sections per year
- Preparing students for interviews
- Understanding the audience and becoming a part of the collaborative process
- Real-world applications



#### GRADUATE PROGRAM

- Courses on pedagogical issues, research methods, and theory
- Pursuing ground-breaking research with top scholars
- Specialization ranging from Design Thinking to P-12 Education





## Engineering Education Research Questions



How can community-based learning support students and communities through reciprocal partnerships in engineering education?

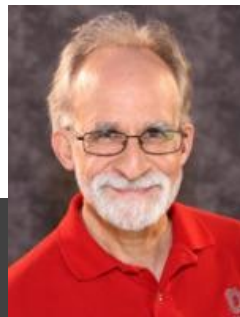
How do women of color excel as faculty and in the professional workforce?



How can student success in engineering be improved through an understanding of identity and motivation?



How can educational innovations be propagated and sustained for broad adoption?



How can engineering student perceptions, major selection, and retention of learning inform how we design their first-year experiences?



How can we intentionally design research to purposefully advocate for marginalized populations?



How can engineering students' university-to-industry transition be improved through the lens of identity and career development?



How do engineering educators innovate to adapt to broader social and historical changes?





## Engineering Education Research Questions



How can service learning in engineering support students and communities through reciprocal partnerships?

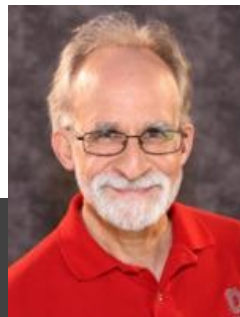
How do women of color excel as faculty and in the professional workforce?



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How can educational innovations be propagated and sustained for broad adoption?



How can engineering student perceptions, major selection, and retention of learning inform how we design their first-year experiences?



How can we intentionally design research to purposefully advocate for marginalized populations?

How can engineering students' university-to-industry transition be improved through the lens of identity and career development?



How do engineering educators innovate to adapt to broader social and historical changes?





**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

Department of Engineering Education

# ABERG

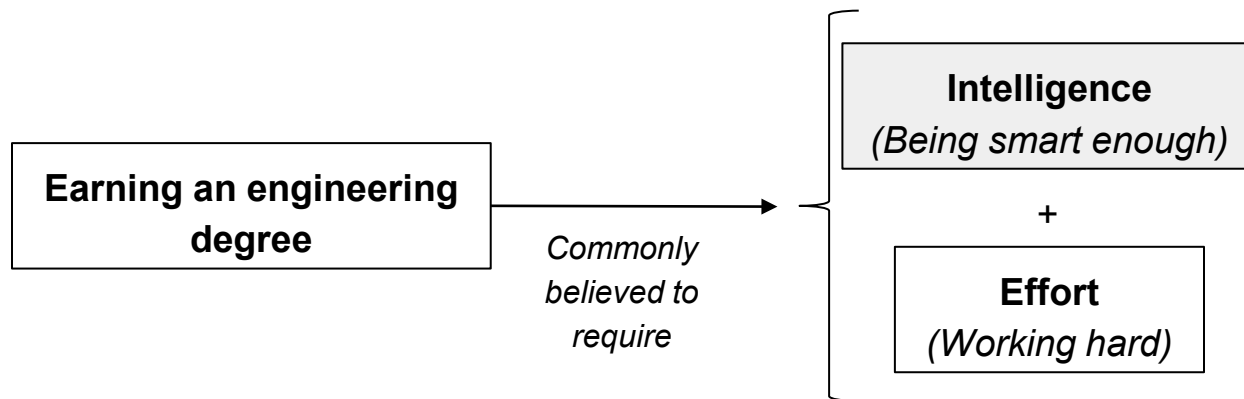
Beliefs in Engineering Research Group





# Am I Smart Enough to be an Engineer? Study of Engineering Students' Beliefs and Identities Across Institutionalized Educational Pathways

NSF EHR Core Award #1920421



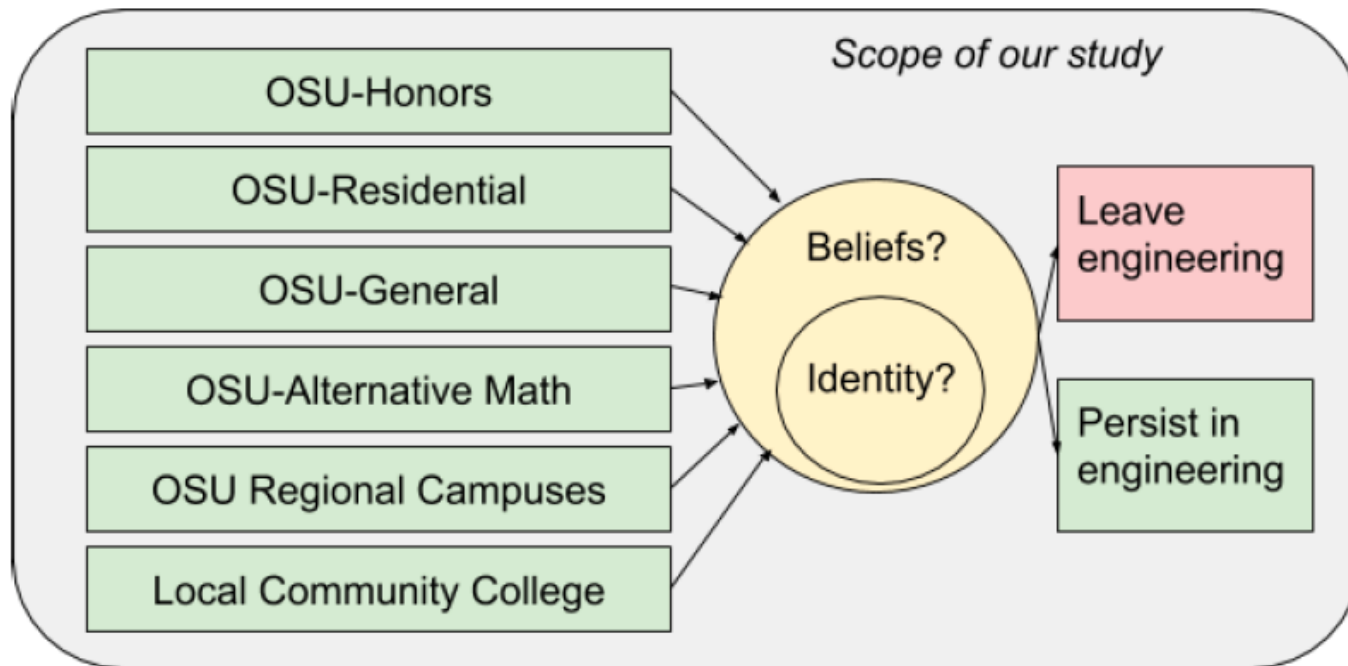
Engineering Pathway
1) OSU-Honors
2) OSU-Residential
3) OSU-General
4) OSU-Alternative Math Starting Point
5) OSU Regional Campuses (Averaged across 4 campuses)
6) Columbus State Community College





# Am I Smart Enough to be an Engineering? Study of Engineering Students' Beliefs and Identities Across Institutionalized Educational Pathways

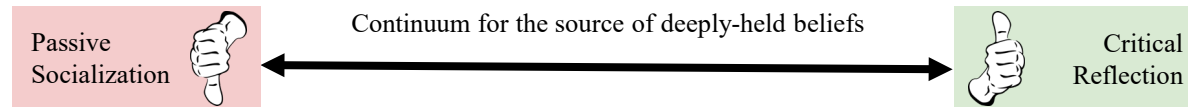
NSF EHR Core Award #1920421





# CAREER: Surfacing deeply-held beliefs about gender- and race-based minoritization in engineering

NSF EHR Core Award #1943934



## Who?

- Engineering faculty, staff and administrators
- Identify as White and/or male
- Recognized by members of minoritized identities for promoting inclusivity

## What?

- Interviews about causal beliefs (why do women and people of color remain minoritized?)
- Graduate education: ENGREDU 6194 Autumn 2020!





**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

Department of Engineering Education

# Thank you!

Emily Dringenberg  
[dringenberg.1@osu.edu](mailto:dringenberg.1@osu.edu)



 **BERG**  
Beliefs in Engineering Research Group



# Using professional career experiences to strengthen pathways into the geoscience workforce

4<sup>th</sup> Annual Diversity in STEMM Meeting, Ohio State University

Anne-Marie Núñez

@AM\_NunezPhD

# Acknowledgements

- National Science Foundation Award: # 1600542
- Judy Haschenburger, Alexis Godet, Walter Gray, Marina Suarez, Vanessa Sansone, and David Young

# Status of diversity in geoscience

- Geoscience: Earth, atmospheric, ocean sciences
- Geoscience, along with Engineering and Computer Science, is among the least diverse STEMM disciplines in people of color
- Students of color less likely than others to be exposed to geoscience as career option –few (if any) geoscience classes before college, less exposure to outdoors, and/or bad association with outdoors
- Exposure to career options early on is key

# GEOPATHS at UTSA

- NSF-funded program to expose high (not highest) potential students to geoscience careers at University of Texas San Antonio (UTSA)
- 2<sup>nd</sup> year and 3<sup>rd</sup> year students – GPAs 2.2-3.0; large share of low-income, first-generation, Latinx students
- Medical rotation model: one semester research and one semester internship, plus professional development
- Importance of experiential learning, exposure to different options in geoscience

# Results

- Going from having “nothing” to having rich and varied experiences
- Increased self-confidence in abilities and capacity to apply to jobs and graduate school in geoscience
- Increased knowledge about diversity within geoscience careers like oil, gas, environmental sustainability
- Apply research experiences and classroom knowledge to real life, see contributions utilized by internship employers in work settings
- Students from less selective schools feel more confident (e.g., UTSA vs. UT Austin) about seeking geoscience opportunities
- Employers value students' skills, see students' talents

# Implications

- “Intentionality” to serve students in a holistic way (NASEM, 2018)
- Leveraging partnerships between academic and student affairs – tailored to the specific STEMM discipline
- Leveraging local employers’ engagement
- COVID19: Virtual internships? Stress to employers the power of making these opportunities accessible to all students
- Economic uncertainty: even *more critical* to have exposure to wide range of options (e.g., beyond oil and gas)

# References

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- O'Connell, S., & Holmes, M. A. (2011). Obstacles to the recruitment of minorities into the geosciences: A call to action. *GSA Today*, 21(6), 52-54.
- Sansone, V., Núñez, A.-M., Haschenburger, J., Godet, A., Gray, W., Birnbaum, S., & Young, D. (2019). Developing work-based geosciences learning opportunities in a Hispanic-Serving Institution. *New Directions for Student Services*.

# Questions?

Anne-Marie Núñez  
@AM\_NunezPhD  
[nunez.8o@osu.edu](mailto:nunez.8o@osu.edu)

# Diversity, Equity, and Inclusion: College Approach

4<sup>th</sup> Annual Diversity in STEMM Meeting  
The Ohio State University  
May 7, 2020

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Dr. Leo Taylor

Program Manager for Faculty and Staff Affairs  
Office of Diversity, Equity, and Inclusion

**CFAES**



**THE OHIO STATE UNIVERSITY**

COLLEGE OF FOOD, AGRICULTURAL,  
AND ENVIRONMENTAL SCIENCES

# About CFAES

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# Strategic Plan

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- Approach: Learning and alignment process instead of compliance requirement
- Reimagining process began in 2019 and continues
- DEI recognized as one of the top priorities

# ONE **MISSION** *WE SUSTAIN LIFE*

## GOAL



**Transform CFAES** to be a highly effective, relevant, efficient, and innovative college by focusing on four grand challenges:

1. Sustainability —simultaneously ensuring viable agriculture production, food security and safety, and environmental and ecosystem sustainability.
2. One health —studying the intersection and interaction among human, animal, and environmental health.
3. Rural-urban interface —exploring the tensions and opportunities created in the communities, industries, policies, economies, and communications between rural and urban residents.
4. Leadership —preparing the next generation of scientists and leaders.

## HOW

**\$100  
MILLION  
UNDERWAY**

**Refresh our Infrastructure** by transforming the physical environment in all of our facility locations to support and inspire our work, as well as improving the way we work.



**Recruit, Secure, and Retain Diverse Talent** by designing and advancing talent practices which support CFAES in becoming a great organization to work with and for.



**Leverage Student Engagement and Inclusion** by designing and advancing programs to increase student engagement and immersion in the work of our disciplines, industry, and other learning environments.



**Engage Communities** integrating into all aspects of CFAES (core business and programming) - in relationships, decisions, policies, and practices with staff, grantees, community members, alumni, and partners.

All search committee members are required to attend a training on inclusive hiring practices.

We actively recruit URM and diverse students.

# COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES: **AT A GLANCE**

## Successful Graduates

**92%** report employment or acceptance to graduate or professional school within 6 months

**74%** of employed graduates stay in Ohio

**40%** have participated in at least one education abroad experience

**Over \$2 million annually** in scholarship support awarded

## Distinguished Faculty and Staff

**37** college faculty members, recipients of the Alumni Award for Distinguished Teaching

**49** staff members, recipients of the Distinguished Staff Award

## Influential Alumni

**39,700** living alumni

**27,000** alumni living in Ohio

**4,100**

undergraduate and graduate students

## ATI

Agricultural Technical Institute

**96%** employed or starting a **4-year degree** within **6 months**

The Ohio State University College of Food, Agricultural, and Environmental Sciences (CFAES) is a large, diverse college supporting 10 academic units, the Ohio Agricultural Research and Development Center, Ohio State University Extension, and two-year degree programs offered by the Agricultural Technical Institute. The college has campuses in Columbus and Wooster, and has a presence in all 88 Ohio counties. It serves as the home for 330 faculty, more than 4,100 undergraduate and graduate students, and 1,230 staff.

## WATER QUALITY

Multi-college and multi-university initiative to ensure clean water

## OARDC

The Ohio Agricultural Research and Development Center

Nation's largest university agbioscience research enterprise

Nearly **\$41 million annually** in sponsored research

Nearly **500 projects** at any one time

Linda Salf

Fellow of the National Academy of Inventors



Professor **Rattan Lal**, recipient of the Justus von Liebig Award and the Norman E. Borlaug Award

Professors **David Denlinger** and **Linda Salf**, National Academy of Sciences members

## 4-H YOUTH DEVELOPMENT

**183,000** youth participants

**22,000** adult and teen volunteers



## FSR

Farm Science Review

One of the nation's largest agricultural outreach events

Nearly **130,000** attendees every year

## OSU EXTENSION

More than **1.5 million** educational contacts each year

Brings **\$6.5 million** in federal funding for nutrition education to Ohio

**\$10 million**: Increased profits for Ohio farms and agribusinesses credited to Extension's C.O.R.N. Newsletter

The Nationwide and Ohio Farm Bureau 4-H Center

OHIO STATE'S **1ST LEED** CERTIFIED BUILDING

## The Wilma H. Schlermeyer Olentangy River Wetland Research Park

A teaching, research and outreach center

The aquatic gateway to the Ohio State main campus

## GREEN ROOF

OPEN TO THE PUBLIC

Howlett Hall

## OUTDOOR LABORATORIES

Chadwick Arboretum  
Secret Arboretum  
Waterman Farm

**9** research stations across the state

# Office of Diversity, Equity, and Inclusion

- Staff
  - Search for Assistant Dean/Director – finalists interviewed last week
  - Oversight by Tracy Kitchel, Associate Dean for Faculty and Staff Affairs



Dr. Tracy Kitchel

## Our Team



**Alicia Baca**  
Program Assistant  
baca.31@osu.edu



**Dr. Leo Taylor**  
Program Manager for  
Faculty and Staff  
Affairs  
taylor.3408@osu.edu



**Pamela Thomas**  
Program Manager for  
Student Affairs  
thomas.8@osu.edu

# Ohio State University Extension



The Supplemental Nutrition Assistance Program Education: Nutrition Education and Obesity Prevention Grant Program (SNAP-Ed)

**CFAES**

## Ohio AgrAbility

Ohio State University Extension



THE OHIO STATE UNIVERSITY  
COLLEGE OF FOOD, AGRICULTURAL,  
AND ENVIRONMENTAL SCIENCES

**CFAES**

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### UTILIZING ASSISTIVE TECHNOLOGY

Utilizing assistive technology concepts for farmers with a limiting or disabling condition.

[READ MORE >](#)



# Ohio 4-H LGBTQ+ SUMMIT



Kayla Oberstat

Adult Professional Development Day: **86 attendees**

- Youth Summit: **54 attendees**
- **15 States** represented at Summit:

California, Colorado, Delaware, Florida, Indiana, Iowa, Maine, Michigan, Minnesota, Ohio, Pennsylvania, Virginia, Washington DC, West Virginia, Wisconsin

- **94% of adult respondents** indicated the event “Met” or “Exceeds Expectations”
- **97% of adult respondents** and **100% of youth respondents** agreed this event should take place again in the future

**CFAES**

# Faculty and Staff Initiatives (Leo)

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- Inclusive Excellence training for search committees
- Professional development workshops and webinars
  - Implicit Bias
  - Power and Privilege
  - Gender Identity and Sexual Orientation
  - Employee Assistance Program Overview
  - Mental Health Awareness (neurodiversity includes mental health)

# Student Initiatives (Leo)

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- Professional development workshops and webinars
- Mental health support group for graduate students (all OSU)
- Co-host w/PDA mental health support group for postdocs (all OSU)
- Soon: mental health support group for DEI professionals
- Cultivating Change – student organization for LGBTQ Agriculturalists (chapter of nat'l foundation)





# Student Initiatives (Pamela)

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- MANRRS – Minorities in Agriculture, Natural Resources & Related Sciences (chapter of nat'l society)
- SROP – Summer Research Opportunities Program
  - Partnership with grad school designed to help historically underrepresented students explore opportunities for graduate study and academic careers
- LSAMP – Louis Stokes Alliances for Minority Participation
  - Program to increase URM recruitment, retention, persistence, and attainment of STEM degrees
- Panama Program – study abroad program targeting barriers faced by low-income, first-gen, and multicultural students

# OSU+ Community Initiatives (Leo)

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- Professional development workshops and webinars
  - Gardening with physical limitations webinar
  - Multi-generational Workforce (May 18)
- Anti-Asian Bias Coalition
  - Collaboration with MCC, OIA, CCS, API Alumni Assoc, AAA student org, multiple community mental and public health professionals, and OPAWL
  - Implicit bias/bias intervention workshop with emphasis on AAPI issues
  - Programs by AAPI for AAPI for mental health support
  - Series of webinars on historical oppression and resilience of AAPI individuals in the U.S.

# Moving Forward

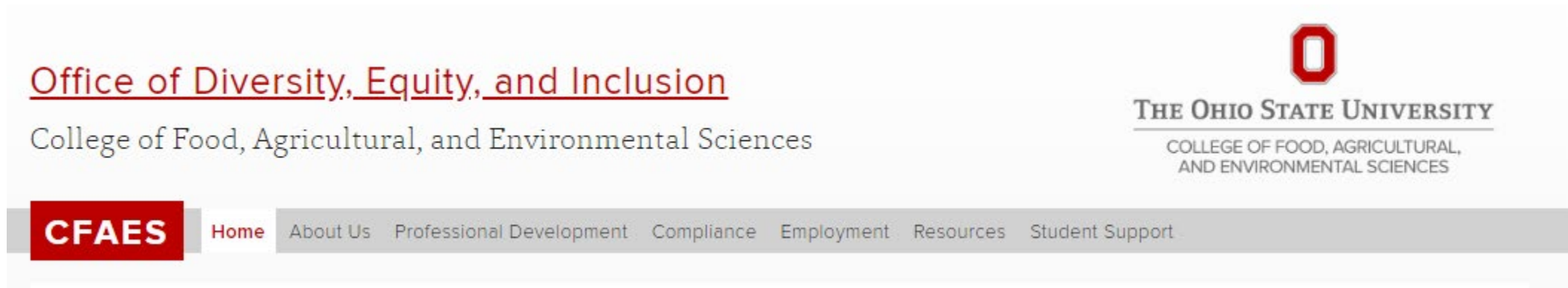
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- Remodeling 2<sup>nd</sup> floor space in Agricultural Administration to create a noticeable DEI office presence (date TBD)
- Restructuring/reorganization now that office has two Program Managers with some overlap and will have new Assistant Dean/Director soon
- New Assistant Dean will be responsible for creating more cohesive college-wide approach to DEI efforts – currently many efforts, but somewhat siloed
- Discussion about creating a DEI certification program for faculty and staff much like the one offered by the College of Engineering

# For more information

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<https://equityandinclusion.cfaes.ohio-state.edu/>



Leo Taylor – [taylor.3408@osu.edu](mailto:taylor.3408@osu.edu)

Pamela Thomas – [Thomas.8@osu.edu](mailto:Thomas.8@osu.edu)

Tracy Kitchel – [Kitchel.2@osu.edu](mailto:Kitchel.2@osu.edu)

**CFAES**

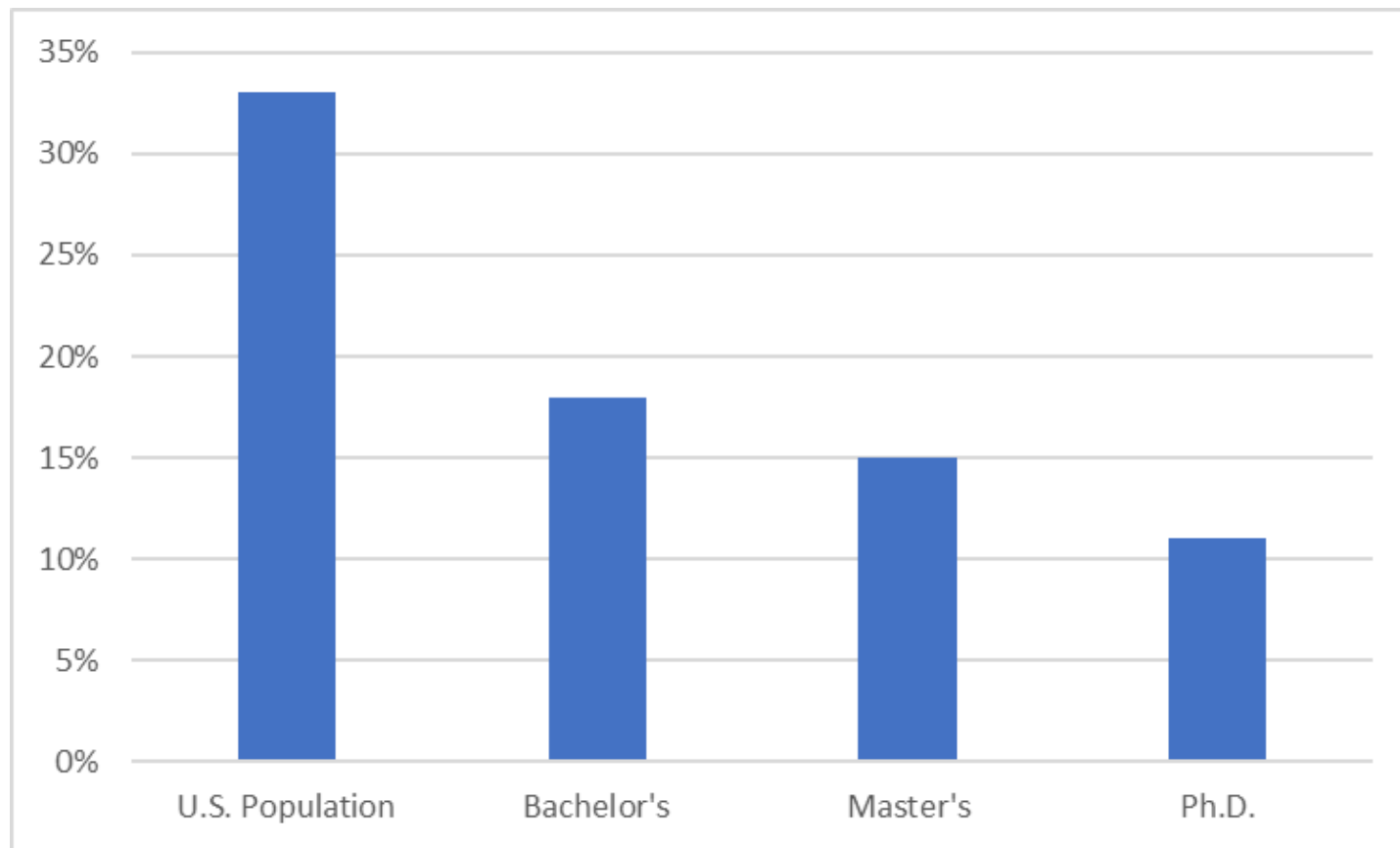
# Chemistry Bridge Program

Thomas J. Magliery

May 7, 2020

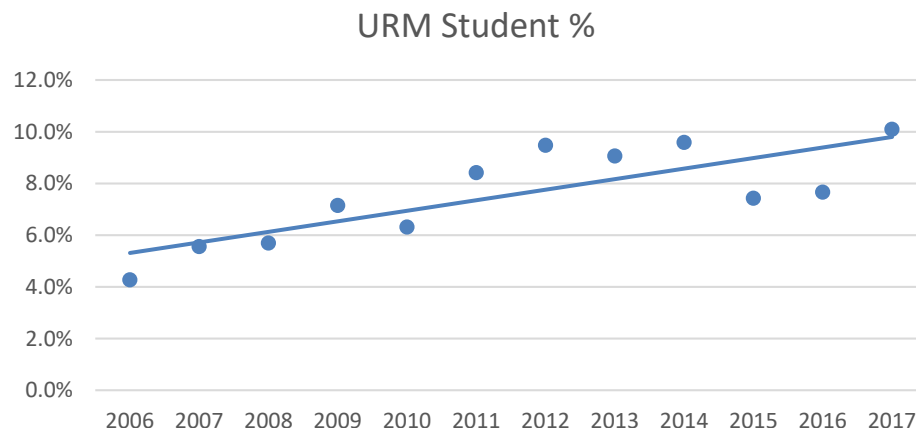
Diversity in STEMM

# URM Degree Attainment in Chemistry



Source: IPEDS Completion Survey By Race (2013-2017)

# Chemistry Grad Student Diversity



Year	All Chem/Biochem B.A./B.S.	URM <sup>a</sup> Chem/Biochem B.A./B.S.	All Chem M.S.	URM <sup>a</sup> Chem M.S.	All Chem Ph.D.	URM <sup>a</sup> Chem Ph.D.
2014-2015	129	10	19	1	21	2
2015-2016	137	16	18	0	29	2
2016-2017	151	13	11	2	46	3
2017-2018	147	20	14	2	37	4
2018-2019	110	10	10	3	36	2
<b>Total</b>	<b>674</b>	<b>69 (10%)</b>	<b>72<sup>b</sup></b>	<b>8 (11%)</b>	<b>169</b>	<b>13 (8%)</b>

# ACS Bridge Project



American Chemical Society

ACS Bridge Program  
powered by IGEN  
Inclusive Graduate Education Network

## GET INTO GRAD SCHOOL WITH ACS

The ACS Bridge Program (ACS-BP) seeks to increase the number of students from underrepresented minority groups obtaining a PhD in the chemical sciences. ACS-BP students enter programs that provide research experience, advanced coursework, mentoring, and coaching to prepare a graduate school application.

Students who have not applied to graduate school, or who have applied but were not accepted, may be offered:

- A free common application that will be shared with participating departments
- Resources to strengthen applications
- Connections to faculty and mentors
- Networking opportunities with other ACS-BP students

Learn more and apply at  
[www.acs.org/bridgeprogram](http://www.acs.org/bridgeprogram)



The ACS Bridge Project (Bridge Program and Bridge Travel Awards) has support from the National Science Foundation (NSF) through grant NSF-1834545 and the American Chemical Society. The ACS Bridge Project is a part of the NSF INCLUDES Alliance: Inclusive Graduate Education Network (IGEN). For more information, about IGEN, visit [IGENetwork.org](http://IGENetwork.org). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.



## The Bridge Project has the following goals

- Increase, within 10 years, the fraction of chemical science PhDs awarded to underrepresented minority students to match the fraction of chemical science Bachelor's degrees granted to these groups
- Develop, evaluate, and document a sustainable model bridging experiences that improve the access to and culture of graduate education for all students, with emphasis on those underrepresented in doctoral programs in chemical sciences
- Promote and disseminate successful program components to the chemical science community



THE OHIO STATE UNIVERSITY

DEPARTMENT OF  
CHEMISTRY AND BIOCHEMISTRY

# Program Overview

- One-year post-baccalaureate program
- 4 students per year with full funding
  - Generous matching from ASC, GS
- Transition to Ph.D. or M.S.
  
- ASC Bridge Partner
- 2 student pilot implementation
  
- ACS Bridge Site

# Project Elements

- Enhanced orientation, Physics Bridge synergy
- Undergraduate and graduate classes
- Rotations, lab group “embed” and summer research project
- Tutoring, mentoring, monitoring
  - Mentor training (LSAMP, NRMN)
- Community

# Admissions

- Admissions after April 15
  - ACS portal and our files
- Core coursework, research potential/skills, ‘grit’
- Interview
- Bridge directors, Admissions Committee, Vice Chair
- Recruiting
  - Cleveland State, Central State, Wilberforce, WVSU
  - Oakwood and Alabama A&M
  - NOBCChE Collaborative (Hampton, JSU, WSSU)

# Synergistic Activities

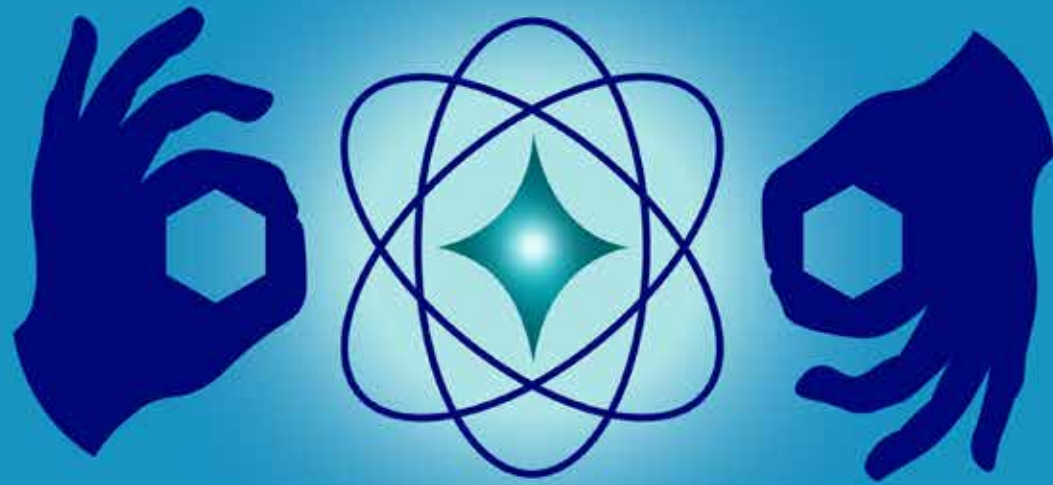
- **Physics Bridge Program**
- NOBCChE/SACNAS clubs/mentors
- ODI GPS
- ODI Orientation
- LSAMP Training
- SROP
- ABRCMS, SACNAS, NOBCChE meetings
- ASC and GS Fellowships and MTFA
- Yunkin Success Center
- Counseling and Consultation Services
- OUAB Grad/Prof

# Future

- Transition to PhD or MS programs
- Implementation at scale
- Recruiting/building the pool
- Sustainability

# Thank you.

- What questions do you have?
- Tom Magliery, [magliery.1@osu.edu](mailto:magliery.1@osu.edu)



# SciAccess

Promoting Disability Inclusion  
in Astronomy and STEM

Anna Voelker  
voelker.30@osu.edu  
The Ohio State University

# Science, Shakespeare, & Autism



# The Sky In Your Hands



Observatori Astronòmic  
UNIVERSITAT DE VALÈNCIA



**AWB**  
Astronomers Without Borders





Shape Editor

Instructions

Parameters

Processing

☒ spiral\_galaxy  
☒ double\_sided  
☒ intensity  
☒ textures

Save Model

Preview Model

Model Params

Model Making Params

Gas/Spiral Arm parameters

Gas Percentile: 55

Spiral Percentile: 75

Smooth Size: 11

Create masks

Gas/Dust parameters

Gas Percentile: 75

Dust Percentile: 55

Smooth Size: 11

Create masks



Regions

bulge

gas

Take 10

autogas

remove\_star

spiral

Take 10

autospiral

☒ Clusters  
☒ Stars  
☒ Textures

Shade Editor

Instructions

Painting

Brush size: 10

Paint mode: ☒ Paint ☐ Erase

Parameters

Processing

☒ spiral\_galaxy  
☒ double\_sided  
☒ intensity  
☒ textures

Save Model

Preview Model

Model Params

Model Making Params

Gas/Spiral Arm parameters

Gas Percentile: 20

Spiral Percentile: 75

Smooth Size: 11

Create masks

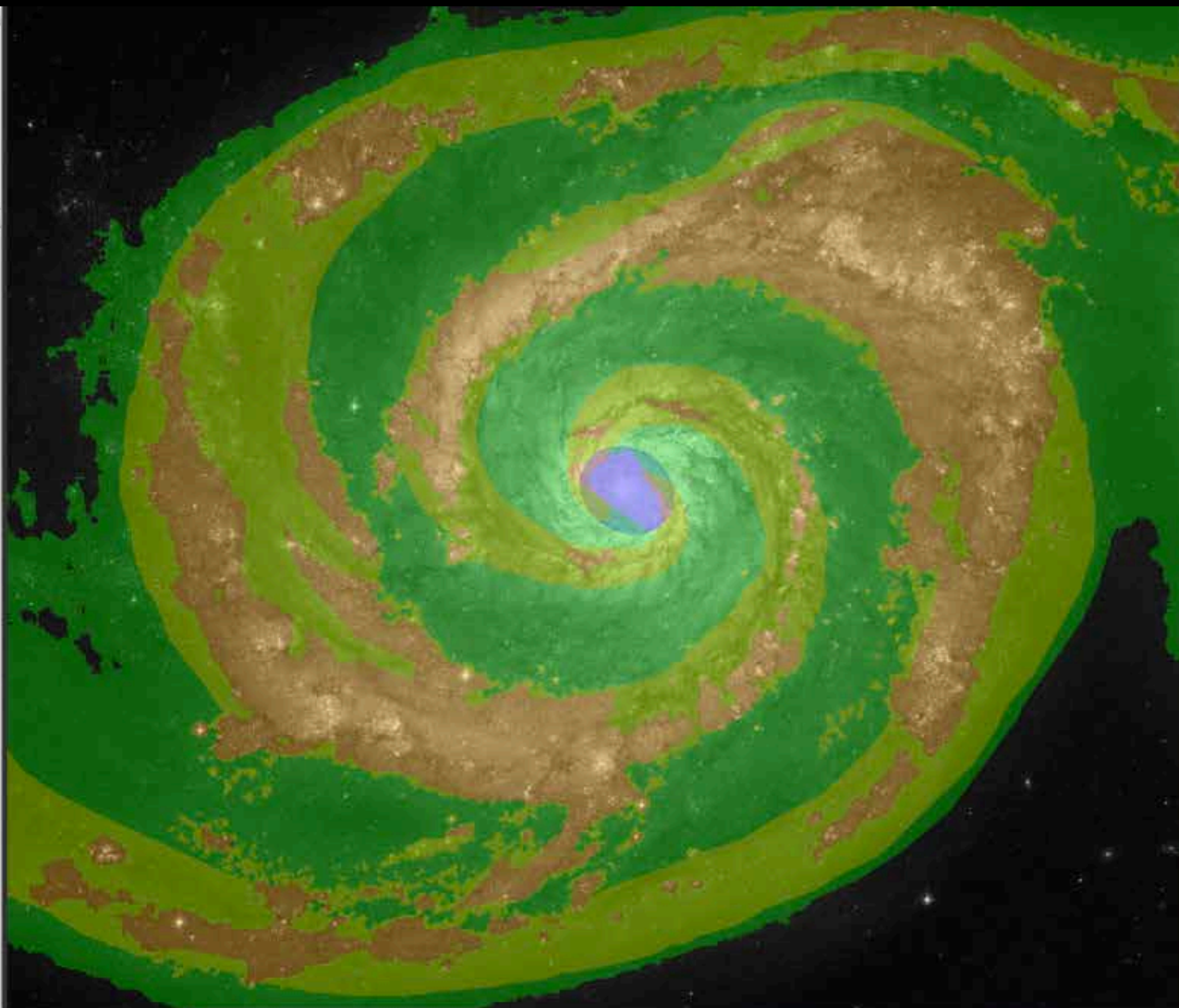
Gas/Dust parameters

Gas Percentile: 75

Dust Percentile: 55

Smooth Size: 11

Create masks



Layers

Regions

☒ bulge  
☒ gas

Take 10 (0.1)

☒ autogas6  
☒ autogas6  
☐ remove\_star  

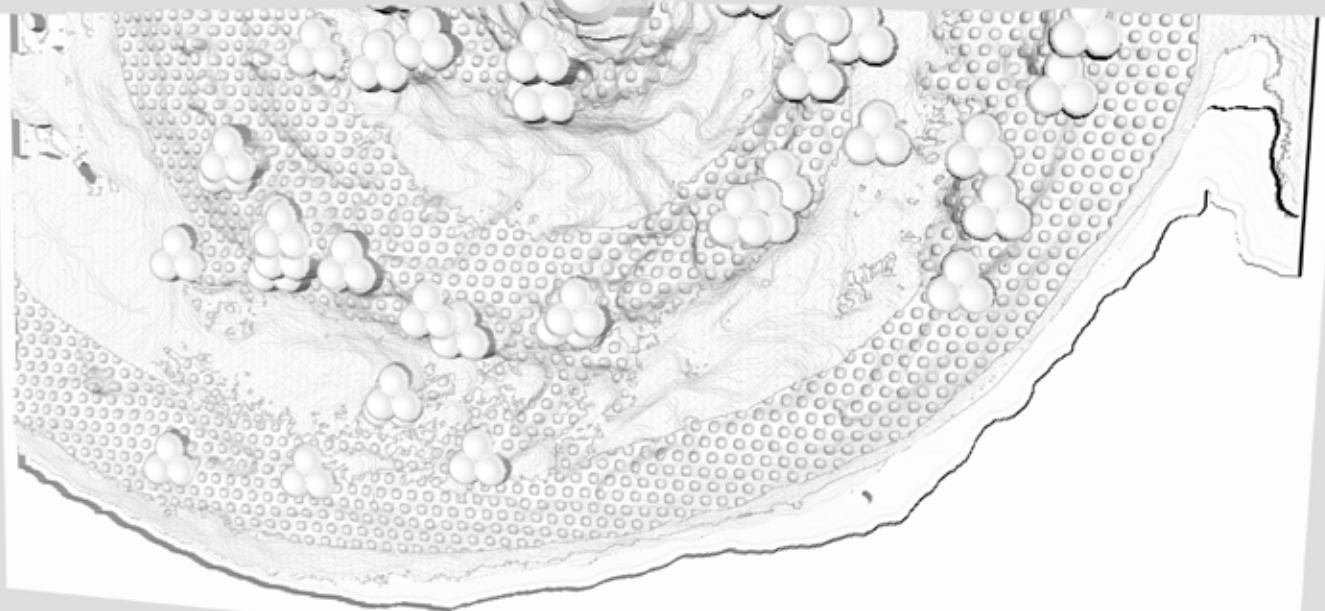
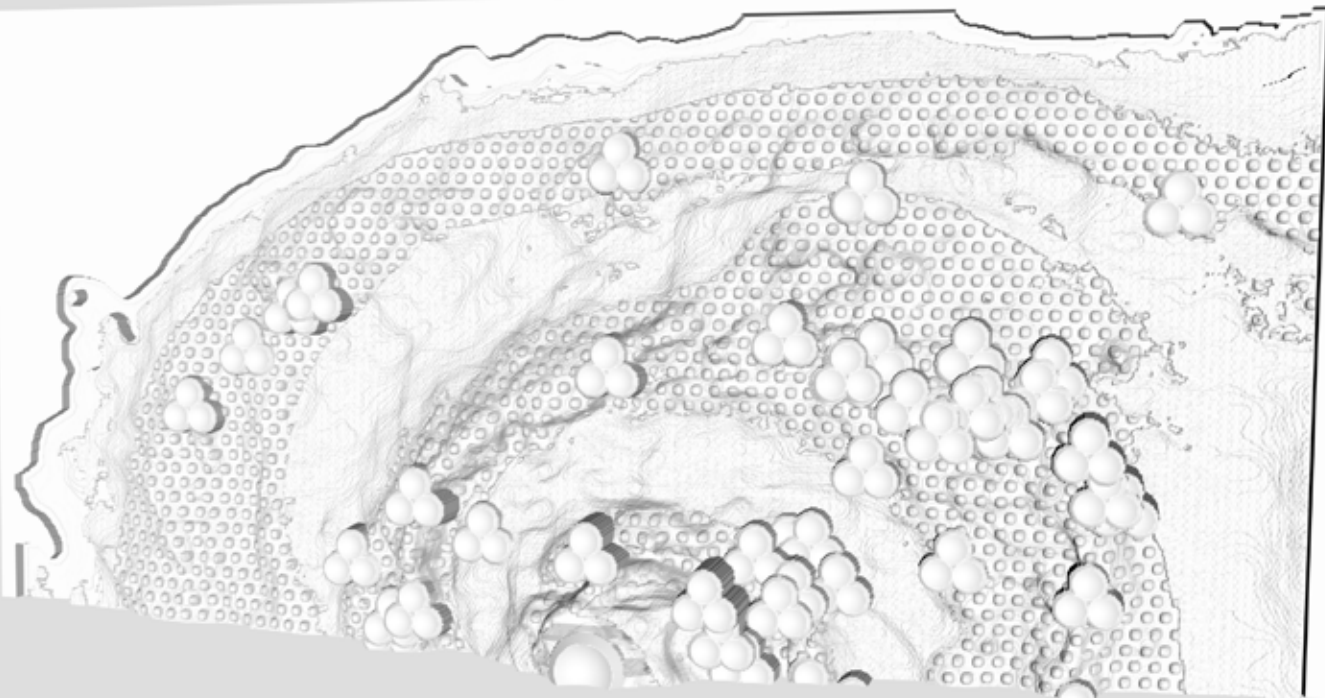
spiral

☒ Take 10 (0.1)  
☐ autospira  
☐ autospira

Clusters

☒ Stars

☒ Textures



# 3D Printing

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When chaos ensues...





Outreach

MD  
School  
for the  
Blind





# The Smithsonian National Air and Space Museum



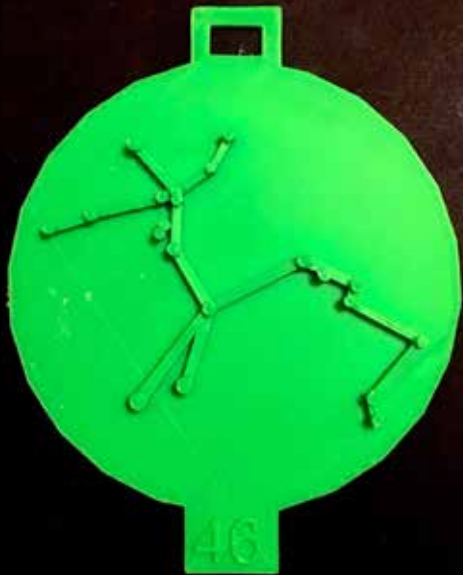
See3D



**3D Printing for People Who are Blind**

[info@see3d.org](mailto:info@see3d.org)

# Astronomy Models



# Contact




- [See3d.org](http://See3d.org)
- Instagram: [@see.3d](https://www.instagram.com/see.3d)
- Twitter: [@See3DPrinting](https://twitter.com/See3DPrinting)
- Facebook: [See3D](https://www.facebook.com/See3D)
- Founder- Caroline Karbowski: [info@see3d.org](mailto:info@see3d.org)
- Emily Kiehl: [emilydkiehl@gmail.com](mailto:emilydkiehl@gmail.com)
- Garrett Carder: [carder.320@osu.edu](mailto:carder.320@osu.edu)


# No 3D Printer? No Problem!



<https://www.perkinselearning.org/accessible-science>

SCHOOL FOR  
THE BLIND  
eLEARNING

Accessibility




ACCESSIBLE SCIENCE





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# Accessible Science



## Welcome!

Explore ideas and resources related to accessible science for youth who are blind or visually impaired, including those who are deafblind or who have multiple disabilities.

Share your ideas. Ask questions.  
Join the community!

# SciAccess

The Science Accessibility Conference



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

## The SciAccess Conference

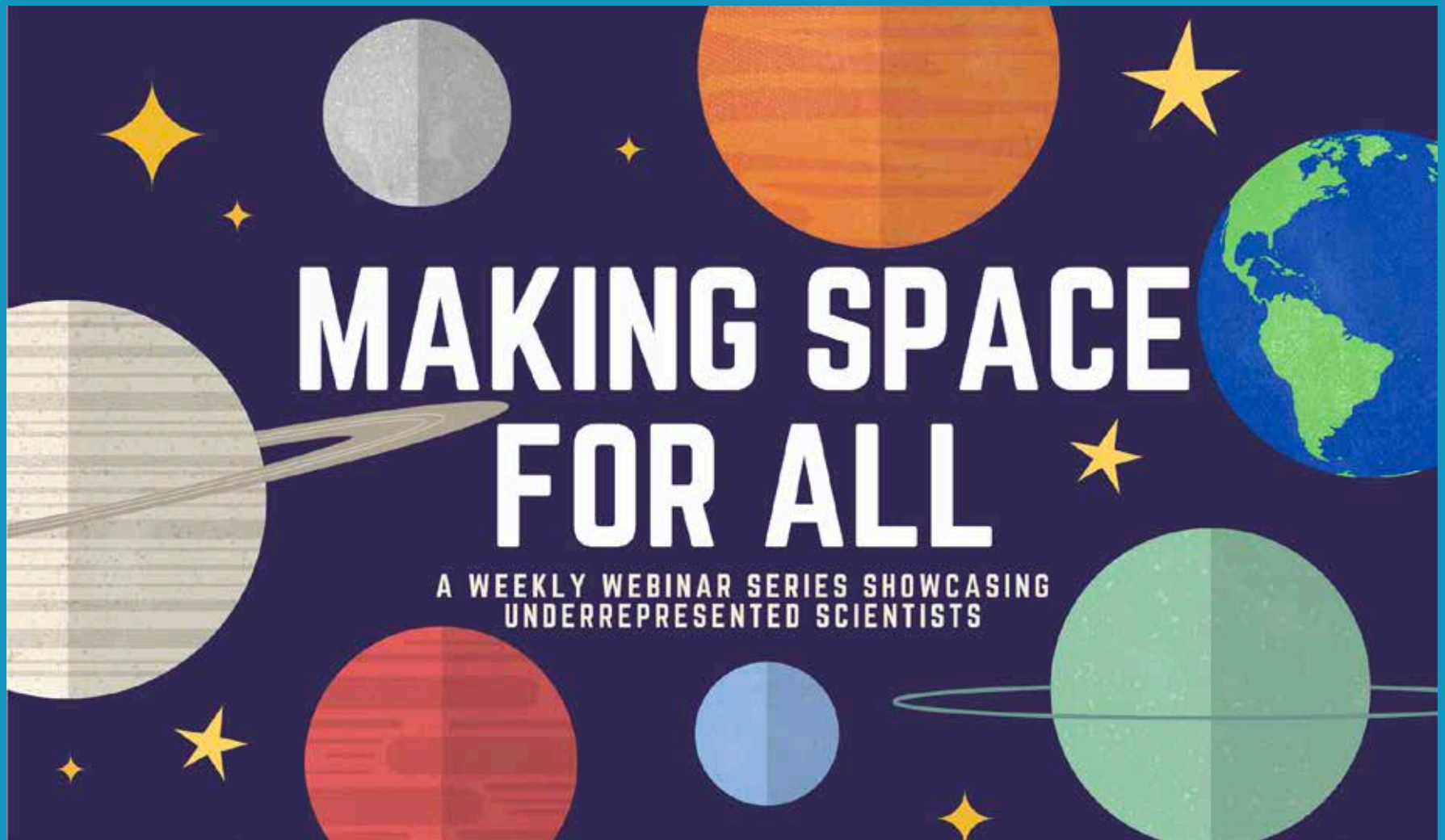
**June 28, 29, 2019**

**The Ohio State University, Columbus**

**Exploring innovative paths to equitable  
science access for those with disabilities.**

**With Space Explorer Anousheh Ansari,  
Autism Advocate Dr. Temple Grandin,  
and over 60 other outstanding speakers.**





Every Thursday at 3 PM ET. Access the Full Schedule at:  
<https://astronomy.osu.edu/outreach/making-space>

Zoom Link: <http://go.osu.edu/makingspace>

# June 29, 2020

The 2020 SciAccess Conference

REGISTER HERE: <https://go.osu.edu/sciaccess2020>



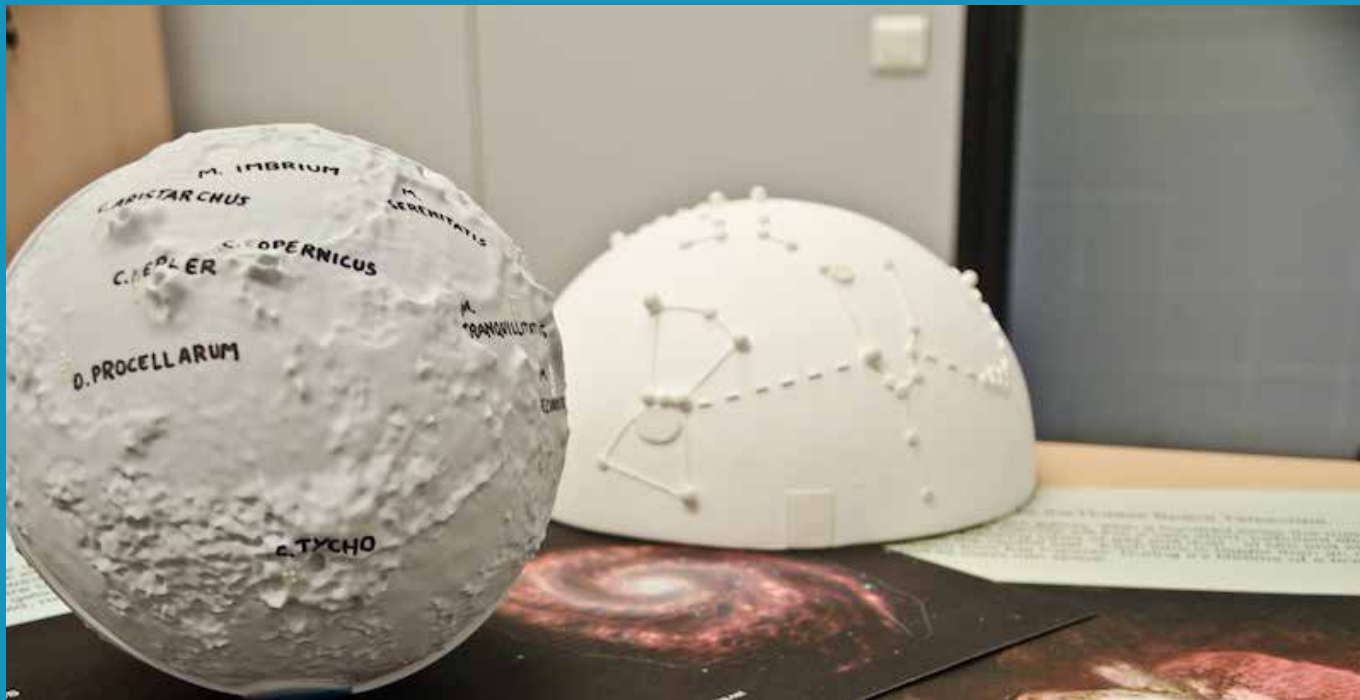
A special all-day edition of the Making Space For All webinar series, focused on promoting disability inclusion in astronomy and STEM.

# STEM Accessibility Resources

- SciAccess Community Group and email list:  
<https://www.facebook.com/groups/2758761130833027/>
- AWB (Astronomers Without Borders) Accessibility Guidelines:  
<https://astronomerswithoutborders.org/gam2019-resources/people-with-disabilities.html>
- NFB (National Federation of the Blind): <https://www.nfb.org/programs-services/national-center-blind-youth-science>
- NSF (National Science Foundation) Advancing Research Impact in Society (ARIS): <https://www.researchinsociety.org/>
- SEDS (Science Education for Students with Disabilities):  
<http://www.sesd.info/index.htm>

# Resources Continued

- NSTA (National Science Teachers Association):  
<https://www.nsta.org/disabilities/>
- Independence Science and the ISLAND Conference:  
<https://independencescience.com/>
- Free astronomy 3D prints: <https://astrokit.uv.es/index.html>



# STL File Resources

- [Thingiverse.com](https://www.thingiverse.com)
- [Myminifactory.com](https://myminifactory.com)
- [Stlfinder.com](https://stlfinder.com)
- [Btactile.com](https://btactile.com)
- [Touch-mapper.org/en](https://touch-mapper.org/en)
- [3dprint.nih.gov](https://3dprint.nih.gov) (NIH 3D Print Exchange)
- [Grabcad.com](https://grabcad.com)
- [Nasa3d.arc.nasa.gov/models/printable](https://nasa3d.arc.nasa.gov/models/printable)
- [Rovingbits.com/StarCoins](https://rovingbits.com/StarCoins)
- [Astrokit.uv.es/index.html](https://astrokit.uv.es/index.html)



**Thank you!**

Anna Voelker  
voelker.30@osu.edu  
The Ohio State University

# Discussion

**Challenges and opportunities during COVID-19**

# Thank you

Our website: [go.osu.edu/stemmdiversity](http://go.osu.edu/stemmdiversity)

Subscribe to our listserv – Link available on our home page

[hernandez.16@osu.edu](mailto:hernandez.16@osu.edu)

[zepeda.3@osu.edu](mailto:zepeda.3@osu.edu)