Accessibility
Imposter Syndrome was developed by psychologists Pauline Rose Clance and Suzanne Imes in 1978 with a particular focus on women, who generally are more prone to be “susceptible” to Imposter Syndrome. Through its recognition and further development into the 21st century, its focus has expanded to more than just women. It’s generalized for all marginalized groups within workplaces and academia. Millions have ascribed their feelings of self doubt to Imposter Syndrome and it’s not new to our conversations in Inclusivity/Diversity Trainings. There are plenty of women’s leadership conferences that include workshops on “Overcoming Imposter Syndrome” because we are all under an umbrella of pluralistic ignorance when it comes to discussing these experiences/feelings.

There is a widely held belief that STEM is not for the weak-minded but rather intellectual, advanced persons with an insight that differs from others. The analytical. Currently the face of STEM at large is the white male, our professors are predominantly male across all colleges under the umbrella of STEM. This belief perpetuates the idea, and I mean statistically within the respective fields and by average grade, that the intellectual is male and the Other identities do not have the same intellectual build to succeed in STEM.

We believe that inclusivity and accessibility are synonymous with each other. In conversation of social justice, it is necessary we talk about access and disability. Disability justice is trans-inter disciplinary, we see it in every social group and all identities. However, access is not confined to assisting only persons with disabilities but everyone at large. Again, we strongly believe that access and inclusion are synonymous with each other. A lot of what we spoke about stems from having no access whether that’s mentorship or representation or others.

At the core of the Underrepresented Student experience is Invisible Labor, which are unseen efforts, hidden work, generally distinct experiences common amongst URS that you can’t necessarily put on your resume but affect your STEM career (whether you continue or not). These are the additional things that students have to deal with on top of studying STEM in order to achieve the same playing field as students that are historically over-represented or the expectations of STEM classes. They are perpetuated when STEM isolates social contexts, making it harder for URS to feel supported and welcomed. In navigating these experiences without guidance or validation, students often will find themselves lacking inspiration to continue their career in STEM feeding into the common metaphor “the leaky pipeline” from educational careers.

It might tricky to differentiate everyday life experiences and URS experience that can adversely affect their classroom experience. I’ve listed a number of examples that can illustrate the invisible labor: Creating access in areas of no accessibility; this can range from spending extra time on material because of cognitive or mental disabilities or transcribing material in terms that is understandable to the student.

Navigating social contexts: protests, policies that affect certain identities; everyday non-academic contexts can adversely affect students and generate mental exhaustion. On the other side of this, senior students or professors that have related experiences due to their identities spend extra time supporting students when the classroom does not. In other words, we have used tokenism very loosely because it is not only individually but also at a university level that senior students or professors have to do in addition.

Finally proving self worth is an external and internal experience that students find themselves navigating.

In the past year, we have seen significant strides in what education can look like. Particularly, how we can make education accessible to all students. While many students have had their complaints about the IVC format, many students have benefitted from the format and furthermore we have seen attributes come out of IVC such as recorded lectures, live captioning, easy pronoun/name identification...
Supportive Classroom STEM-vironment Workshop

Presented by the CSME/Being Human In STEM Interns:
Ella Spurlock, Marina Gerton, Michelle Cao
Getting Started

Please rename yourself based on what your role at the university is.

Add before your name:

- US - for undergraduate student
- F - for faculty or instructor
- S - for staff
- GS - for graduate student
- P - for postdoc
- O - other

Ex: “F - Claudia De Grandi” or “US - Ella Spurlock” etc.
WHO WE ARE

Michelle Cao  
(she/they)  
Major: Physics & Astronomy  
michellekimcao@gmail.com

Ella Spurlock  
(she/her)  
Major: Chemistry  
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Marina Gerton  
(she/her)  
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marina.gerton@utah.edu
Disclaimer

This workshop has been created by students, and even more significantly by humans. We are not infallible in our knowledge and we are open to different interpretations. Our content is entirely built on a student viewpoint that is not generalized across the student body. We understand there are plenty of grey areas and surrounding language that have different associated personal preferences or connotations. We are mindful about these viewpoints and intentional in our language use.
Logistical Notes

This workshop is 90-minutes long with a short break half-way through

The slides and recording will be made available after the workshop

Live captioning is available by clicking on the bottom right of the screen under the Live Transcript button ‘CC’
What Informed Us
Our Goals, Inspiration, & Research:

**Goals:** Present our investigation about the correlation between STEM classroom environments and retention rates/diversity

- We believe instructional teams are foundational in providing healthy, positive, and supportive classroom environments
- Socio-Political structures informs us on every aspect of culture including how we learn, the content we learn, and how we are taught.
- *Identity not only belongs in STEM but is inherent in how we approach learning*

**Quantitative Data:** Student demographic by major publicly provided by the Office of Budget & Institutional Analysis (OBIA)

[https://www.obia.utah.edu/](https://www.obia.utah.edu/)

**Qualitative Data:** *Personal stories as told by students via an informal Survey, Feedback from Professors Instructing Summer Semester 2021

*Sent out & collected in April 2021*
**Research**

- **What I Wish My STEM Professor Knew**
  - Collected student stories via an open survey distributed to select STEM courses at the U of U*. To inform us on the student perspective.
  - *Sent out and collected through the month of April 2021.

- **Teaching Strategies**
  - Investigation into pedagogical strategies: researched Universal Design for Learning (UDL), Formative Assessments, Constructivism, Scaffolding, Group Learning, etc.

**Presentation**

- **Recommendations for Inclusive Learning**
  - Curated a non-exhaustive collection of recommendations for teaching inclusively.
  - Observed classes across The College of Science.
  - Held informal conversations with professors to learn the realistic challenges, barriers, and implementations of these strategies.

**Summer Internship Work**

- **NOTE:** The College of Engineering and The College of Mines & Earth Sciences did not offer intro-level courses over the summer. 3 math & 2 physics courses were observed.
Our Motivation: Accessibility & Inclusivity

- Inclusivity and Accessibility are synonymous with each other
- In conversations of social justice, it is necessary we talk about access & disability
- Disability justice is trans/inter-disciplinary
- The majority will live with at least one disability at some point in their/our lives
- Accessibility is not confined to assisting only people with disabilities.
  - Access includes English learners having available assistance in understanding instructors
- When access is not available, students are facing *invisible labor*
“Because of my disability if things aren't presented in a clear organized way I struggle to get through them. I can spend much more time trying to understand unclear guides than I do actually learning the material. Once I know what's expected, it takes no time at all. Working hard isn't a challenge, working on the right thing can be. I'm near constantly trying to find ways to do as best I can so that my disability doesn't show. If it has to be brought up it has caused my previous teachers to use that as a reason not to try and help me. (Before coming to the U. I don't reveal it anymore) Most of the time my disability hasn't prevented me doing well, it's just made it harder…”

Major: Mechanical Engineering
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2. Workshop Introduction

3. **Introduction to Recommendations for Inclusive Learning**

4. The Importance of Representation
   a. Eurocentrism in STEM
   b. Scientist #1: Chien-Shiung Wu
   c. Scientist #2: Martin Gouterman
   d. Scientist #3: Tikvah Alper

5. Reflection and Debrief on Recommendations for Inclusive Learning
   a. Recommendations for the Post-COVID Classroom

6. Resources
Our Learning Outcomes

- Attendees will use the content of the workshop as a stepping off point for reflecting on their teaching practices
- Attendees will identify some of the practices demonstrated in the workshop or laid out in the list of inclusive practices that they will implement in their classrooms
- Attendees will identify and learn about a non-traditional scientist in their own field of study who interests them
- *Keep in mind your own personal learning outcomes/goals (i.e. why did you choose to attend the workshop?)*
Our Format

Guide to Inclusive Learning/Instructing
Explains the underlying lecture structures

Lecturer
Delivering content

Student
Voice the thoughts of a student in class

Illustrated by Claudia De Grandi
Lecture Outlines

Yesterday:
Compounds/molecules, types of bonds, and naming compounds

Today: Chemical Bonding
1. Lewis Structures  
   a. Octet rule  
2. VSPER

Today's Topic: Competition
a. Interspecific vs. Intraspecific competition  
b. Lotka-Volterra model  
c. Exploitative vs. Interference competition  
d. Scramble vs. Contest competition  
e. Fundamental vs. Realized niches
Outlines, Organization, Outcomes

- Assists neurodivergent students (those with autism, ADHD, ADD, etc.), but also the entire student body, to learn with ease
- Broad course outlines and everyday class outlines allow students to understand the flow of content
  - Students will make connections between topics
  - Students will know expectations and understand learning outcomes
- Provide students with general learning outcomes or goals for the course
  - Interventional Learning (What is important to the student? How does this course relate to or enrich the student’s life? Why did they choose to take the course?)
  - Should be straightforward and ‘measurable’
  - Reaffirm the importance of having personal learning goals as well
- Lecture and subtopic titles allow students to organize and study with ease
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Dimensions of Representation

● What is Representation?
  ○ Representation tells people they belong and are capable of making significant contributions

● Our current understanding of STEM is because of the contributions of many people across different disciplines over time
  ○ Ex. Calculus tells us about kinematics, quantum/particle physics tells us about atomic structure, atomic bonding and molecular interactions tells us about DNA, so forth...

● Interdisciplinary Representation
  ○ Knowledge comes from all forms and types of questioning how things works

● Removing Singular Representation
  ○ Ex. Liu Hui was solving linear eq. using matrices in 220 BC which we know as Gaussian Elimination, Islamic Golden Age (850C) had many different texts on the laws of motion which we know as Newton’s Law of Motion, Pythagorean theorem was found all over the world
The Importance of Representation: Dimensions

Eurocentric STEM culture

“In schools, the standards and policies of math/science learning reflect a normative canon of knowledge, values, and practices shaped by colonial and settler colonial histories. From this perspective, learning becomes a process of enculturation where, in Western Modern Science (WMS) for example, empiricism, objectivity, and rationale seem the only legitimate ways of knowing and being”

“While colorblindness implies a blindness toward racial identities of people, cultureblind STEM signals a blindness to the anti-Black, colonial, and settler colonial histories that have shaped WMS (and mathematics) to be anything but ‘culture-free’”

The Importance of Representation

- Aspirations in STEM fields oftentimes come from established participants that look like them
  - Students need to be able to picture themselves as: Scientists, Technologist, Engineers, & Mathematicians.
  - Participation in STEM from all backgrounds benefits everyone (more ideas, more hands)
- Hidden figures in science are predominantly the historically marginalized social classes
  - Feeds into underrepresentation/low participation amongst marginalized social classes
- Non-traditional STEMicist
  - Contributors of STEM that do not ascribe to over-represented social class (white, cis, heterosexual, abled males)
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Can you name a Chinese (or east-asian) Scientist other than Chien-Shiung Wu? (Reflective, type in chat)
Chien-Shiung Wu
吴健雄
(Wú Jiànxióng)
“jee-ahn shee-ung woo”
Particle, Nuclear, Experimental Physicist
1912-1997

What is the first image in your mind when you picture a scientist?
(Reflective, type your answer in chat)
“A petite Chinese girl worked side by side with some top US scientists in the laboratory studying nuclear collisions. This girl is the new member of the Berkeley physics research team. Ms. Wu, or more appropriately Dr. Wu, looks as though she might be an actress or an artist or a daughter of wealth in search of Occidental culture. She could be quiet and shy in front of strangers, but very confident and alert in front of physicists and graduate students. China is always on her mind. She was so passionate and excited whenever ‘China’ and ‘democracy’ were referred to. She is preparing to return and contribute to the rebuilding of China.”
A Short Timeline: “Ask Dr. Wu”

Wu immigrates to the US in 1936 faced with sexism/racism. Her thesis is completed at UC Berkeley in 1940.

At UC Berkeley, Wu conducts research in Uranium Fission Products (did not obtain faculty here)

Wu is appointed faculty at Columbia University in 1945 (until her retirement 1981).

Other experiments: Manhattan Project, EPR, Beta Decay, CVC Hypothesis Sickle Cell Anemia

Wu Experiment is Carried at Columbia University in 1956-1957

World leading experimental physicist with the honors: the first women with an honorary doctorate at Princeton, first female president of The APS, and the first living scientist to have an asteroid named after her.
“Mrs. Wu is wasting her time. I would bet you a large sum that parity is conserved.”

Wolfgang Pauli to Victor Weisskopf
Scientific Findings: Violation of Parity

The Wu Experiment (1956-1957)

Chen-Ning Yang and Tsung-Dao Lee won the Nobel Prize in Physics for CP Violation in 1957. Wu would not get recognized for her experiment until the Wolf Prize was awarded to her in 1978.

Fundamental Contribution to Particle Physics which Lead to the Development of the Standard Model
“It is perhaps difficult for a modern student of Physics to realize the basic taboo of the past period (before 1956) ... it was unthinkable that anyone would question the validity of symmetries under ‘space inversion,’ ‘charge conjugation’ and ‘time reversal.’ It would have been almost sacrilegious to do experiments to test such unholy thoughts.”

Chien-Shiung Wu (date unknown)
First Lady In Physics

In a speech at MIT symposium 1964 against gender discrimination:

“I wonder.... Whether tiny atoms and nuclei, or the mathematical symbols, or the DNA molecules have any preference for either masculine or feminine treatment”


In 1963:

“In China there are many, many women in physics. There is a misconception in America that women scientists are all dowdy spinsters. This is the fault of men. In Chinese society, a woman is valued for what she is, and men encourage her to accomplishments, yet she remains eternally feminine.”

Quoted in 'Queen of Physics', Newsweek (20 May 1963)
Quiz!

1. Have you identified a teaching practice that you will consider this upcoming semester so far? (yes, no, somewhat)
2. Do you think the challenges/barriers that Chien-Shiung Wu faced are still applicable today? (yes, no, somewhat)

Questions Asked Before:
1. Can you name a Chinese (or other east-asian) scientist other than Chien-Shiung Wu?
2. What is the first image in your mind when you picture a scientist?
3. Does the picture of Chien-Shiung Wu Challenges your idea of a scientist?
**Kinematics** (linear/uniform circular motion)
Karen Uhlenbeck/ Maryam Mirzakhani (late 1900, mathematicians) - modern geometric analysis (more applicable to quantum mechanics/classical physics)

Nasir al-Din al-Tusi (1200, mathematician) - formulated spherical trigonometry as early as 400 BCE (basis for uniform circular motion)

Bhaskara Acharya (1100, mathematician) - conceived differential calculus

Domingo de Soto (1500, theologist) - refined definition of acceleration

**Dynamics (force)**

Thabit ibn Qurra (c. 850, polymath) - founder of the analysis of force/torque.

Ibn Sina (900, polymath) - conceptized inertia (1st law of motion)

Hibat Allah Abu'l-Barakat al-Baghdaadi (1100, philosopher) - conceptualized constant force imparts a constant acceleration (2nd law of motion)

Ibn Baijah (1100, polymath) - conceptualized opposite reactions (3rd law of motion)

**Energy/work**

Emilie du Châtelet (1700, physicist) - refined the conservation of energy and momentum concept

Emmy Noether (1900, mathematician) - every conserved force has a conservation law

**Rotational/ rigid bodies**

Katherine Johnson (1900, mathematician) - orbital mechanics

Sophya Kovalevskaya (1800, mathematician) - “Kovalevskaya Top” list of known integrable rigid bodies

**Oscillations/waves**

Nergis Mavalvala (present, physicist) - proved gravitational waves exist

Donna Strickland (present, optical physics) - chirped pulse amplification application

**Astronomy**

Cecilia Payne-Gaposchkin (1900, physicist) - demonstrated hydrogen is the most abundant element in the universe

George Edward Alcorn Jr. (present, astrophysicist) - computer analysis of launch trajectory and orbital mechanics for Rockwell Missiles

George Carruthers (1950, astrophysicist) - Invented UV camera/spectrograph used by NASA in Apollo 16

Subrahmanyan Chandrasekhar (1900, physicist) - white dwarf mass limit

Henrietta Swan Leavitt (1800, astronomer) - discovered relationship between luminosity and Cepheid Variables (measure the dist. of stars relative to Earth)

Annie Jump Cannon (1800-1900, astronomer) - credited with creating the Harvard Classification Scheme of stars

**Quantum Mechanics**

Sau Lan Wu (present, quantum physicist) - discovered J/ψ particle (standard model)

Lisa Randall (present, theoretical physicist) - Randall-Sundrum Model
Break Time

My back hurts; I need to stand up and stretch/walk around

I need to quickly go check on my child in the other room

I had a class right before this and didn’t get to eat lunch; I need to grab a snack

I’m having a hard time paying attention anymore; I just need to step away for a bit

I pulled an all-nighter last night to finish a paper, I need to step away from my computer and get coffee

I rushed to this meeting and really have to use the bathroom, but didn’t want to miss any content
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Martin Gouterman
Quantum Chemist and Gay Activist
1931 - 2020
Brief Biography

Scientific Contributions:

Developed the influential ‘four-orbital model’ of porphyrins

Social Contributions:

One of the first out gay chemists and fought for better lives for LGBTQ+ community
Undergraduate and graduate degrees in physics.

*University of Chicago*
*(1949-1958)*
Postdoc to William Moffitt, and then Assistant Professor of Quantum Chemistry upon Moffitt’s sudden death.

*Harvard University*
*(1958)*
Independent career in quantum chemistry researching porphyrins began.

*Harvard University*
*(1958-1966)*
Scientific Career

Roald Hoffmann:
Gouterman’s student who went on to earn a Nobel Prize
(not pictured)

Paul Seybold:
Gouterman’s student who published a paper cited over 700 times.

Martin Gouterman
Scientific Career

Focused on mentorship and shifted to more applied chemistry.

*University of Washington*
*(1966-end of career)*
Martin married Delynn Eastwood, a female postdoc and colleague in his lab, briefly while at Harvard.

Why?

“Gouterman made it clear that the marriage was merely a cover that he, for one reason or another, felt obliged to resort to.”

Personal
Quiz:

What molecule did Martin Gouterman spend his career studying?

A. Phosgenes
B. Pyridines
C. Porphyrrins
Quiz: Growth Mindset

- Growth Mindset requires the creation of a humane environment/space that allows growth
- Humane environments tell students they are able to improve without worrying about detriments to their grades
- Provide low-stake assessments
  - Short assignments worth little points
  - Spread throughout the semester (quizzes, pre-class assignments, in-class assignments)
  - To build familiarity with topics/questions
- Remind students about beneficial study habits/growth mindset and provide opportunities for them
  - Ex. “Successful habits”, “Study halls over office hours”
Ben Barres (Neurological Chemist) - He did revolutionary work on glial brain cells and was the first openly transgender member of the US National Academy of Sciences

Rachel Carson (Marine Biologist) - Brought attention to bad effects fertilizers and other industrial chemicals have on the environment, and closeted lesbian

George Washington Carver (Agricultural Chemist) - Besides advocating crop rotation, Carver also helped pioneer the field of chemurgy.

St. Elmo Brady (Physical Organic Chemist) - First African American to earn a Ph.D. in chemistry. Built chemistry programs at 4 major HBCUs.

Winifred Burks-Houck (Environmental Organic Chemist) - First woman president of NOBCChE. Forged bonds with other national societies to advance black chemists.

Marie Maynard Daly (Biochemist) - Elucidated how histones function. The first African American woman in the United States to earn a Ph.D. in chemistry.

George Edward Alcorn Jr. (inventor, physicist) - invented the X-Ray Spectrometer (applied in physics lab)

James A. Harris (nuclear chemist) - co-discovered Rutherfordium (104) and Dubnium (105)

Lise Meitner (physicist) - discovered protactinium and nuclear fission (she also observed energy is not conserved in beta decay)

Tapputi Belatekallim - world’s 1st recorded chemist

Elizabeth Fulhame - discovered catalysis

Irma Goldberg (Organic Chemist) - Goldberg Reaction (Copper reaction to produce nitrogen-carbon bond)

Ursula Franklin (metallurgist) - concluded the radioactive isotope strontium-90 was appearing in children’s teeth which led to the “Partial Nuclear Test Ban Treaty of 1963”

Maria Goeppert-Mayer (nuclear physicist) - atomic nuclear shell structure

Alice Ball (chemist) - developed the Ball Method (effective leprosy treatment)
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Tikvah Alper
“The Sage of Radiobiology”
Physicist and Radiobiologist
1909-1995

Obtained from: https://en.wikipedia.org/wiki/Tikvah_Alper
Born 1909 in Cape Town, South Africa to Russian Jewish refugees

Studied physics at Cape Town University, obtaining her masters

Moved to Berlin in 1929 to obtain her doctorate, studied delta rays under Lise Meitner

Married bacteriologist Max Sterne

Opened home laboratory since she was excluded from academic positions as a married woman

Left Berlin for South Africa in 1933, without completing her doctorate
Brief Biography: Continued

- Sons Jonathan and Michael born in 1935 and 1936
- Became head of Biophysics section of South African National Physics Laboratory in 1948
- Left South Africa as a result of her opposition to apartheid in 1951
- Trained in speech therapy and became teacher to the deaf to assist disabled son Jonathan
- Died in England in 1995
- Took an unpaid position at MRC Radiobiology Laboratories at Hammersmith Hospital in London
- Researched the effects of radiation on cells and cell biology
- Became Director of the Radiobiology Unit in 1962, and studied prion diseases and the infectious agent of Scrapie
Science and Community Engagement

Scientific Achievements

- Developed method for measuring optical density of bacterial cultures
- Discovered that infectious agents of Scrapie and BSE do not contain nucleic acid
- Worked towards identifying the existence of prions
- Developed an instrument to help visualize pitch variations for speech therapy

Action in the Community

- Retrained as a speech therapist after learning her older son was deaf
- Temporarily (14 years) left scientific career to teach her son and other deaf children
- Was a noted feminist who never took her husband’s name or wore a wedding ring
- Lost her South African passport and laboratory position due to her opposition to apartheid
Who did we talk about?

- **Chien-Shiung Wu**
  - Experimental, particle, and nuclear physicist
  - “First lady of physics”, “Madame Wu”, “Dragon Lady”
  - Notable works: Manhattan Project (U-286), Wu-Experiment (CP Violation), Beta Decay
  - 1st female president of American Physics Society, Honorable Doctorates at Princeton

- **Martin Gouterman**
  - Quantum Chemist
  - Notable Works: 4 orbital model of porphyrins
  - Leading figure in Seattle’s gay rights movement of the 1960s
  - Mentor to many recognized scientists

- **Tikvah Alper**
  - Radiobiologist and physicist
  - “The sage of radiobiology”
  - Notable work on: prions, Scrapie, irradiation of cells, opacity of bacterial cultures
  - Also worked as a teacher to deaf children
Reflection: Group
Reflection

Questions

● Did you already know about these three scientists? Why or why not?
● Do you think that the legacy of scientists are affected by their activism (positively or negatively)?
● How do you plan to introduce non-traditional STEMicists to your classes?
STEMicists of the Week: Biology Edition

Rebecca Lee Crumpler (physician and nurse) - first African-American woman to obtain M.D., published medical text directed towards mothers
Rotonya Carr (physician-scientist) - hepatologist studying and treating alcoholic and non-alcoholic fatty liver disease
Rosalyn Yalow (medical physicist) - 1977 Nobel laureate, developed the radiimmunoassay technique
Flossie Wong-Staal (virologist) - first to clone HIV and determine function of its genes
Rita Levi-Montalcini (neurobiologist) - discovered nerve growth factor, 1986 Nobel laureate
Yizhi Jane Tao (biochemist) - mapped the atomic structure of influenza A nucleoprotein
Françoise Barré-Sinoussi (virologist) - worked to link HIV as cause of AIDS, 2008 Nobel laureate
Dorothy Crowfoot Hodgkin (chemist) - X-Ray Crystallography to determine biochemical structures (an essential tool in structural biology)
Roseli Ocampo-Friedmann (microbiologist) - studied extremophiles, work has contributed to exploring terraformation of Mars
Maria Sibylla Merian (naturalist) - skilled illustrator, studied botany and tropical insects

Branson Herman (physicist) - researched alpha helix protein structure (led to our understanding of how sickle cell anemia works)
Emmett Chappelle (biochemist) - discovered single cell organisms photosynthesize, worked on bioluminescence
Ernest Everett Just (biologist) - research observed cell surface in the development of organisms, could have sped up our understanding of the cell
Nettie Stevens (geneticist) - discovered sex chromosomes
Maude Menten (biochemist) - worked in enzyme kinetics, Michaelis-Menten kinetic equation
Gerty Cori (biochemist) - discovered course of catalytic conversion of glycogen, 1947 Nobel laureate
Alma Howard (radiobiologist) - proposed the first concept of cell cycle (4 distinct periods)
Margaret Bastock (geneticist) - provided the 1st evidence that a single gene can change behavior
Barbara McClintok (cytogeneticist) - discovered genetic transposition, 1983 Nobel laureate
Reflection

Questions

• Did you already know about these three scientists? Why or why not?
• Do you think that the legacy of scientists are affected by their activism (positively or negatively)?
• How do you plan to introduce non-traditional STEMicists to your classes?

Instructions

• First spend some time reflecting on the questions on your own
• If you would like to discuss with a group, please move into a breakout room
• If you end up in a room alone, please move to another
  ○ If you see any rooms with 4 people in them already, choose a different room
• If you don’t want to have any group time, please stay in the main room
Share your thoughts and/or what you discussed with your group about introducing non-traditional STEMicists to your courses

Type in chat or raise your hand to comment verbally
Group Time and Resubmissions

After individual section, group time allows students to check in with each other and increase their understanding.

Allowing group resubmissions ensures that students can apply increased understanding and recover from mistakes.

Taken together, group time and resubmissions build connections amongst students and provide a safety net for grades.

We recommend limiting group sizes to 3-4 people to help maintain positive group dynamics.
Table of Contents/Agenda

1. Jumping Right In (Bad Start)
2. Workshop Introduction
3. Introduction to Recommendations for Inclusive Learning
4. The Importance of Representation
   a. Eurocentrism in STEM
   b. Scientist #1: Chien-Shiung Wu
   c. Scientist #2: Martin Gouterman
   d. Scientist #3: Tikvah Alper
5. Reflection and Debrief on Recommendations for Inclusive Learning
   a. Recommendations for the Post-COVID Classroom
6. Resources
Debrief: Takeaways
Recommendations for Inclusive Learning/Teaching

- Lecture outlines and clear organization of courses
  - Titling lectures, providing guidelines of topics, setting clear expectations (learning outcomes)
- “Non-traditional STEMicist” and why representation in STEM matters
  - Eurocentric standard, de-colonizing STEM
- Feedback
  - Structured and unstructured quizzes
- Quizzes
  - Group submissions
  - Providing expectations/guidelines
  - Maintain regular quiz schedule
  - Growth Mindset
- Affirmations
  - Ex. “This is a positive & supportive classroom environment”
- Mental/physical breaks

[Link to full list of recommendations for inclusive learning]
What this looks like post-COVID

- Record lectures
  - Allows students to focus more on understanding than note taking, and recover from missed lectures
- Post slides (pre- and post-lecture)
  - This allows students to study directly from provided material and look back over what they may have missed
- Optional IVC
  - This ensures students can still attend class if they are unable or uncomfortable coming in person
- Online assignment submission
- Supplemental technology programs
  - Provides a different instructional method to keep students engaged
- Designated breaks
  - Gives students the chance to recharge and deal with non-class related issues
- Be flexible!
Think about overall structure/delivery of your course (beyond content)

Think about content you’re teaching

Think about student reactions (engagement, feedback, etc.)

Designing your course

Illustrated by Claudia De Grandi
How do you introduce your course?
Our Learning Outcomes

- Attendees will use the content of the workshop as a stepping off point for reflecting on their teaching practices.
- Attendees will identify some of the practices demonstrated in the workshop or laid out in the list of inclusive practices that they will implement in their classrooms.
- Attendees will identify and learn about a non-traditional scientist in their own field of study who interests them.
- *Keep in mind your own personal learning outcomes/goals (i.e. why did you choose to attend the workshop?)*
Exit Survey
Resources: Literature (on teaching)

Arthur B. Powell and Marilyn Frankenstein on understanding the eurocentric history of, and links between, culture and mathematics
Ethnomathematics

Connie M. Moss and Susan M. Brookhart on formative assessment as an instructional practice
Advancing Formative Assessment In Every Classroom

Claude Steele on the effects of stereotypes
Whistling Vivaldi: How Stereotypes Affect Us and What We Can Do

bell hooks on teaching pedagogies and educational practices
Teaching To Transgress: Education as the Practice of Freedom
Teaching Critical Thinking: Practical Wisdom
Teaching Community: A Pedagogy of Hope
Resources: Literature (social justice, broadly)

Ibram X. Kendi on Black Experience, Racism at large
How to Be An Antiracist

Leah Lakshmi Piepzna-Samarasinha on disability as trans/inter-disciplinary social justice work
Care Work: Dreaming Disability Justice

Robin Wall Kimmerer on indigenous knowledge and the alternative scientific method outside of the traditional form.
Braiding Sweetgrass

Michelle Alexander on mass incarceration and modern prison systems
The New Jim Crow
Resources: Other

**Literature**
- Rising Out of Hatred
- Detours: A Decolonial Guide to Hawai‘i
- Sapiens
- The Double Helix
- Stamped From the Beginning
- White Fragility
- Between the World and Me
- Walking Out On the Boys
- The Sixth Extinction: An Unnatural History
- Creating Inclusive Learning Opportunities in Higher Education
- Hidden Figures
- Becoming
- The Remedy: Robert Koch, Arthur Conan Doyle, and the Quest to Cure Tuberculosis
- Freedom is a Constant Struggle

**Fiction**
- The Nickel Boys
- Americanah
- Bluest Eyes
- Sulah
- Their Eyes Were Watching God

**Film**
- Picture a Scientist
- 13th
- Just Mercy
- The Pieces I Am
- Crip Camp

**Podcasts**
- Scene on Radio
- White Lies
- Sounds Like Hate
- This American Life
- Nice White Parents
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Parks, Shoshi. "This brilliant Chinese scientist was taught she was just as capable as men. Then she came to America". May 17, 2018
Zabel, Mark D; Reid, Crystal. A brief history of prions. Pathogens and Disease, 2015.
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