Expanding Your Horizons - March 30, 2019

1. **Build Your Future: Careers in Architecture**
   Do you love designing or learning about structures? Learn some basic architecture vocabulary, and then translate your ideas into form!
   ~Susanne Cowan, MSU School of Architecture

2. **Crafting New Medical Diagnostics**
   Crafting and engineering share a common theme: to harness creativity and create a new, functional item. See how crafting tools can be used to create compact devices that can detect small molecules and learn how these devices can be used by medical professionals.
   ~Stephanie McCalla, MSU Dept. of Chemical and Biological Engineering

3. **Become a Road Designer!**
   Designing a road isn’t always as simple as connecting “Point A” to “Point B.” Learn about some of the challenges faced in transportation engineering. Then, discover design solutions by teaming up and practicing with hands-on models of different transportation scenarios.
   ~Danae Giannetti, Montana Department of Transportation

4. **Using DNA to Improve Livestock Production**
   Collect DNA from a thymus gland and learn about genetic testing in livestock. See how molecular biology and genetics are being used to select better animals and predict how they will perform—sometimes even before they are born.
   ~Dr. Jennifer Thomson, Jordan Hieber and Luka Mueller, MSU Department of Animal and Range Sciences

5. **Water Shapes Our World!**
   Learn about rivers, floods, and how water shapes our habitable world. Use the stream laboratory and giant sandbox to move water and earth, and make floods, rivers and deltas.
   ~Jean Dixon, MSU Department of Earth Sciences

6. **We’ve Got Gas! Carbon Capture in Molecular Sponges**
   Absorption is happening all around you—gases and liquids sticking to surfaces. Observe the power of absorption in well-designed “molecular sponges” with very large internal surfaces (up to a football field per gram) to adsorb gases like CO2 directly from the atmosphere.
   ~Nicholas Stadie and Erin Hanson, MSU Dept. of Chemistry and Biochemistry

7. **Exploratory Education in the STEAMlab**
   The STEAMlab is CMB’s high-tech MakerSpace in which we explore, create, and experiment with all kinds of tech design and engineering.
   ~Natalia Kolnik, Children’s Museum of Bozeman

8. **How Losing My Toes Helped Me Find My Passion: Turning Adversity to Strength**
   When I was in a severe motorcycle accident, I lost one and a half toes and broke ten bones. But I found my passion for medicine and neuroscience research. Learn how my accident influenced my career choice. I hope my story will help you find your passions, too!
   ~Zariah Tolman, MSU Dept. of Cell Biology and Neuroscience and Biochemistry

9. **Glowing Frog Cells to Study the Brain**
   We use electricity in our brains to think. Learn how scientists use frog cells to study that electricity! You’ll get a chance to prepare the frog cells and watch them glow using a microscope.
   ~Suzy Kohout, Josh Davison and Keith Andrews, MSU Department of Cell Biology and Neuroscience

10. **Inspecting Sunlight**
    We can’t travel to the Sun, but we know a lot about what it’s like there. Build your own spectrophotograph and learn how to see the messages hidden in the Sun’s light.
    ~Aki Takeda, MSU Department of Physics; and Tatsuya Akiyama, MSU Department of Microbiology and Immunology

11. **Virus Epidemic!**
    Learn about and discover different kinds of viruses and how they infect their hosts. Then, design your own virus to battle during the final viral epidemic!
    ~Kelly Shepardson and Heather Walk, MSU Department of Microbiology and Immunology

12. **Ecology Games: Catching Fire**
    How can models help us understand wildfire? Find out by building and burning a matchstick forest! Test how slope and tree density affect fire spread, and learn how models are used to study fire ecology and fire management.
    ~Kristen Emmett, MSU Department of Ecology

13. **Have Your DNA and Eat It Too!**
    Build a model of DNA to figure out how DNA divides and fits into all your cells. Then figure out what your DNA says using a special code. Is your DNA mutant? Let’s find out!
    ~Jennifer Lachowiec and Megan Hager, MSU Department of Plant Sciences and Plant Pathology

14. **Electricity & Magnetism: Create Your Own Electric Motor!**
    Electricity and magnetism work together in many fascinating ways. Create your own spinning electric motor using some wire, a magnet, and a small battery. You even get to take your motor home with you!
    ~Rob Maher, Allison Banfield and Ross Snider, MSU Department of Electrical and Computer Engineering

15. **Can We Drink It?**
    Environmental engineers help make our tap water safe to drink. In towns like Bozeman, water from natural sources is converted to clean, tasty drinking water in a treatment plant. Learn about water treatment by cleaning up our own samples of dirty water.
    ~Eileen Lauchnor, MSU Department of Civil Engineering
16. Our Place in the Universe
Ready to know about our solar system, galaxy and how humans learn about space? Then this workshop is for you! Explore how we fit into the universe.
~Amy Miller and the Space Public Outreach Team

17. Biosafety in the Research Laboratory
Disease-causing pathogens come in many shapes and forms. To prevent infections and develop effective medical treatments, we must understand the biology of these organisms. Learn the basic principles of biosafety and how scientists protect themselves while doing important research.
~Phil Merta, MSU Office of Research Compliance

18. Starting Scent(s): Unlocking the Secrets of Plant-Pollinator Communication
This “sense-ational” workshop explores plant-pollinator interactions. Smell different scents that plants use to “talk,” see how flowers direct pollinators to nectar sources using special UV runways, and test your investigative skills by determining which insects and animals pollinate different plants.
~Amy Trowbridge and Shelynn Malone, MSU Dept. of Land Resources and Environmental Sciences

19. What(ER) in the World?
Where does your drinking water come from and how do you know it’s clean? What is water contamination? Explore the water cycle, basic chemistry and environmental contamination. Learn how everyday items affect water chemistry, and translate that to the environment.
~Katharine Seipel & Stephanie Bonucci, Enviromin Inc.

20. Fossils of Montana
Montana has a rich paleontological history, from 2-billion-year-old stromatolite fossils to dinosaurs like T-rex, all the way to Ice Age mammoths! Learn about famous fossils from Montana, and get hands-on experience preparing fossils from the Museum of the Rockies with help from museum paleontologists.
~Amy Atwater and Scott Williams, Museum of the Rockies

21. Storytelling with ALICE
Storytelling is a creative way to relate your view of the world to your friends and family, but we’ll take storytelling another step. Tell your story and learn the basic concepts of programming using Alice, a 3D environment that makes it easy to animate a story. Learn how to express your story in a virtual world created by you!
~Brittany Fasy, MSU Gianforte School of Computing; and Barbara do Amaral, MSU Department of Education, Health and Human Development

22. What’s Killing the Bees?
Explore the factors affecting honey bee health and the molecular techniques used to study them. Learn about honey bee biology and colony loss, then take a “crash course” on interpreting the presence of pathogens from PCR and gel electrophoresis.
~Fenali Parekh and Vanessa Orcutt, MSU Department of Plant Sciences and Plant Pathology

23. Mathematics, Computer Coding and Robots
Dash is a robot that you will use mathematics to learn how to program. You will use coding to program Dash’s movements and behaviors to explore shapes and angles in geometry.
~Megan Wickstrom, MSU Department of Mathematical Sciences

24. Insect-Plant Interactions for Sustainable Agriculture
Insects are an indispensable part of agricultural production—sometimes beneficial, sometimes harmful. But their presence in the field is unavoidable if we want to take our agricultural productions sustainable. Explore a basic part of the insect-plant interaction in agriculture.
~Buddhi Achhami, MSU Dept. of Land Resources and Environmental Sciences

25. Television: A Place for Girls
Broadcast television is a terrific field for girls—come run a camera, see what goes on in the control room, or get in front of a green screen! Television needs women trained in engineering, film production, editing, accounting...lots of STEM fields! ~Paul Heitt-Rennie, MontanaPBS

26. This Little Piggy and Probability
Porker Brothers® needs your help developing rules for a new game. But how do you make a “fair” game if players will roll a plastic pig instead of a six-sided die? We’ll play with pigs, develop game strategies and explore how this all fits in with probability and statistics.
~Jennifer Green, Allison Theobold, Nicole Carnegie, Katie Banner, Megan Higgs, Meaghan Winder, Esther Birch and Kara Johnson, MSU Department of Mathematical Sciences

27. Helping Improve Stem Cells for Therapy and Research
Stem cells have remarkable potential to transform the future of medicine. Take part in the processes we do in the lab and view the cells on a microscope with a screen. Learn basic sterile techniques and talk about careers that use these skills.
~Elizabeth Corbin, MSU Dept. of Chemistry and Biochemistry; and Rebecca Knutson and Clayton Sirling, MSU Dept. of Cell Biology and Neuroscience

28. Spherification
Spherification is a fun technique used by upscale restaurants to create caviar-looking bubbles of liquids (e.g., as a way of serving soy sauce with a tuna tartar). With the right ingredients, this can be done at home. You will learn what is physically happening to create this membrane, then spherify their own liquids...and taste-test them, of course!
~Connie Chang, MSU Dept. of Chemical and Biological Engineering

29. Watersheds and Water Users
Every living thing needs water! Who are the water users in our watersheds and how do we ensure there is enough to go around? Discover where and what is our local watershed and learn how water scientists help decide how our water is used.
~Rose Vallor, MSU Dept. of Education; and Meryl Storb, MSU Dept. of Land Resources & Environmental Sciences

30. Unseen Worlds: How Microbes Make Their Living in Extreme Environments
We will look at how the smallest organisms, called microbes, end up living where they do by looking at how environmental conditions in hot springs in Yellowstone affect where microbes can survive. We will also run an experiment to see what type of sugars microbes can use.
~Rebecca Mueller, MSU Thermal Biology Institute
31. Lip Balms and Bath Bombs Away!
Come and discover the chemistry behind lip balms and bath bombs. You will get to create your own and take it home with you! ~Stephanie Wettstein, Joelle Romo, Adam Job and Tara Sundsted, MSU Department of Chemical and Biological Engineering

32. Shake it Up! Capture Little Green Cells
Learn how to harvest microorganisms and participate in flocculating their own tube of microalgae by adding an aggregating agent, shaking it all up and watching to see what happens to their little green cells!
~Kate Morrissey, MSU Department of Chemical and Biological Engineering

How EYH Works
Each participant attends four workshops, which are clustered into “color groups.” For example, the Cherry group at right will attend workshops 1, 4, 10, 15. Participants rank their top 8 color group choices on the registration form. Every effort will be made to place participants in one of their top color choices; however, this is not guaranteed. All groups are unique and aim to “expand your horizons.” Each color group is limited and fills on a first-come/first-served basis. The conference is limited to 280 participants. Workshops are listed in numerical order, not in the order of presentation. Participants receive a confirmation, indicating their color group. Each participant attends the four workshops listed in their color group. The $30 registration fee is non-refundable. Please note that EYH is an event for middle-schoolers only. We do not have space to accommodate parents. Thanks for understanding.

Times and Location:
Pick-up and drop-off are outside the Strand Union Ballrooms. Registration begins at 8:30am. The welcome begins at 9am. Pick-up is at 3:00pm. The SUB is located on Grant Street, just west of South 7th Avenue. Parking is available in the garage or lot off Seventh Ave. Outdoor parking is free on Saturdays. Workshops and Group Activities take place at various campus locations.

Color Group workshops
(not in order)
Cherry......................... 1, 4, 10, 15
Cocoa............................. 5, 8, 12, 24
Copper ......................... 2, 5, 9, 18
Cotton candy .................. 3, 7, 12, 28
Dandelion ..................... 4, 15, 16, 30
Emerald ....................... 5, 11, 17, 27
Gold............................. 1, 6, 18, 31
Grape......................... 7, 13, 19, 23
Graphite...................... 3, 6, 17, 22
Lemon......................... 8, 16, 25, 29
Licorice ....................... 9, 15, 23, 32
Lime ............................. 3, 5, 9, 17
Marshmallow .............. 11, 13, 20, 26
Mint......................... 10, 15, 20, 27
Pearl......................... 1, 11, 12, 18
Pumpkin ....................... 12, 19, 28, 30
Raspberry .................... 8, 13, 16, 32
Silver ......................... 2, 6, 10, 18
Sky ......................... 19, 22, 7, 31
Tangerine ..................... 3, 13, 20, 24
Violet ......................... 1, 10, 21, 29