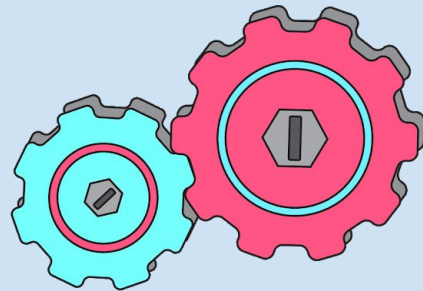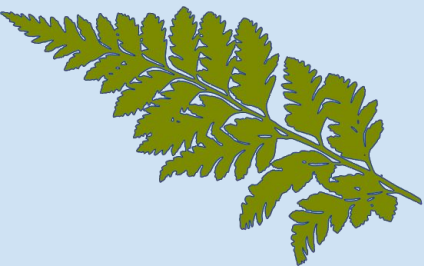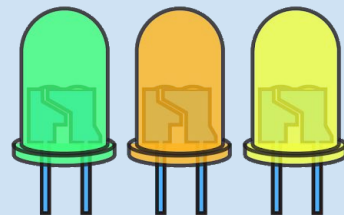# STEAM WORK EXPERIENCE PROGRAM

General Orientation, April 8th 2019

Schedule:

- Staff Introductions
- What is STEAM?
- Program Overview
- Safety Overview
- Surveys + Paperwork
- Design Challenge (time permitting)
- Lab Tours

Staff Introductions

Rakeem Washington (Opening Doors Project Director) Rakeem.Washington@pcc.edu

Julie Stocker (Opening Doors Education Coordinator) Julie.Stocker@pcc.edu
- Oversee Opening Doors Project, manage student payments, administrative, and student issues.

Francesca Frattaroli (STEAM Program Coordinator/Instructor) Francesca.Frattaroli@pcc.edu
- Oversees STEAM WE curriculum, scheduling, and Fab Lab access.

Jordan Laurent (Instructor) Jordan.Laurent@pcc.edu
- STEAM WE instructor with experience in design, microelectronics, music, and coding. Oversees curriculum and TEB 119 STEAM Room access.

Adam Greene-Haley (Instructor) HoodRichardson@gmail.com
- STEAM WE Drone instructor based out of the Airway Science Program. Oversees Drone Curriculum and Airway Science Room Access.

What is S.T.E.A.M. ?

Science
Technology
Engineering
Art
Mathematics

SCIENCE

"The intellectual and practical **activity** encompassing the **systematic study** of the structure and behaviour of the physical and natural world through **observation and experiment**." - Oxford English Dictionary (OED)

From Latin scientia, from scire 'know'.

Actions:
- Systematic study
- Observation and Experiment

Goal:
- To know about the physical and natural world

TECHNOLOGY

"The **application of *scientific* knowledge** for **practical purposes**, especially in industry."
"Machinery and **equipment** developed from the application of scientific knowledge."   - OED

From Greek tekhnologia 'systematic treatment', from tekhnē *'art*, craft' + -logia ("a speaking, discourse, treatise, doctrine, theory, science,")

Actions:
-   Application of *Scientific* Knowledge

Goal:
-   Equipment for Practical Purposes

ENGINEERING

"The branch of *science and technology* concerned with the **design**, **building**, and use of engines, machines, and structures."
 "The action of **working *artfully*** to **bring something about.**" - OED

From medieval Latin *ingeniator*, from *ingeniare* 'contrive, devise', from Latin *ingenium* (engine);

Actions:
- Design, Build
- Working *Artfully*

Goal:
- Create, bring about machines, structures, something

ART

"The expression or **application of human creative skill and imagination,** typically in a visual form such as painting or sculpture, producing works to be appreciated primarily for their beauty or emotional power." -OED

From middle english, "skill as a result of learning or practice," from Old French art (10c.), from Latin artem "work of art; practical skill; a business, craft," from *ar(ə)-ti- ("Greek artizein "to prepare"), suffixed form of root *ar- "to fit together."

Actions:
- Expression of imagination
- Application of creative skill

Goal:
- Produce works to be appreciated for their beauty or emotional power.

MATHEMATICS

"The abstract **science** of number, quantity, and space, either as abstract concepts (pure mathematics), or as applied to other disciplines such as physics and *engineering* (applied mathematics)" -OED

From Old French mathematique, from Latin (ars) mathematica 'mathematical (*art*)', from Greek mathēmatikē (tekhnē), from the base of manthanein *'learn'*.

Actions:
- Systematic study
- Observation and Experiment

Goal:
- Learn about numbers, quantity, and space, and apply them to other fields

STEAM Work Experience (Syllabus) Overview

What this program is:

An opportunity to explore creative and technical fields through hands-on personal and group projects, expert presentations, and self-directed learning.

Goals of the program:
- Teach STEAM related tools and skills.
- Develop general workplace skills including teamwork, time and project management, workplace communication, and shop safety.
- Identify interests as they relate to potential career paths and develop those interests through individualized projects that build relevant skills.
- Encourage documentation of projects and building of an online portfolio, showcasing skills and accomplishments.

STEAM Work Experience (Syllabus) Overview

Where this program is:

Physical Location:

PCC Cascade Campus, 705 N Killingsworth St, Portland, OR, 97217

- **Cascade Fab Lab**, Paragon Arts Building (N Killingsworth & Albina)
- **Margaret Carter STEAM Room**, TEB 119 (N Killingsworth & Kerby)
- **Airway Sciences**, TEB 121

Website:

STEAMWE.github.io

STEAM Work Experience (Syllabus) Overview

Program Content and Outcomes:
The STEAM Work Experience Program is a selection of group and individual learning opportunities, in which students can choose to participate in all offerings, or focus in on a particular aspect of the program.

Program Elements:
1. **Tool Mastery**: Students can focus on a mastering a specific tool or set of tools, building out documentation and example work.
2. **Group Projects:** Students can work to contribute to a long-term group project with an established goal.
3. **Independent Projects:** Students (by themselves, or in small groups) can complete a number of guided or self-devised projects that utilize fabrication tools and techniques.
4. **Independent Study**: Students can choose to focus on a specific theme or academic discipline, taking online courses and designing projects that align with a specific field of study. *(recommended for students not participating in GED program or taking college courses)*

STEAM Work Experience (Syllabus) Overview

Spring 2019 Group Projects

1. **Drone Building and Flying Workshop:** Weekly drone workshop where students are able to assemble, program, modify, and fly remote controlled drones. *(skills: general fabrication, soldering, electronics, programming, piloting)*
2. **Farmbot Project:** Multi-term project where students assemble a garden bed and autonomous gardening robot, select optimal plants for climate, monitor garden, and harvest and sell/donate produce. *(skills: general fabrication, electronics, programming, environmental science, agriculture, small business)*
3. **Sonic Arts Workshop:** Workshop where students learn basics of Ableton music software, recording, and beat mixing techniques. *(skills: Audio Technology & Production, Interface Design, creative expression)*
4. **Inventor Workshop:** Three-week workshop where students identify real-world problems, design technical solutions, fabricate a prototype, and present it to the public. *(skills: creative problem solving, technical design, prototyping, documentation, and public speaking)*

STEAM Work Experience (Syllabus) Overview

All students are expected to generate documentation of their work and participate in a weekly progress review. **Students are encouraged to identify a topic or skill that relates to their personal or career interests. Instructors can then help to develop a relevant project path.**

Success in this program is largely dependent upon the time and effort investment of each student, for which there is no set requirement (max. 20hrs/week). However, there are a set of outcomes that a student who actively participates can expect to achieve…

STEAM Work Experience (Syllabus) Overview

Upon successful completion of this program, students will be able to:

- Identify PCC's career pathway programs & corresponding skill requirements
- Identify and use common measurement and hand tools (Calipers, Measuring Tape, Hammer, Drill)
- Respect standard shop safety and maintenance protocols
- Operate a 3D Printer, Laser Cutter, Soldering Iron, & CNC Router
- Generate designs using 2D and 3D Modeling Software
- Identify common electronic components and apply basic circuit theory to microelectronic projects
- Apply Design Process, project management, and teamwork techniques to hands-on projects
- Clearly document their skills and projects and be able to explain their accomplishments to a layperson
- Share a portfolio of completed projects and acquired skills to a potential employer or educator

Program Rules and Expectations:

- **Treat fellow students as colleagues** - When you can, help your classmates when they are struggling with a problem by sharing your skills and acquired expertise.

- **Avoid swearing and use respectful language** when communicating ideas and disagreements. Even if nobody is being insulted, swearing it is considered highly unprofessional in many workplaces.

- **No phones allowed in the workspace.** Working with hand and power tools requires undivided attention and phones pose a dangerous distraction.

- **Sign in and out when leaving the workspace**. Pay is dependent on attendance- if you do not record your attendance or record it inaccurately, a supervisor will be required to estimate your attendance (which may not be to your benefit).

Program Benefits:

- **There are no minimum attendance requirements***, with the exception of orientations and safety trainings (though lack of participation may make it harder to re-engage ongoing projects).
  *You are expected to attend the hours and times you sign up for.

- **Students can choose which projects to work on** and for how long.

- **Students can submit purchase requests for specific tools** and materials needed for their projects.

- **Students can request 1:1 training for subjects** or technologies not covered in group orientations.

- **Students may make products for sale**, using work experience tools and resources.

Instructor Contract:

- What are our duties as Educators?:
    - Share our knowledge and skills
    - Provide you with challenging but achievable problems to solve
    - Give you the tools to be successful
    - Answer questions and offer constructive feedback

- What does it mean to be a respectful educator?
    - Show up on time and prepared to educate
    - Give you our undivided attention during class time
    - Actively listen to and acknowledge your concerns and experiences
    - Constantly try to improve our educational content and methods as we continue to learn
    - Maintain a compassionate and positive attitude, especially at times of disagreement

Student Contract?

- What are my duties as an STEAM Work Experience student?

- What does it mean to be a respectful student?

- What does it mean to be a respectful team member?

Program Schedule:

2019 Spring Term: *April 8th - June 13th*

General Weekly Format: *(for students who cannot attend all regular hours, additional hours are available).*

LOCATION:	FAB LAB	FAB LAB	TEB 119	TEB 119
TIME:	**MONDAY**	**TUESDAY**	**WEDNESDAY**	**THURSDAY**
1PM - 2PM	New Topic Training	Grp Proj. /Ind. Sdy	Special Topic	Drones/Ind. Proj
2PM - 2:45PM	New Topic Training	Grp Proj. /Ind. Sdy	Special Topic	Drones/Ind. Proj
2:45PM - 3:10PM	--BREAK--			
3:10PM - 4PM	Group Project	Grp Proj. /Ind. Sdy	Drones/Ind. Proj	Drones/Ind. Proj
4PM - 5PM	Group Project	Grp Proj. /Ind. Sdy	Drones/Ind Proj	Drones/Ind. Proj
ACTIVITY:	New Topic Lecture	Self Directed	Invited Speaker	Weekly Check-In

Program Schedule:

WEEK	DATES	EVENTS/TOPICS
1	4/08 - 4/11	Orientation Week - Surveys, Tours, Trainings (CNC, 3D Print, Lasercut)
2	4/15 - 4/18	Online Courses, Soldering Group Project, Intro to Drones
3	4/22 - 4/25	CNC Project, Intro to Electronics, Micro Electronics Project, Career Lecture
4	4/29 - 5/2	Sonic Arts Workshop, Hydraulics Project, Artist Lecture
5	5/06 - 5/09	Farmbot Group Project, Environmental Engineer Lecture
6	5/13 - 5/16	Farmbot Group Project Continued, Sociology Lecture
7	5/20 - 5/23	Game Design Project, Entrepreneur Lecture
8	5/27 - 5/30	(No Class Monday) Composite Artist Workshop, Inventor Workshop
9	6/03 - 6/06	Inventor Workshop
10	6/10 - 6/13	Inventor Workshop

Schedule changes from week to week, see course website for detailed, up-to-date schedule

Website Overview: STEAMWE.github.io

GENERAL SHOP SAFETY RULES:

- Do not operate any equipment until you have been trained and approved by a supervisor.

- If you are unfamiliar with the operation of a piece of equipment, STOP, and ask for guidance from a supervisor.

- Alert those around you when starting up a power tool.

- Do not use a power tool unless there is at least one other person in the room.

- When working with a new material, check its MSDS or confer with supervisor regarding the material's risks and properties.

- Follow all equipment and chemical specific procedures and recommended precautions.

GENERAL SHOP SAFETY RULES:

- Pay full attention to task at hand. Absolutely no horseplay or phone use during equipment operation.

- Use appropriate protective equipment for all tools and chemicals (gloves, goggles, earplugs, etc.).

- Wear clothing appropriate to your work environment and task (ex. close toed shoes, long pants, etc.).

- Chemicals requiring ventilation must be used outside or under a fume extractor.

- Do not wear ties, jewelry, or loose clothing when operating rotating machinery.

- Wear gloves when handling hot or sharp objects or chemicals.

GENERAL SHOP SAFETY RULES:

- Maintain a tidy working area while working.

- Ensure your work area is clean and tools are put away before leaving work area.

- Ensure all equipment is turned off/unplugged when not in use.

- Keep ground clear of obstructions and tripping hazards.

- Report injuries immediately to the nearest supervisor.

GENERAL SHOP SAFETY RULES:

- In case of emergency, call campus security at extension 4444 or dial 911.

- If injured, do not attempt to remove foreign objects from the body. Alert supervisor and seek immediate medical attention.

- If chemicals get into your eyes, proceed to nearest eyewash station and rinse eyes for 15 minutes then proceed to medical treatment.

- Follow any additional safety rules or policy posted in the shop or stated by a supervisor.

Work Experience and Fabrication Skills Surveys

For this you will need a **PCC Email address.**

Please Navigate to ~

 STEAMWE.github.io > Spring 2019 > Week 1 > Day 1

There are 2 surveys, please fill out in as much detail as possible.

Design Mini Challenge: Marshmallow Tower (20min)

Design, Planning, Coordination, Communication, Invention, Testing, Revision, & Reflection.

1. Break into groups of 2-3
2. Draw potential tower designs (Without Talking!!) - 2 minutes
3. Draw and discuss tower designs with group, pick a design - 5 minutes
4. Start Building! - 10 minutes
5. STOP!
6. Towers are measured (no touching!) and prize is awarded.

Design Mini Challenge: Marshmallow Tower (20min)

Rules:

1. Build as tall a tower as you can, using spaghetti and mini marshmallows.

2. It must be able to hold a regular marshmallow without falling.

3. The tallest tower (measured from the base of the large marshmallow) standing without support wins.

Design reflection:

1. How many different designs did you come up with?
2. Did you try more than one design once you started building?
3. Did your final product look like any of your original designs?
4. How many times did your tower fall over while you were building it?
5. What did you learn about your building materials by actually building with them?
6. What was the most challenging part of building the tower?
   a. Strategy?
   b. Communication?
   c. Time?
   d. Ideas?
   e. Materials?

7. Do you think you could now come up with a better tower given more time?

Lab Tours:

- Interactivity Lab, MAHB 223 (3-3:30PM)

- AR/VR Lab, MAHB (3:30 - 4PM)

- Cascade Fab Lab, PARAGON (4PM +)