SCC Makerspace Workshop Topics Checklists

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This Document Overview

This document is a checklist of topics to cover in a workshop. Beside each piece of equipment or in a central locations is a thin (½ inch) binder with this workshop topic list, a procedure checklist for using the machine, and a user manual.

Workshops are generally 1 hour long, with some 2 hours.

Each workshop or group of workshops is on a separate page of this document.

Unfinished workshop checklists are at the end of each section of this document.

These workshop checklists can also be turned into procedure checklists to keep by each machine.

Do not offer unscheduled (impromptu) workshops except by special approval from Tom or joint approval by the workshop facilitator and the students.

Workshops are often teasers or introductions for MAKR courses or other Los Rios classes.

Welcome to SCC Makerspace

MakerSpace Tour

The Makerspace tour is a "Welcome to MakerSpace" event that occurs spontaneously when a new student or SCC staff walks in the front door. The new person is show around the facility and the equipment of the flex space and the shop are explained. The Makerspace policy on materials is explained. The next steps for the student are elaborated including waiver, Makerspace orientation, shop training, workshops, and MAKR classes. Visitors are given take-away handouts of a road map of the facility and calendar of events.

– Any student or IA staff can offer

– About 15 minutes long

– Host welcomes new individual or group.

– Ask about previous MakerSpace experience to determine if a tour is needed.

– Host will hand off individual(s) to another staff person for a short tour

– Tour

    Capabilities of flex space

    Machinery in flex space room

    Machinery in shop room

– Material policy (explain prototypes free, production materials cost)

– Waiver signature not required, but offer it if they have time

– Ask if they want to come to an orientation workshop

– Take-away road map of what is in the MakerSpace

– Take-away calendar and schedule of workshops

MakerSpace Orientation

The Makerspace orientation is the required step for new students before they can attend workshops or use the equipment. The liability form is signed, some basic safety principles are outlined, and the Makerspace code of conduct and positive mental attitude are explained. Along with a packet of information students are given lists of resources on campus and are given a calendar of Makerspace workshops. Students may leave with a small 3D printed or laser cut take-away.

– All student and IA staff can offer

– 30 minutes long

-- Liability form

-- Basic safety training (not hands on but has demo)

-- Time allowed on each machine

-- Code of conduct

-- Packet of information.

-- Drop-ins at scheduled time.

-- Culture. Play nice with others.

-- Fill out waiver

-- Direct to resources (list of workshops, etc)

– Mention procedure checklists in binders near equipment

-- 3D printed take-away

Equipment and Skills Workshops

Equipment and skills workshops focus on a particular piece of equipment or a common category of equipment. These workshops may also teach one particular skill such as starting a sole proprietor business,

Wood Shop Workshops

Shop Safety Training

The shop safety training is required before anyone can use the shop equipment, even if they have used similar equipment in the past. Personal protective gear is issued and is required for use of most of the equipment. Safe and unsafe materials is described. Safe dress code is explained.

Safety features and requirements are described for the hand drills, impact drivers, nail braid air gun, band saw, belt sander, drill press, compound miter chop saw, and table saw. As time permits, students will be given hands on experience with the various wood shop machines.

– 1 hour long

– Mat, Luis, Conner, Christian can offer now

– Ask students what is their background, if they have worked in a shop before.

– First shop violation is a warning, second is …

– Have students put on eye protection (glasses or face mask)

– Materials must be inspected.

– Start with 18 volt drill. Bit must be flush and in straight. Remove bit overhand, not underhand. Two variable speeds, bubble level.

– Impact driver. 18V but not two speed. Hammers screws into concrete or metal

– Air gun that shoots nail brads. Point downward when picking up. If it jams, get staff. Air pressure control dial on back. Too high of pressure can cause a blowout. Lights up when ready.

 – Emergency procedures (alert staff. 911)

 -- PMA (Positive mental attitude)

– Be mindful of others in the shop

 -- Location of phone, first aid kits, exit

 – Material safety data sheets (upon request)

 – Fire evacuation plan

 – Dress code (hair tied back, close toed shoes)

– Electronics allowed but not at table saw since it might trigger saw stop

 – No headphones or cell phone calls in shop

 – Low music in shop

 – Clean up afterwards

 – Don't tamper with machines (drill press, laser cuter)

 – Ask staff to fix machine, don't tackle repairs yourself

> Note: Students not liable if they break something accidentally

 – Students own Personal Protective Equipment must be approved by staff

  – Free prototyping materials, not production.(Material policy)

> Student price (not yet)

– Band saw. Blade cover must be slid down at the end. No gloves required. Fence guard use it unless wood is too large. Use arm and not your body weight when pushing wood. Wait until blade stops before removing. Smallest wood allowed is 4" x 4".

– Belt and disk sander. Only one person work on the machine at a time. One edge of wood must be on the table at a time. Sand from the front edge of the disk only. If vent tube is getting full can turn on suction to empty. No-go zone at top of belt. No-go zone from middle of disk to the back. Can re-center belt if no staff available.

– Compound Mitre Chop saw. Plug in at the start, unplug at the end. Lock down. Guard on side. Can pivot, be sure to lock down for angular cuts. Is about 1 degree off on angle. Horizontal slide lock. If wood width less than 5 inch, don't need horizontal slide. Hold down wood with dominant hand, and other arm on saw handle. Don't stop blade inside the wood, can explode. Saw blade width is 1/8 inch thick, so include blade width when measuring.

– Equipment covered

- Table Saw

- Band saw

- Belt/ Disk Sander

- Drill press

- Hand tools (brief)

- Optional – one major tool (jig saw, nail gun)

- Other tools are staff request (reciprocating saw, skill saw, angle grinder)

– Show location of procedure checklists (in small binders nearby)

Table saw workshop

Safe and effective use of the table saw is explained, with hands on experience. Various types of cuts (angular, pocket) are demonstrated. Allowed materials is discussed. Proper use of pilot holes and push sticks is demonstrated. Students will complete a simple hands on project requiring the table saw. Clean up with the shop vacuum is demonstrated at the end.

– angular cuts

– pocket cuts

--pilot holes

--push stick etiquette

--materials (wood types, knots, melamine)

--shop vacuum

Belt Sander and Band Saw and Chop Saw

Safe and effective use of the belt sander, band saw, and miter chop saw is demonstrated. Students practice with hands on activities. Chop saw angles, clamping, gluing, routing is covered. How to transfer a photographic image to wood is demonstrated. After treatments like palm sanding, staining and painting are discussed. If requested and time permits, how to wall mount the wood creations is discussed.

– Limit to 5 students

– Mat is able to offer this workshop.

– Pre-cut some 4 x 6 wood

– 2 hours

– Safety

– Chop saw angles

– Clamping

– Gluing

– Photoshop image transfer to wood

– Palm sanding

– Routing

– Staining

– Optional wall mount with drill press

–Creation of a wood object (select their own animal, cartoon character, 3 string guitar)

Hand Woodworking tools, Tormek sharpener, Mini-lathe

This hand tool workshop covers the smaller motorized and non-motorized woodworking tools in the SCC Makerspace. This workshop includes the dremel high speed rotary tool and the Tormek sharpener. The mini-lathe for small metalworking projects will be demosntrated. Safety principles and techniques for efficient use of all tools are covered. A simple hands-on project will be done by the students.

– 1 hour long

– Mat can offer this workshop

– Use of all non-motorized (hand) Makerspace woodworking tools

– Use of a dremel high speed rotary tool and attachments

– Use of drill and impact driver

– Tormek sharpener will be demonstrated

– mini-lathe safety and operation will be covered

– Small wood project will be done by students

Print Workshops

Large Format Printer Roland TrueVIS (Intro)

The intro to the large format Roland TrueVIS printer is usually combined with one application, such as making stickers, banners, heat transfer elements, or large photographs. The intro workshop describes the capabilities and applications of the large format printer. It covers materials and material costs including free materials for prototyping and paid materials for production. The workshop describes the general process of loading and unloading materials and cutting blades. Policies about scrap materials is described. Types of file formats supported is mentioned including the mention of vector and raster files. The general flow of design and export using Versaworks is mentioned.

--3 people max

– Michelle, Chad, Cisco, Kim, Sam can offer

– 1 hour workshop. Follow-on workshops would be stickers, banners, heat transfer, or large photograph.

– Talk about actual machine.

      Capabilities-- stickers/ sticker transfer for signage

      heat transfer (fabrics)

      banners (clubs, sign-age)

      large format photography.

Material costs

      Prototyping free (stickers, some t-shirts available heat transfer, not banner)

      Where scraps are located

      When to pay, how much for banners, students provide t-shirts

– Load the media (unload and load)

– Load cutting blades/knives

--Stickers (what's involved but don't make)

--Large format photography (what's involved but don't make)

– Prototype free, production costs for material

--Banners (What's involved but don't make)

– Design and export (general concepts of raster or vector, save file to PDF, use Versaworks)

– How to unload media

– Tagging work for pick-up later

– Save extra media for scrap bin

– Show location of procedure checklist (in small binder nearby)

Roland/ Making stickers (Follow-on to Intro)

This workshop follows or is combined with the large format printer (Roland) introductory workshop. Students are hands-on actually creating some stickers. The material used for stickers is mentioned. The maximum number of free sticker and the cost for additional stickers is gone over. How to load material and cutting blades into the Roland is covered. A detailed description of the design process, export into XYZ or PDF formats is gone over. Which folder (stickers folder) to place the exported files into is gone over. Use of the Versaworks software is described. Managing the job queue using Versaworks is described. The workshop has a take-away sticker at the end.

– 3 people max

– Kim, Michelle, Sam, Cisco, Tristan can offer now

– (See the Roland Intro)

– Material is glossy calendar vinyl

– 10 stickers max for free prototype. More requires material purchase.

– Design and export

 --Artwork in any format raster or vector

  Discuss final shape of sticker or heat transfer (rectangle or irregular)

  (vector only for heat transfer, stickers)

  Always export XYZ, and PDF formats onto flash drive

  Software is Versaworks for Roland. Only on computer next to Roland

– Export

 Save original file to their own backup media

 Save as PDF to flash drive

 From flash drive to appropriate folder on the desktop which says "Banners, Stickers, Heat Transfer"

– Open Versaworks

 Delete existing jobs, if any

 Add job to QA

Search for file in folder on desktop

– Change the media (unload and load)

--Template set up

--Trainer does it first, then individuals

– A die cut process

– Take-away is some kind of sticker

Roland/ Making banner (Follow-on to Intro)

This workshop follows or is combined with the large format printer (Roland) introductory workshop. Due to the high cost of banner material, it is only offered when there is a commercial request for a banner. Students are involved as much is practical with hands-on banner creation. The material used for banners is mentioned. How to load material into the Roland is covered. A detailed description of the design process, export into XYZ or PDF formats is gone over. Which folder (Banner folder) to place the exported files into is gone over. Use of the Versaworks software is described. Managing the job queue using Versaworks is described. The workshop has a take-away sticker at the end.

– Only offer this workshop when a production banner is requested

– 1 to 2 hours long

– Michelle can offer. Mat can do grommets. (30 minutes)

– (See the Roland Intro)

– Change the media (unload and load)

– Material costs

– File format is raster (DPI appropriate to size)

– Design and export

--Artwork in any format raster or vector

Discuss final shape of sticker or heat transfer (rectangle or irregular)

(vector only for heat transfer, stickers)

Always export XYZ, and PDF formats onto flash drive

Software is Versaworks for Roland. Only on computer next to Roland

– Export

Save original file to their own backup media

Save as PDF to flash drive

From flash drive to appropriate folder on the desktop which says "Banners, Stickers, Heat Transfer"

– Open Versaworks

Delete existing jobs, if any

Add job to QA

Search for file in folder on desktop

– Grommets (on sample vinyl)

Roland/ Heat Transfer (Follow-on to Intro)

This workshop follows or is combined with the large format printer (Roland) introductory workshop. Students are hands-on actually creating some heat transfer items such as T-shirts. The material used for fabric tranfer is mentioned. Students or customers provide their own blank T-shirts. How to load material and cutting blades into the Roland is covered. A detailed description of the design process, export into XYZ or PDF formats is gone over. Which folder (heat transfer folder) to place the exported files into is gone over. Use of the Versaworks software is described. Managing the job queue using Versaworks is described. The workshop has a take-away heat transfer item such as a canvas bag at the end.

– 1 to 2 hours

– Michelle, Kim, Cisco, Chad can offer

– Design and export

--Artwork in any format raster or vector

Discuss final shape of sticker or heat transfer (rectangle or irregular)

(vector only for heat transfer, stickers)

Always export XYZ, and PDF formats onto flash drive

Software is Versaworks for Roland. Only on computer next to Roland

– Export

Save original file to their own backup media

Save as PDF to flash drive

From flash drive to appropriate folder on the desktop which says "Banners, Stickers, Heat Transfer"

– Open Versaworks

Delete existing jobs, if any

Add job to QA

Search for file in folder on desktop

– Change the media (unload and load)

– (See Roland Intro)

– Material costs

– File format is vector (although can convert raster)

– A die cut process

– How blade cuts

– Take-away Canvas bag

Roland / Large Format Photography (Follow on to Intro)

This workshop follows or is combined with the large format printer (Roland) introductory workshop. Due to the high cost of photographic material, it is only offered when there is a commercial request for a printed large photograph. Students are involved as much is practical with hands-on photo printing. The material used for photographs is mentioned. How to load material into the Roland is covered. A detailed description of the design process, export into XYZ or PDF formats is gone over. Which folder (Photo folder) to place the exported files into is gone over. Use of the Versaworks software is described. Managing the job queue using Versaworks is described. The workshop has a take-away sticker at the end.

– Only offered on request

– Michelle can offer

– (See Roland Intro)

– Types of substrate materials.

– Load materials

– Design and export

--Artwork in any format raster or vector

Discuss final dimensions of the image

Always export XYZ, and PDF formats onto flash drive

Software is Versaworks for Roland. Only on computer next to Roland

– Export

Save original file to their own backup media

Save as PDF to flash drive

From flash drive to appropriate folder on the desktop which says "Banners, Stickers, Heat Transfer"

– Open Versaworks

Delete existing jobs, if any

Add job to QA

Search for file in folder on desktop

Audio and Video Workshops

Making a podcast

The podcast workshop is a hands-on experience recording and editing a short podcast. Use of inputs such as microphones, audio sources like mp3 players or phones is demonstrated. Basic mixing using Garage Band software is demonstrated.

– limited to 5 students

– 1 hour

– Luis can offer

– Power on is inserting a plug, not a switch

– Garage band is software

– Input from either microphone, from phone/mp3 player

– Multiple channels (currently two microphones)

– Show location of procedure checklist (in small binder nearby)

– Record a speech or song

Model Making Workshops

Model Kit Building (before the Model Painting workshop)

The model kit building workshop covers pre-printed or game kit models. Cutting and trimming techniques, adhesives are covered. Where to buy kits, where to meet like minded kit builders is described. Priming techniques and clamping or binding methods are discussed if needed. Students build a simple kit themselves.

– 2 hours long

– Sam can offer

– Pre-print models or buy game kit

– Where to buy

– Where to meet like minded model builders

– Cutting and trimming techniques. Flush snips. Exacto knives

– Adhesives (super glue, PLA binding)

– sometimes clamping, binding (often kits snap fit)

– If time, primer technique (spray paint)

– Build a kit with students

– 1 day to dry before painting

Model Kit Painting (after model kit building)

Once a student has assembled or built a model kit, this workshop walks them through the process of painting the model. Types of paint are discussed. Hand brush skills are developed. Base coat and weathering techniques are demonstrated. Decal application and weathering is demonstrated. Detail painting is gone over. Students will hand paint a small model themselves.

– Offered later by Sam

– Types of paints

– hand brush skills

– Base coat techniques

– Weathering techniques

– Decal application and weathering

– Detail painting

– Hands on painting exercise

Miniature Model Painting

This workshop covers painting of miniature models such as model railroad displays or realistic battle simulations. Simple color theory and palette development will be covered. Types of paint, primarily acrylic, will be discussed. Brush techniques, spray paint, and protective top coat will be introduced. Identifying, painting, and weathering details will be covered. Students will hand paint a simple miniature model.

– 1 hour long

– Chad, Erin can offer

– Possibly light assembly

– Simple color theory and palette development

– Paint, acrylic (full opacity layers, washers)

– Brush techniques

– Spray paint

– Detailing (how to identify details, weather effects)

– Protective top coat

– Drying timings (adheres in seconds, curing times 1 day)

– Students will hand paint a simple miniature model

Fabric Workshops

Sewing Machine

This workshop will cover specifics of the use of the Singer 4432 machine, although general principles of using all sewing machines will be discussed. Sewing, cutting, and ironing safety tips will be covered. Correct bobbins, threads, types of fabrics, and needles appropriate for the Singer will be covered. Sewing curves and hems will be talked about. The parts of the machine, stitching variations, guide feet, and reverse feature will be covered. Students will make a small object such as a hamsa pillow.

– 2 hours

– Less than 5 students

– Cisco, Kim can offer

– Ask students their background, experience and interest

– One yard per semester. Other fabric students provide.

– In workshop provide a pattern and fabric sample. Pattern is 8.5 x 11.

– Model: Singer 4432

– Safety guidelines for sewing and ironing

– Only old classic bobbin. Other bobbins must be inspected by staff.

– Only Singer needles allowed: regular, light, heavy. Other needles in original packaging inspected by staff.

– Threads must be inspected by staff. (Not waxed, not low grade). Upholstery thread except on silk.

– If something breaks on the machine, contact staff and don't fix yourself.

– Winding bobbin

– Basic parts of machine

– Stitching variations

– Preferred Singer threads (smoother threads). Student threads must be inspected.

– Types of fabric supported (up to denim in thickness, 3 layers of fabric, silk okay)

– Cutting fabrics (proper shears, laser cut)

– Other types of machine guide feet

– Sewing curved seam (freehand)

– hemming (by hand or by machine)

– Optional: mention ironing (on small board)

– reverse features on Singer

– Show location of procedure checklist (in small binder nearby, includes manuals, patterns, techniques)

– No storage locker for student projects

– Students make hamsa pillow (filler provided)

Serger Machine

The Serger Machine workshop covers the difference between a serger and a sewing machine, and applications of a serger machine. Types of fabrics usable, and types of cone style threads are covered. Winding a bobbin and threading the machine is demonstrated. Tips on cutting and ironing fabrics are presented. Types of stitches available are demonstrated. Students will sew an example hem with the machine.

– 2 hours

– Less than 5 students

– Kim can offer

– Ask students their background, experience and interest

– One yard per semester. Other fabric students provide.

– In workshop provide a pattern and fabric sample. Pattern is 8.5 x 11.

– Uses for Serger as opposed to sewing machine (marrowing, …)

– Fabrics (knits, lace...)

– Model: Juke ??

– Safety guidelines for sewing and ironing

– Only cone style. Other bobbins must be inspected by staff.

– Only Juke or universal needles allowed: regular, light, heavy. Other needles in original packaging inspected by staff.

– Threads must be inspected by staff. (Not waxed, not low grade). Upholstery thread except on silk.

– If something breaks on the machine, contact staff and don't fix yourself.

– Winding bobbin

– Basic parts of machine

– Stitching variations

– Preferred Juke or high quality threads (smoother threads). Student threads must be inspected.

– Types of fabric supported (up to denim in thickness, 3 layers of fabric, silk okay)

– Cutting fabrics (proper shears, laser cut)

– How to thread machine

– Types of stitches

– Example with blind hem or other specialized stitch

– Show location of procedure checklist (in small binder nearby)

Leather Maker

The leather Makerspace workshop covers the principles of cutting, stitching, and engraving leather creations. Types of leather is covered. Cutting designs into leather is also demonstrated.

– 1 hours

– Kim, Christian can offer

– Types of leather

– Examples of leather objects

– Cutting

– Stitching

– Engraving

– Carving designs into leather

Costume Design Workshops

Costume Design / Cosplay

The costume design and cosplay workshop discussed how to create costumes such are suitable for cosplay events. The workshop covers researching the character, identifying sources of materials, construction techniques, and creating a budget for the costume. Techniques for making accessories are covered. A list of resources (online and local) is given out. Students make a simple pouch.

– Under 4 students unless the workshop is in the Fashion department

– Cisco, Christian can offer

– Follow up to Sewing Workshop

– PDF handout

– How to research character

– Identify budget, method (thrift store, closet...) and materials needed

– Accessories needed (3D printed, electronics, heat transfer, laser cutter, vacu-former – masks, helmets…)

– List of resources (designers online…)

– Construction methods

– Students make and take-away pouch

Cosplay Components

This Cosplay Components workshop focuses on creation of individual cosplay components instead of a completed costume. This workshop is about creating belts, accessories, tools, non-functional weapons, and electronic gear.

– Could be offered by Christian Espinoza

– Involves the use of heat guns, hot glue guns, tooling foam

Electronics Workshops

Electronics Basics

The electronics basics workshop is for students new to the field of electronics, or those who want a broader view of what can be done with electronics in a Makerspace. The location and use of the parts and equipment in the electronics corner are covered. Types of electronic systems, such as analog, digital, high and low voltage are described. The main electronic components (resistors, capacitors, diodes, LEDs, transistors, motors, sensors, IC circuits) are demonstrated. Ways to prototype circuits are covered. Ways to mount electronic circuits are presented. Electronic control devices such as microcontrollers (Arduinos), single board computers (Raspberry Pi) are covered. Students make a simple LED circuit.

– 1 hour max

– Conner, Mark, Cody, Scout, Johnathan can offer

– Applications of electronics in making

– Different devices and storage in the MakerSpace electronics corner

– Show resistors, capacitors, diodes, sensors, transistors, motors, integrated circuits

– High and low voltage systems

– Analog and digital

– Prototyping methods

– Mounting methods (dead bug style, perf board through hole, surface mounted)

– Integrated circuits and discrete components

– microcontrollers like arduinos, single board computers, single DC and AC

– Soldering

– Make an LED circuit on a breadboard

Soldering

The hands-on soldering workshop gives students the minimum they need to know to start soldering electronics circuits. Safety tips are covered. Types of solder and their ideal temperatures are discussed. Types of soldering irons are demonstrated. Desoldering principles are demonstrated. Students practice soldering on a simple circuit board.

– Limited to 5 students or less

– Conner, Mark, Cody, Mat, Scout can offer

– Safety tips

– Types of solder (temperatures for each)

– Types of solder irons (pencil, temperature controlled…)

– Desoldering

– Show location of procedure checklist (in small binder nearby)

– Student practice with a pc board with resistor, LED, IC chip such as 555 timer, button

     Students desolder practice pc board at the end of the workshop or buy it

Arduino basics

The Arduino basics workshops gives students enough of an introduction the Arduino family of microcontrollers they can begin creating their own projects. The difference between microcontrollers and traditional computers is covered. The various types of Arduinos are shown. The Arduino IDE is demonstrated. Various ways to power an Arduino are shown. The basics of the C language which is used to program Arduinos is covered in a handout. The serial monitor and serial plotter in the IDE are demonstrated. Students to a hands on project to dim an LED when a potentiometer is turned.

– Limited to 5 students

– Conner, Mark, Cody can offer

– Ask students their experience and background with electronics

– If no electronics background, encourage them to take Electronics Basics and Soldering

– Microcontrollers vs single board computers

– Types of Arduinos (nano, Uno, Mega, specialty like lilipad)

– Mention they are single chip computers and just the ATMEL chip can be used

– Arduino IDE (download location, cross platform, chip selection, libraries, serial monitor, editor window)

– Battery power and wall socket power

– C language basics (set up, loop, …) Give handout of C cheat sheet

– Connect up an arduino Uno with sample program and show serial monitor

– Have students make a dimmable LED when a potentiometer is turned

Intro to Arduino Programming

This intro to programming workshops covers the minimal concepts needed to write simple Arduino C programs. This is similar to the "Hour of Code" trainings, with a focus on what is needed for programming Arduino DIY projects. C language variable assignment, logical branching, and loops are covered.

– The Arduino IDE code window is introduced.

– Variable assignment, logical branching, and loops are covered.

– Students create and run a simple Arduino blink program, with serial IO

Arduino sensors

The Arduino sensors workshop covers how Arduinos (or other microcontrollers) can measure properties of the world around them, and even make simple decisions or actions based on changes in the world. Various types of sensors are discussed such as light, humidity, temperature, pressure, sound, moisture, IR, orientation, magnetic field, RFID, and biometrics such as heart rate. More new sensors are developed each day, but the same general principles apply to all. The main types of sensor outputs such as analog, PWM, and digital are covered. The I2C and SPI protocols to communicate with sensors are covered. Error handling methods, interrupts, and other real world considerations are covered. Communication and storage of data gathered will be discussed. Students will build a simple ping ultrasonic sensor.

– Conner, Mark, Cody can offer

– Types of sensors (IR, light, ultrasonic, resistance, temperature, humidity, moisture, pressure, motion, sound, potentiometer, GPS, dust, water level, gas, 3 axis accelerometer, barometric, magnetic field, RFID, heart rate, etc)

– Reading switches and voltage levels (debounce, mapping)

– Sensor outputs (analog, PWM, binary…)

– I2C (wire library)

– SPI

– UART

– Arduino libraries

– Data storage (real time clock + SD card, serial interface to PC or wireless…)

– Error handling (averaging, repeated read with delay, error catch in code, error messages)

– Interrupts

– Sleep mode for lower battery consumption

– Brief mention of mesh networks and remote transmission (LoRa, etc)

– Make a ping distance sensor and send to serial port

– Make a TMP36 temperature sensor

Arduino motors

The Arduino motors workshop introduces how to run and control different kinds of motors from a microcontroller. Motorized electronics is used in robotics, CNC machines, solar trackers, and countless

moving devices. Issues around power requirements and motor controllers are discussed. Students make a simple stepper motor circuit.

– Conner, Chad, Mark can offer

– Types of motors (DC, servos, stepper motors)

– Applications (robots, CNC machine, solar tracker...)

– Power requirements of motors

– Using relays, power transistors, MOSFET for higher current drain

– Motor controllers

– Sensing position of a motor

– Mention muscle wires

– Make a stepper motor controlled by potentiometer

Arduino Displays

The Arduino displays workshop introduces different ways to display data gathered by a microcroller. Light displays, numerical displays, character and graphical displays are discussed. Other non-visual output devices such as buzzers and audio speakers are presented. Power considerations and display driver modules are considered. Students make a simple LCD display.

– 1 hour long

– Mark can offer

– Types of visual displays (LED, LED matrix, serial port, 7 segment, LCD character display, graphics, eInk)

– Other types of output (piezo buzzer, audio, ethernet, bluetooth, serial port)

– Display drivers

– Power considerations (sleep mode, external battery…)

– Make 2 line LCD display, controlled by serial monitor input

Arduino Communication

The Arduino communication workshop introduces the variety of ways that microcontrollers communicate with other machines (IoT) or with humans. Communication methods are discussed including: Serial port, WiFi, bluetooth, infrared, RS 433 mhz, nRF24L01 2.4 ghz, and long range xBee and LoRa. Students create a simple RF transceiver system.

– 1 hour long

– Mark can offer

– Serial port (hardware UART and software serial port)

– Serial Monitor and Serial Plotter in IDE

– IR transmitter and receiver

– WiFi

– Ethernet shield

– Bluetooth shield

– RF 433 mhz transmitter/receiver modules and shields

– nRF24L01 + 2.4 ghz or + PA + LNA

– xBee

– LoRa for long distance

– Project with rf433 mhz

Non-Arduino Microcontrollers

The non-Arduino microcontrollers workshop introduces the ever-changing world of Maker friendly microcontrollers. Arduino are the most popular and well known, but other common and more modern microcontrollers are introduced such as: ATTiny, ESP8266, ESP32, NodeMCU, Teensy, STM32. Most of these other Maker friendly microcontrollers can be programmed from the Arduino IDE and the basic process is demonstrated. Students make a simple program using an ESP8266 chip.

– Programming with Arduino IDE

   Arduino as ISP or FTDI programmer

– Applications (smaller or faster)

– ATTiny85

– ATMega328-PU but can't make it cheaper

– ESP 8266 (has wifi)

– ESP32 (the hot rod with wifi and bluetooth)

– NodeMCU

– Teensy 3.6

– MSP430 (low power)

– STM32

– Build example with ESP8266 and wifi

Build a robot

The robot building workshop pulls together electronics, 3D printing, programming, and even woodworking. Types of DIY robots are covered (flying, driving, swimming, arms…). The use of sensors and motors are presented. Manufacturing cases, chassis, and appendages is elaborated. How to remotely control a robot is covered. Programming for robotic movement and even autonomous control is discusses.

– Types of robotic devices (quad-copter, driving, swimming, prosthetic arms...)

– Robot kits or from scratch

– Sensors to measure position, detect obstacles

– Motors to control wheels or arms

– Battery power and power considerations

– Chassis construction (3D printed, wood machined, repurposed...)

– Remote controlled (wired controller, wifi, bluetooth, RF)

– Autonomous (single board computer and AI)

Programming the Raspberry Pi

The Raspberry Pi programming workshop introduces programming in Python on a Raspberry Pi single board computer. The workshop covers the basics of accessing from Python the IO pins on the Raspberry Pi. Communication with other devices via wifi or wired ethernet is covered, as well as serial port communication. Students make a run a simple serial port communication program in Python.

– Python basics (with a language cheat sheet handout)

– GPIO (library to access the IO pins for input and output)

– Wifi or ethernet communication with Lan or Internet

– Serial communication using a wired cable to nearby computer

– Camera control using Pycamera

– Students make a simple serial port communication program

Advanced Arduino programming

The advanced Arduino programming workshop covers less common but very useful features of microcontrollers, especially the Arduino brand. This covers software interrupts, sleep mode, EEPROM static memory, bit operations, memory optimization, Arduino IDE command line programming, creating Arduino libraries.

– Interrupts

– Sleep mode

– Bit operations

– Memory optimization

– EEPROM

– Using Arduino IDE from the command line

– Creating Arduino libraries

– Optional: ATMEL Studio

3D Making Workshops

3D Printing (Dremel, Makerbot)

The 3D Printing using the Dremel and Makerbot printers covers the process of printing an STL file on those specific models of 3D printers. The workshop begins with an already created STL file, then reviews the slicer software (Makerbot Print, Dremel Digilab) that produce gcode for the specific printers. Print bed preparation is covered. Changing filament and initiating printing is discussed. How to transfer files to the printer internal memory from a flash drive is illustrated. How to remove the completed item and how to clean the bed is described. How to clean up the finished item is explained. If time permits, students print their own item, or put it in the queue to print later.

– Limited to 5 students

– Cody, Christian, John, Sam, Alicia, Scout, Chad can offer

– Review additive manufacturing

– Machines here (MakerBot Replicator, Dremel Digilab…)

– Start with STL file (Made in Fusion 360, OpenSCAD, TinkerCad, etc)

– Slicer software (Makerbot Print, Dremel Digilab, Cura…)

– How to load desired filament

– Print bed preparation (sometimes blue tape or glue)

– Put gcode file onto flash drive.

– Initiate printing

– Remove item from print bed

– Clean up print bed

– Clean up 3D model (sand, cut off supports, etc)

3D Printing (Formlabs)

The 3D printing on the Formlabs workshop shows the specifics of 3D printing on the Formlabs printer. How to slice STL files using the Preform software is demonstrated. How to load resin, how to prepare the bed, how to start the printing from a USB drive, and how to remove the completed item is demonstrated. Print bed clean up, and 3D model clean up is described.

– Limited to 5 students

– Cody, Christian, John, Sam, Alicia, Scout, Chad can offer

– Start with STL file (Made in Fusion 360, OpenSCAD, TinkerCad, etc)

– Slicer software (Preform)

– How to load resin

– Print bed preparation (staff offers help)

– Go straight from slicing software on PC, no flash drive

– Initiate printing

– Remove item from print bed

– Clean up print bed

– Clean up 3D model (sand, cut off supports, etc)

Fusion 360

The Fusion 360 software workshop introduces students to the 3D modeling software from Autodesk. Menus, scaling, units, geometric shapes basics are presented. Inscribed, circumscribed, rotation, subtraction, champers and fillets of objects is introduced. Arrangement of overhangs is covered. Students model a bolt and create an STL file. CAM is not covered in this short workshop.

– Limit 8 students due to number of licenses

– Mat can offer

– One person presenting, one walking around and helping students

– Don't go into CAM side

– Workshop presenter uses projection screen, students work on PC's

– Menus

– Scaling, metric vs SAE

– Geometrical shapes

– Inscribed and circumscribed

– 3D rotation of images (quick keys)

– Subtractions

– Champers and fillets (rounding corners…)

– Angle of overhangs

– Arrangement (multi-part models, wrappers, supports)

– Make a bolt

Vacuum Former

Use of the Formtec vacuum formers is presented in this workshop. Safety issues and allowable materials are covered. Appropriate models to duplicate are discussed. How to preheat the machine, place and clamp the model, and the steps to mold the form are demonstrated. How to clean up the machine afterwards is covered.

– Safety issues: Top part gets very hot. No glasses. No gloves. Model object can't be meltable.

– Only use materials in the cabinet under the machine. Can purchase if in production mode.

– Manual is below the machine. ? Button will offer help on many screens.

– Model can be metal, wood, plastic, clay. Ask staff for assistance if plastic. (no nylon. ABS, PLA prints consult staff. Nothing below 20% infill.)

– No computer connected.

– Put model on bed. Lower bed if needed.

– Release clamps on front. Place molding material with even gap around edge. Lower and clamp.

– Press left coil icon to turn on heaters. Wait 15 minutes to reach operating temperature. Continue heating until the material is soft enough.

– After preheat pull upper bed forward over material. Wait 3-4 minutes until it sags 3-4 inches. Push upper bed back.

– Press arrow icon to load the options screen. Hand button. Press model up with lever, then hit second (middle) icon over immediately. After mold is complete, press last icon to release mold. Often mold sticks.

– Lower build tray down (lever on side).

– Turn off pre-heat on main menu (coil icon).

– Clear build tray and any debris afterwards. Optionally turn off power switch.

CNC Workshops

CNC Mill

The CNC Mill workshop covers how to use the MX-50 Model-A cnc mill. Starting from an STL file, how to load the model into the SRP player on the nearby PC is covered. Appropriate materials is also discussed. Loading and clamping materials is demonstrated. How to remove and clean the finished model is described.

– Mat, Cody, Scout can offer

– Safety issues (door closed, glasses required, no rings, bracelets, loose gloves, need close toed shoes, hair tied back)

– No test run required first.

– Prefered file format is STL file format. (can use a few other formats)

– Load into SRP player. Will walk you through what you need to do.

– Materials, no metal, no soft styrofoam. Any wood is prefered. Block resin okay. Not too hard of materials. For plastics get staff approval.

      Sample materials for students are on the side of the CNC Mill. Bring your own specialty materials.

– Orient the model, cutting parameters, specify material, set model supports, set axis origins.

– If you wish to change the router bit get staff help.

– If material is too hard router bit can be damaged or bend if origin set incorrectly

– To put material in the mill, open door, open clamps on each side and clamp down.

      If flatbed is installed use predrilled holes to set clamps.

      Close door, press enter on front of machine.

– To start routing, use SRP player. Vpanel lets you calibrate.

      Watch the cut for the first 5 minutes to verify all is well.

– When done, will stop and lift up head, and PC computer will prompt. Drill head moves back and work is moved forward. Just lift open door, and remove material.

– Post processing (sand, cut off supports, paint, stain)

– Clean up-- ask staff. Wipe window with microfiber

– Can leave files on PC computer for now.

– Temporary storage is in cabinet under PC for finished student projects. Flash drive is put in office.

CNC Router (by special request only.)

Sit with Matt, Scout for a day. About 30 step process. Staff only right now.

Metal Workshops

Welding I, II

The welding workshops are offered offsite in the "hot space" location of SCC Makerspace. These workshops are hands-on and take several hours each.

Metal Work I, II

The metal working workshops are offered offsite in the "hot space" location of SCC Makerspace. These workshops are hands-on and take several hours each.

Laser Cutter Workshops

Laser Cutter

The laser cutter workshop offers hands-on practice using the Universal Systems Laser Cutter. Safety topics and allowable materials are covered. How to take SVG or vector based images and process them in the Corel Draw software on the PC next to the machine is covered. How to define cut lines and engraving images is demonstrated. How to load and position the material in the cutting bed is demonstrated. Starting the cut process is presented. Clean up afterwards is also described. Students create a take-way key chain or other item.

– Up to 6 students at a time. Ask what students want to do with the machine and tailor the examples to their interests.

– Kim, AJ, Erin, Cody, Christian, Alicia can offer

– Safety topics (venting, no glasses, etc). Do not leave machine unattended. If cabinet is filled with smoke, pause and increase fan speed.

– Materials allowed (natural materials like wood or leather, but not melamine or plastics). Banned materials are posted on side of laser cutter. There are prototype wood samples in cabinet and scraps on side.

– Does cutting and engraving. For cutting you need less thickness than max. Engraving takes longer than cutting, up to several hours.

– PC is next to laser cutter. Can use USB flash drive or email. Not clipboard copy and paste.– File formats that can be imported (Vector for cutting, raster okay for engraving. SVG, etc)

      Black and white images. SVG preferred. Adobe illustrator, etc.

– There is a procedure guide in drawer underneath the PC.

– Always do a test print first on the desired material.

– Loading files into the Correl Draw software. Resizes imported images at random so check.

– Setting cut depths and properties of cuts. Black is interpreted as engraved. Shades of gray. Cut color is Red RGB [255,0,0] #FF0000

      There is a material template below the PC workstation

      For cutting, hairline width line.

– Starting the cut process: Select print on the menu, then type of material and thickness. Use digital micrometer to measure thickness. Can set raster and vector engraving intensity. Click Apply, then OK.

– Then pick Focus view when cabinet door is open, laser will move to physical position. Then make appropriate adjustments by moving the material or the file image on the screen. Move icon can

– When done laser goes to the resting position (upper right) and fan turns off. Removing the cut material from the laser cutter. Allow fumes to clear out before opening the case. (Leather and plastic have especially unpleasant fumes.) Open cabinet and remove wood. Individual cut pieces may fall out.

– Save and remove the file from the PC when done.

– Clean glass occasionally with micro fiber towel.

– Finished work is placed nearby, usually on red cart with scraps.

– Post-processing (painting, staining, etc)

– Take-away: key chain or whatever the workshop presenter prefers.

Startup Workshops

Sole Proprietor Startup

This workshop covers how a maker or craftsperson or inventor can create a legal small business to market and sell their creations. Basics of name selection, costs, licenses, business cards, websites, liability, income tax and banking are covered.

– Missy can offer

– What is the terminology for a business

– Selecting a name

– Costs

– Business license

– Business cards

– Website

– Liability

– Banking

– Income tax (quarterly payments)

Marketing and Branding

This workshop on marketing and branding covers the basics of how a a maker or craftsperson or inventor can promote, brand, price, identify delivery methods, and create a marketing plan for a product. Identifying competitors and product niches is discussed. Issues of quantity and give-aways are mentioned.

– Missy can offer

– Marketing avenues

   websites (Etsy, Amazon Handmade, Artfire, Craftsy, Craigslist, Dawanda, eBay, Folksy, iCraft, etc)

   word of mouth (friends and relatives)

   fliers

   conferences

   faires

   local stores

family and friends

social media (social media representative)

– Marketing plan

– Who are your competitors

– What is your niche

– Pricing the product

– Merchandise delivery to customer

– Manufacturing quantity for fairs, etc

– Marketing give-away, samples

Small Business Manufacturing

Once a maker has orders for their product, they are faced with how to ramp up production. This workshop covers material sourcing, inventory management, hiring of staff, and quality assurance issues.

– materials sourcing

– Inventory on hand

– Hiring staff

– Quality assurance

LLC Startup

The LLC startup workshop covers the basics of creating an LLC corporation. Differences form sole proprietorship are covered. Taxation issues, legal advice, and costs are introduced.

– Advantages over single proprietor

– Disadvantages over single proprietor

– Taxation

– Attorneys and legal companies

– Costs

Managing Money Maker

The managing money workshop covers the basics of intelligent money management for individuals and families. Basics of checkbook balancing, reading bank statements, budget creation, savings plans, loans and inters, and whatever else is encountered in daily financial life.

– 1 to 2 hours

– Offered by someone in the business department

– How to balance a check book

– How to read a bank statement, online or paper

– Reconcile check book with bank statement

– Create a budget

– Saving plan

OTHER WORKSHOPS

Hands-on Math for Makers

The hands-on math for makers workshop covers practical mathematics used in creating custom DIY projects. Measurement techniques, calculation tricks, angle measurement, area measurement, speed measurement, and material cost estimating methods are covered.

– Mark can offer

– Measuring

– Calculating tricks

– Angles

– Areas

– Speed

Jewelry making

The jewelry making workshop is a broad description of the field of jewelry making. Soldering, welding, hot wax casting, mini-lathe are described. Various materials used in jewelry such as semi-precious stones, wood, leather, wire wrapped, Hands on activity is done to create some inexpensive jewelry like bracelets, earrings, or a pendant.

– Later in Makerspace could have hot wax casting, soldering, welding. For now hobby style.

– How to use mini-lathe for jewelry making

– Students provide their own materials, or dismantle jewelry at the end or purchase.

– Types of beads (glass, metal, wood, semi-precious stones…)

– In workshop use the inexpensive materials (wood, 3D printed)

– 3D printed jewelry

– Cut marks are always magenta

– Threads (gold & silver, thread, stainless steel, beading cord, leather, synthetic, wire wrapping)

– Hand tools and how to us

– Head pins and how to make them

– How to make jump rings

– Take-away would be bracelets, earring

Cell Phone Photography

Almost everyone has a cell phone (mobile) with a camera, often a quite sophisticated camera. This workshop describes some principles and techniques to create better photographs on a cell phone. Post-processing of images using filters is demonstrated.

– Limitations of cell phone cameras

– Digital zoom and artifacts

– Software filters

– Publishing and sharing

Project Oriented Workshops

Project oriented workshops may use multiple machines and multiple skills. Instead of training students on one particular piece of equipment or one particular skill, these workshops focus on completing an applied project.

Phone Stand with Laser Cutter

This Phone Stand workshop teaches students how to make an acrylic phone stand using the laser cutter. A design will be put on the phone stand and stained with a sharpie.

– Can be offered by Alba Cuevas

– Load a pattern and design into the computer with Corel Draw

– Use acrylic to cut out a phone stand with the laser cutter

– Use the laser cutter to put a design on the acrylic phone stand

– Use a sharpie to stain the design on the acrylic

Movie Night

This workshop is to enjoy a movie in the evening after Makerspace is closed. Movies would be educational having to do with art or design.

– Can be coordingated by AJ DellAniuaga

– Proposed every other week

– Can use the projectors or TV screens

– Use streaming movies from Netflix, Amazon, or use DVD

Single pot hydroponics

Simple hydroponic plant growing systems can be be constructed using a single container that do not use electrical power. These systems are called passive hydroponics. The basics of hydroponics, nutrients, and types of plants are covered. Powered air bubbler systems are discussed, although the hands-on portion of the workshop focuses on the Kratky method developed by a professor in Hawaii.

– Principles of hydroponics

– Nutrients

– Types of plants

– Passive versus active hydroponics

– Choosing the container

– Making the nutrient

– Planting the seed or seedling

– Light

– How often to add water

– Creation of a Kratky pot system

Guitar construction

The guitar construction workshop discusses the basics of a resonant cavity, basic bridges, types of strings, tuning posts, calculating fret positions, and where to find songs and resources online. Students will build a single string guitar (diddly bow) and learn a simple song.

– Single string slide

– Resonant cavity (cigar box…)

– Guitar strings

– Posts for strings

– Guitar tuning posts

– Calculating fret positions

– Guitar slides

– Simple songs

Build a 3D Printer

This workshop does hands-on construction a 3D printer from a kit. The workshop covers general discussion of current DIY and kit 3D printers. Assembly tips, calibration tips, and generic slicer software are covered. Students will have some hands-on experience with part of a kit construction.

– DIY or kits

– Assembly of a kit

– Calibration of a kit

– Slicer software (Cura)