# Fab Academy 2015 Evaluation Checklist

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**BASIC REQUIREMENTS:**

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1. All work must be in the class archive
2. All fabrication files and code must be present in original formats (antimony, eagle, CAD..)
3. Code must be provided (screenshots of code alone are not acceptable)
4. All weekly units must be completed
5. Final project must meet basic requirements

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**PRINCIPLES AND PRACTICES, PROJECT MANAGEMENT**

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- HTML page(s) that documents a student's work.
- Student has made commits in the Academy archive.

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**COMPUTER-AIDED DESIGN**

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- Original 2D design files
- Original 3D design files
- A description of the software experimentation process.

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**COMPUTER-CONTROLLED CUTTING**

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- Description of process
- Student has made a press-fit construction kit on the laser cutter.
- Photos of the process
- The original design files.

NOTE: Students must demonstrate that they can use both the laser and the vinyl cutter, but to complete the computer-controlled cutting unit, they only need to do press-fit on the laser.

You need to know how to use a vinyl cutter in order to get the Fab Diploma, but that can be documented in any weekly unit or the final project. Students just need to document vinyl cutter usage somewhere.

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**ELECTRONICS PRODUCTION (WEEK 1 OF 2)**

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- Make a FabISP
- Description of the process
- Photos of the process
- Design files (only if you created a new design).

**Outliers:** If board is not working, multiple efforts and troubleshooting steps taken, shown and documented.

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**COMPUTER-CONTROLLED MACHINING**

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- Original design files of student's own design
- Must machine "something big", files must be cut.
    - Molds too large for the Modela are all acceptable.
- Design files
- Tooling, feeds & speeds and materials used.

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**ELECTRONICS DESIGN (WEEK 2 OF 2)**

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- Redraw the echo hello-world board or design your own.
- Add (at minimum) a button and LED with current-limiting resistor.
- Description and pictures of process
- The original design files (Eagle, KiCad, Inkscape - whatever)

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**EMBEDDED PROGRAMING**

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- Document what you learned from reading a microcontroller datasheet.
    - What questions do you have? (optional)
    - What would you like to learn more about (optional)
- Description of programming process
- Program board in as many programming languages as possible (at least one)
- Your code must be documented (code must be executable, no screenshots!)
- At bare minimum, the example code must be modified

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**MICROCONTROLLER PLATFORM + SINGLE BOARD COMPUTER POLICIES**

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**!!!!!!!!!!!!!!!!!! IMPORTANT !!!!!!!!!!!!!!!!!!!!**

## ACCEPTABLE USES OF ARDUINOS

- Prefabricated Arduinos can be used -- **BUT ONLY with networked, student custom-designed shields or connector boards.**
- **If you don't understand what that means, you can't use a pre-fab Arduino**.
- Fabricate your own "Arduino style" board with an ATMega chip, there are numerous fabbable designs available.

## SINGLE BOARD COMPUTERS: RASPBERRY PI, BEAGLEBONE

They are super cheap computers capable of running full operating systems, like Linux and (recently) Windows. PIs, Beaglebones, etc, **can be used as a computer interface (a substitute for your desktop/laptop).**

Students must still fabricate their own boards for each weekly assignment.

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### 3D MOLDING AND CASTING

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- 3D mold designed, CAD files provided
- Mold machined
- Parts cast
- Machinable wax is recommended, not required
    - Foam is also acceptable
- Document process, tooling, materials, machine and feeds & speeds used (if feeds & speeds applicable)

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### 3D SCANNING AND PRINTING

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- 3D scan an object
- Design and print a 3D print a model
    - File sharing site downloads are not acceptable
- Provide your design files
- Document the process
    - tools and materials used
    - troubleshooting tips
- Repair and print the scan (encouraged, but not required)

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### INPUT DEVICES

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*At Minimum (electronics beginners):*

- Fabricate one of the “hello world” input example boards
- Program them (in as many languages as possible)
- Document each sensor, what it does, what you learned.
- Optional: Make as many sensor boards as possible and thoroughly understand how they work.

*Students with Previous Electronics Experience*

- Design your own sensor boards
- Provide the design files
- Above minimum requirements (except fabricating hello world if you already designed your own)
- Encouraged: Use new and unfamiliar sensors

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**OUTPUT DEVICES**

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*At Minimum (electronics beginners):*

- Fabricate one of the “hello world” output example board(s)
- Program them (in as many languages as possible)
- Optional: Make as many output boards as possible
- Document:
    - each board created/device used
    - what it does
    - what protocol it uses
    - what you learned

*Students with Previous Electronics Experience*

- Design your own output board(s)
- Provide the design files
- Above minimum requirements (except fabricating hello world if you already designed your own)
- Encouraged: Use new and unfamiliar devices

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**COMPOSITES**

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- Large 3D mold designed (~$ft_2$), CAD files provided
- Mold machined
- Composite part(s) cast
- Document process, tooling, materials, machine and feeds & speeds used (if feeds & speeds applicable)

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**EMBEDDED NETWORKING AND COMMUNICATIONS**

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*At Minimum (electronics beginners):*

- Fabricate one of the “hello world” networking example board(s)
- Program them (in as many languages as possible)
- Document:
    - each board created/device used
    - what it does
    - what protocol it uses and how it works
    - what you learned

*Students with Previous Electronics Experience*

- Design your own networking board(s)
- Provide the design files
- Above minimum requirements (except fabricating hello world if you already designed your own)
- Encouraged: Use new and unfamiliar protocols

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**INTERFACE AND APPLICATION PROGRAMMING**

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- Write or modify an application that interfaces with an input and/or output device.
- Provide your code files in the original format
- Code must be executable (screenshots of code without files will not be accepted)

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**MECHANICAL AND MACHINE DESIGN**

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- Participate in a group machine build
- Student documents their participation:
    - overall concepts learned
    - troubleshooting steps
    - tips for improvement, etc
- **Instructors must rate student participation**
    - Students who do not participate in group build will not pass the unit

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**INVENTION, INTELLECTUAL PROPERTY, AND BUSINESS MODELS**

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- Student creates and documents a license for their final project
- Creates a plan for for sharing final project (dissemination)

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**DIGITAL FABRICATION APPLICATIONS AND IMPLICATIONS**

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Propose a final project that integrates the range of units covered.

- what will it do?
- who's done what beforehand?
- what materials and components will be required?
- where will they come from?
- how much will it cost?
- what parts and systems will be made?
- what processes will be used?
- what tasks need to be completed?
- what questions need to be answered?
- what is the schedule?
- how will it be evaluated?
- projects can be separate or joint, but need to show individual mastery of all of the skills

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**DIGITAL FABRICATION PROJECT DEVELOPMENT**

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- complete your final project
- track and document your progress:
    - what tasks have been completed, and what tasks remain?
    - what has worked?
    - what hasn't?
    - what questions need to be resolved?
    - what will happen when?
    - what have you learned?
- create a final project slide in the archive according to the specifications Bas provided.