

California State Polytechnic University Pomona

Aerospace Engineering Department's

# Aerospace Structures Laboratory

## Access & Usage Manual

This manual outlines the Aerospace Engineering Department's guidelines & expectations for student access & usage of its Structures Laboratory.

**By**

**Todd D. Coburn**

**04 October 2018**

# *Aero Structures Lab Access & Usage Manual*

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By Todd D. Coburn

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# *Aero Structures Lab Access & Usage Manual*

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Introduction

## 1.0 Introduction

### Purpose

California State Polytechnic University Pomona (CPP) was initially founded in 1957 as the Kellogg Campus of what was then called the California State Polytechnic College in San Luis Obispo. The Pomona Campus separated from the San Luis Obispo campus in 1966 and became California State Polytechnic College Kellogg Campus, and University status was granted in 1972.

The Aerospace Department was one of the College of Engineering's founding departments, and some of our fine current aerospace faculty had the privilege of studying here in the early days of the department.

The ideal behind the founding of CPP & its mother campus at SLO was the principle of *learning by doing*, and this ideal is still the goal of both campuses today. The Aerospace Structures Laboratory is one of the many labs devoted to helping aspiring Aerospace Engineers to get that hands-on *doing* component of engineering.

Over the years, over 29,000 degrees have been awarded by the College of Engineering, and a proportionate amount of these degrees have been awarded to new Aerospace Engineering graduates. These graduates have moved out into industry, and into academia, and have been instrumental in the continued growth and success of the US engineering industry on the worldwide arena. Many of these folks have climbed the corporate ladders at their respective companies, and many have returned to CPP to glean new batches of well-trained engineers for the continued growth of their companies. Many of these folks reflect fondly upon their experiences at CPP, and a number of those have expressed that the hands-on experience they encountered was a positive one that was both career-changing and effective.

The Aerospace Department currently has 10 laboratories dedicated to helping Aerospace students, as follows:

- Subsonic Wind Tunnel Lab (Bldg 13-1229) – Wind Speeds to 200 mph
- Supersonic Wind Tunnel Lab (Bldg 13-1229F) – Wind Speeds to Mach 4
- Unmanned Aerial Systems Lab (13-1114F)
- Aerospace Structures Lab (Bldg 13-1114)
- Fluid Dynamics & Heat Transfer Lab
- Flight Controls & Simulation Lab
- Aerospace Computer Lab
- Aerospace Vehicle Design Lab
- Aerospace Propulsion Lab/Jet Engine Testbed

These labs have traditionally been open for Aerospace student use. This freedom of usage provides a competitive advantage for students seeking to deepen and broaden their hands-on capabilities and experience. Yet access without faculty supervision lays the responsibility for safe and effective usage at the feet of each student awarded the privilege of unescorted access and usage.

This manual outlines the guidelines and expectations of the Aerospace Department for access and usage. This manual is by no means comprehensive, and is expected to be accompanied by careful and considerate student action and judgement.

This manual will be updated continuously to ensure it is up-to-date, effective, and sufficient to maintain and enhance student opportunities while safeguarding students & faculty, and the resources of the school for future generations of learners.

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## **Applicability**

This manual is intended for anyone and everyone interested in using the structures laboratory for any purpose, including students and faculty involved in classes, club, project, build or research activities. Anyone using the laboratory is expected to read and review this manual carefully before entering the lab, focusing special attention on the Safety guidelines of Section 2.

Anyone entering the laboratory must be escorted by university faculty, staff, or maintenance personnel unless they have reviewed this manual in full, including the safety guidelines of Section 2, have agreed to the terms of access and usage documented herein, and have signed the commitment form of page A-1 and filed it with the Aerospace Structures Lab Director, Dr. Coburn, or another aerospace faculty member.

No one is allowed to enter the laboratory unless escorted by university faculty, staff, or maintenance personnel unless they have agreed to all terms in this manual, have signed the form of Page A-1, filed that agreement form with Dr. Coburn or another aerospace faculty member, and been approved for access.

## **Safety Focus**

Anyone requesting unescorted access to the Structures Lab needs to clearly understand the safety and usage guidelines and expectations that are defined in Section 2 of this manual. Anyone not adhering to these guidelines, or unable to correctly articulate accurate answers about safety and usage at any time, will have their lab access revoked for one year.

Be sure to read that section, and this manual carefully, and to refresh yourself on the expectations and guidelines periodically if you wish to retain access to the lab.

## **Manual Updates**

This Lab Access & Usage Manual is under continuous improvement. The latest version will remain available for download at <http://toddcoburn.com/PPP/Aero%20Lab%20Access%20Manual.pdf>. Keep the latest copy on hand and watch for updates in order to maintain your access to the lab. Unescorted folks found in the lab who cannot correctly articulate accurate answers about safety and usage at any time, will have their lab access revoked for one year.

## **Responsibility for Organization & Cleanliness**

In addition to the safety procedures & expectations of Section 2, and the other guidelines of this manual, anyone entering the laboratory is expected to maintain and enhance the organization, cleanliness, and efficient operation of the laboratory by managing the placement and removal of their own items and waste, by returning tools they use or ones they see lying about, and by monitoring & enhancing the cleanliness of the laboratory, tools and equipment. Anyone unwilling to accept responsibility for enhancing the cleanliness & organization of the lab, even to the extent of cleaning messes they did not create, will have their lab access revoked.

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## **Securing & Maintaining Access to the Structures Lab**

Any aerospace student wishing to utilize the Structures Lab for University-related class, project or research work will need to do the following:

- Read this manual in its entirety, understand and be able to articulate its contents, and agree to abide by these guidelines.
- Sign the Commitment form from Page A-1 of this document.
- Secure permission of the Lab Director, Dr. Todd Coburn, or another Aerospace Faculty member.
- Print the Lab Access form: [https://www.cpp.edu/~engineering/current/Student\\_Access\\_Form.pdf](https://www.cpp.edu/~engineering/current/Student_Access_Form.pdf)
- Fill out the Lab Access Form and bring it to your faculty advisor or to the Lab Director, Dr. Todd Coburn for review and approval, then take it to the department office (17-2132) for review and approval by the department chair. If approved, Amy will forward this to John Rotunni, who completes the authorization.

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Lab Safety &amp; Usage Guidelines

## **2-0 Lab Safety & Usage Guidelines**

### **Individual Entry Swiping & Non-Sharing of Access**

Folks who have been granted unescorted lab access are expected to individually swipe their Bronco Cards when they enter the lab. This provides the university with a record of each and every student that is in the lab at a given time.

No-one is authorized to enter the lab without a faculty escort unless they have swiped themselves in. This means groups of folks entering the lab without a faculty escort must wait and individually swipe their badge each time they enter the lab.

The only unescorted people allowed in the structures laboratory outside of scheduled ARO3570L classes are those who have agreed to the terms of this document and who have been granted access by the Department and University thru the Lab Director, Dr. Todd Coburn. Any others wishing to secure access must follow the same process to request access.

Folks with the privilege of access are not authorized to grant access to others, nor to serve as an escort to others who have not been approved for access, nor to swipe them in. This also means folks with access are not allowed to prop the lab doors open, but are obliged to close doors after entry, and it means that folks with access are responsible to ensure that the others in the lab when faculty are not present have been authorized for access.

Anyone spotting someone entering the lab without swiping is expected to confront the individual and to report the incident to the Lab Director.

### **Common Sense**

Common sense is a necessity in any lab or production environment. Consistent application of good common sense can preclude a number of unforeseeable situations from developing in the lab. Alertness is also required. Be sure to get enough sleep before entering the lab and to keep your wits about you at all times.

Commit yourself to safe practices, and to monitoring your own actions and to remaining aware of the activities and actions of others in the lab at all times. This is especially true if no faculty is present in the lab. Report any unsafe or careless activities to Dr Coburn (714-357-4455) or to your faculty advisor immediately. In any emergency, or if your instructor or advisor is not reachable or available at the time of the incident, report any such activities to the department administrator (909-869-2235) and/or to CPP's Emergency Services (909-869-6981) immediately.

### **Eye Protection**

Each and every person entering the laboratory must have safety goggles in their possession.

Safety goggles will be provided for all students enrolled in the ARO3570L Laboratory during class time.

Any other people entering the lab are responsible to provide and carry their own safety goggles each and every time they enter the laboratory.

Anyone who does not have safety goggles in their possession may not enter the lab.

Safety goggles must be worn by every single person in the lab whenever anyone in the lab is using machinery, tools, or equipment.

The lab is used by students for a number of project and research activities. If these activities are analytical and involve no equipment, tools, or machinery, then the people in the lab do not need to wear

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their safety goggles. Yet if one person wishes to use machinery, tools, or equipment in the lab, then every single person in the lab must don their safety goggles, or leave the lab before the machinery or tools are used.

Regardless of whether activities in the lab require safety goggles to be worn or not, anyone entering the lab must have them in possession in case someone wishes to utilize equipment, tools or machinery while they are present in the lab, since these activities take precedence over all other uses of the lab.

## **Clothing**

Proper clothing must be worn in the lab at all times. The following guidelines should be followed by all in the lab.

No loose or baggy clothing nor hanging jewelry is allowed when running any power equipment or any test machines. Anyone wearing loose or baggy clothing or hanging jewelry may not approach within 5 feet of operating machines, power tools, or equipment without securing or removing the loose or baggy or dangly article of clothing or jewelry.

Shoes must be worn at all times. Shoes must completely cover the foot, and must not have pointy heels or exposed toes. Regardless of activities currently being performed or planned in the lab, no one may enter the lab who is not wearing appropriate footwear.

Hair below shoulder length must be tied or confined so that it does not hang where it can be pulled into machines or hardware, and where it cannot catch fire. Anyone with hair more than shoulder length may not approach within 5 feet of operating machines, power tools, or equipment without the hair properly constrained.

## **Emergency Exits**

Be sure to note emergency exits, safety equipment including fire extinguishers, fire blankets, eye wash facilities, first aid kits, and the lab phone.

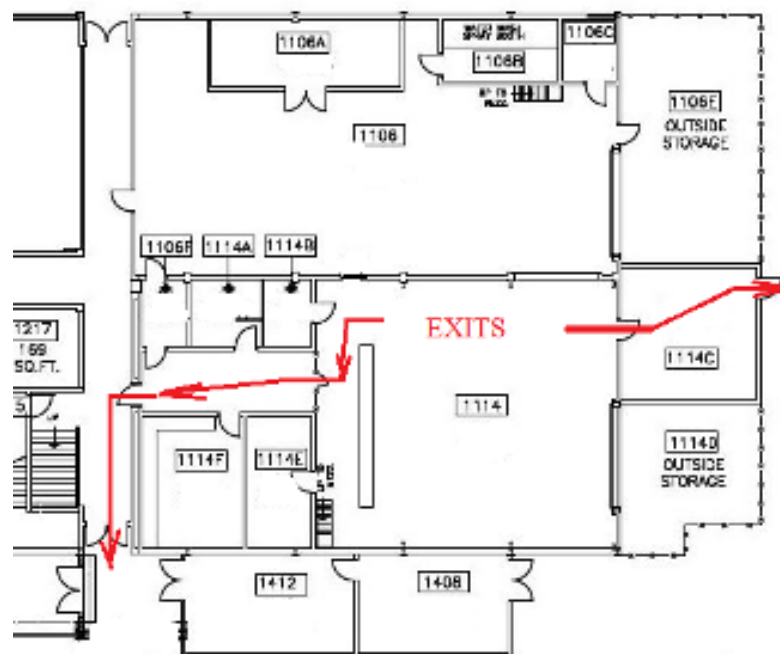


Figure A-1: Emergency Exits



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Lab Safety & Usage Guidelines

If an emergency ever arises in the lab, notify CPP's Emergency Services (909-869-6981) immediately, and exit the building if needed or directed to do so.

## **In Case of Emergency**

In case of emergency, be sure to take appropriate actions, such as the following:

- Shut down equipment.
- Notify instructor and alert others to emergency conditions.
- In event of fire where personal safety is not threatened, use fire extinguisher to extinguish flames.
- If personal safety is threatened, evacuate lab immediately and then notify campus security at 911.

## **Before Using Test Machinery**

Test machinery in the lab is intended for ARO3570L students, for research, for student projects, and for engineering club activities.

Yet students are *not authorized* to use this equipment without prior approval of the Lab Director, Dr. Todd Coburn, or another faculty advisor. Being granted access to the lab does not constitute approval to use the test machinery.

See Section 5 for details on how to secure authorization to use this equipment.

## **General Lab Rules Always in Effect**

The following is always in effect in the lab:

- No test machinery, tools, or equipment may be operated without two or more people present, both of which must have previously studied these lab rules and must have their signature on file with faculty that they adhere to these rules.
- No test machinery can be operated without aerospace faculty knowledge of your specific time and purpose of use.
- Each person in the lab is responsible for his or her own safety, and for the safety of all others in the lab due to his/her own actions, and for the safety of the test machinery or equipment being used
- No smoking or e-cigarettes usage are allowed in the lab.
- No sitting or standing on workbenches at any time.
- No horseplay in the lab.
- Anyone entering the lab is responsible to return all chairs, equipment, tools, and implements to their assigned locations.
- Students may not enter nor leave the lab thru the door into Room 1114C except in the event of an emergency.
- Folks entering the lab are responsible to turn out the lights, turn off any machinery, turn off any portable air conditioning equipment, and so forth when they leave.

## **Lab Cleanup**

Anyone using the lab is expected to help maintain & enhance the cleanliness, organization, and equipment of the lab. Folks entering the lab unescorted are expected to leave no trace of their usage except for an improvement in the cleanliness and organization of the lab.

This means anything carried in gets carried out. Surfaces used are wiped clean. Floor, tables, work areas, and such are vacuumed, swept, wiped, and/or oiled, as needed, so that the area used is in better shape than before.

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Lab Safety & Usage Guidelines

Anyone entering the lab is responsible to ensure that all lab trash cans have been emptied. This means each person entering the lab, by entering, agrees to check the trash and to empty it if it is more than about half full. Anyone unwilling to do this should not enter the lab unescorted.

Small trash cans should be emptied regularly into the large metal trash can, and this can should be emptied into the dumpster behind the library whenever it gets more than half full, or whenever its contents could rot, smell, or pose a danger or threat to lab occupants or their senses of smell.

Anyone entering the lab is also responsible to ensure that no loose tools are left out. This means that each person entering the lab takes responsibility not only for returning their own tools to their proper storage location, but also to return any other tools left out by others. Anyone unwilling to accept this responsibility should not enter the lab unescorted.

Folks exiting the lab are expected to straighten chairs, machines, stools and the like, to clean up any debris or trash that is evident, to remove any projects they have brought into the lab, and to ensure the general organization of the lab is better than it was when they entered.

## **Regulations Regarding Project Structures & Accessories**

There are many productive & effective student clubs, projects, and research activities in the Aerospace Department, and many of these groups and individuals can benefit from using the Structures Lab to collectively work on their projects. This is fine as long as each individual follows this process to secure authorization for access and follows these guidelines after authorization.

Yet access does not authorize leaving anything in the lab without prior approval of the lab director, Dr. Todd Coburn. This includes aircraft, rotorcraft, rockets and parts, etc. It also includes personal tools, machines, backpacks and equipment. It also includes building materials and anything else that was not in the lab prior to entry. Nothing can be left in the lab that was not in the lab before, unless authorization has been secured from the lab director.

We are striving to build cabinets and/or shelves with cubbies that can be checked out for storing of project items, but these are not yet available, and the process for assigning them has not been defined. Therefore, do not leave anything in the lab without prior authorization.

Items that are authorized to remain in the lab must be stored in a safe and non-disruptive way, and must be identified with the name and phone number of a student contact, and of the advisor overseeing the project, and with the date of the last usage of the item.

Failure to comply with this regulation may result in disposal of the item and revocation of the access of the people involved.

## **Regulations Regarding Food & Drink in the Lab**

Eating & drinking is prohibited in the lab whenever any test machinery, machine tools, or other equipment are being used or when chemicals are present.

If all occupants in the lab are involved in meetings or analytical activities, and no-one in the lab is using tools, machinery, or chemicals, then food and drink may be brought in and consumed. However, before anyone in the lab begins to use any of the tools or machines in the lab, all food must be removed and the trash can with its residue emptied. Clean up of crumbs off floor, tables, chairs, and the like is also expected.

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Lab Safety &amp; Usage Guidelines

## Floor Plan & Zonal Overview

The current floor layout of the Structures Lab is shown in Figure 1-1-1 below. Test equipment and areas of usage are indicated as well. The lab is currently being reengineered and the floor plan will be changing as needed.

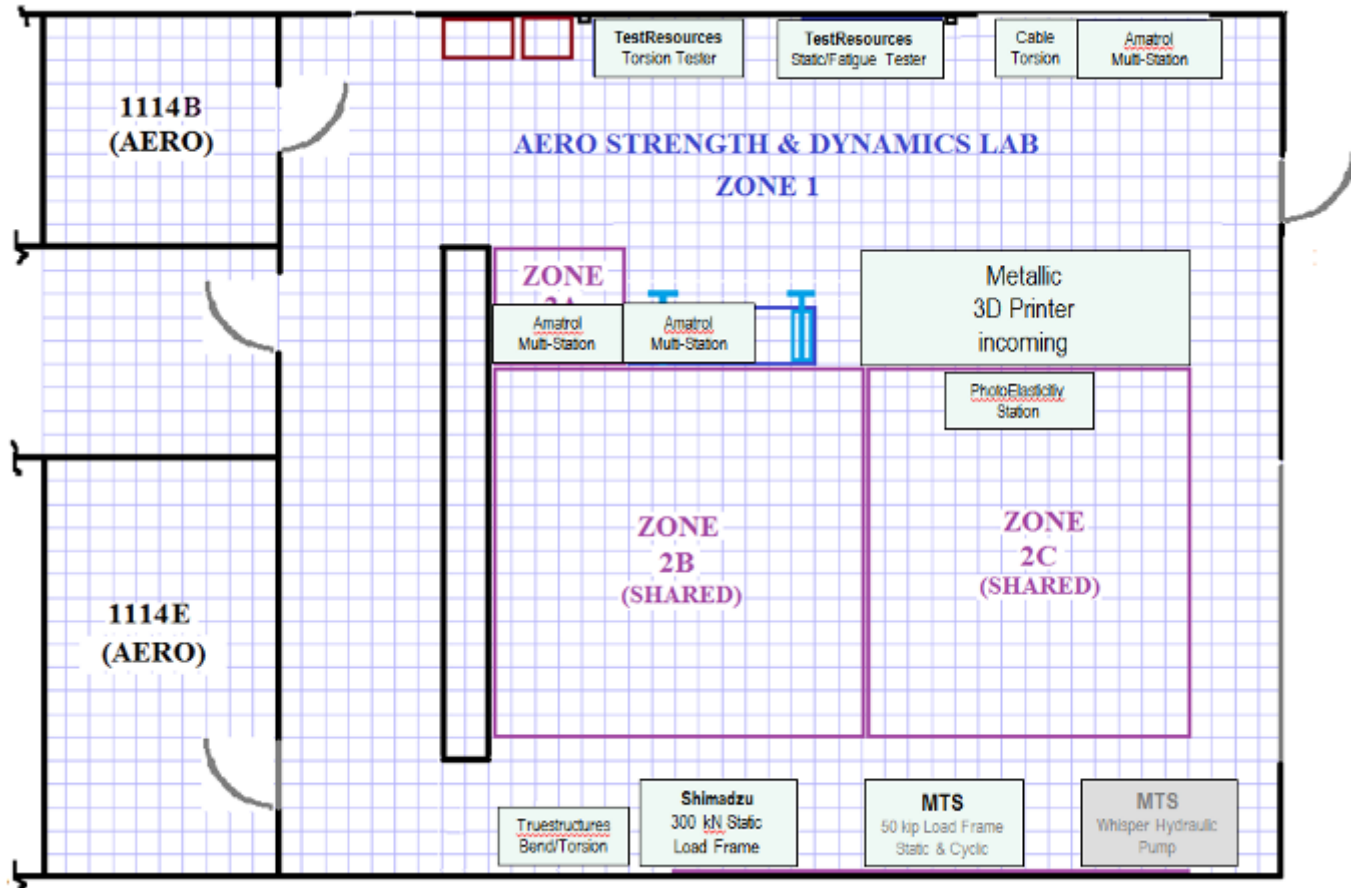


Fig. 1-1-1: Aerospace Structures Laboratory (Bldg 13-1114)

The Structures Lab was designed with a strongback wall and a strong floor, and with a configurable steel framing structure, to enable the attachment & loading of structures for large scale structural testing. This is the only laboratory that has this large-scale test capability at CPP, and this is a competitive advantage of the Aerospace Department and of the College of Engineering.

Figure 1-1-1 shows three test zones (2A, 2B, 2C) that are marked to enable multiple large-scale tests to be active at once. These areas can be used by students performing build activities when large scale tests are not underway. Students using these areas must remove their structures from the laboratory or to a delegated storage cubby in the lab with the permission of the Lab Director, Dr. Todd Coburn. Any personal items or projects left anywhere in the laboratory (including in the storage cubbies) should be labeled with the contact information (including phone number) of the responsible student, the name of the faculty member overseeing the project, and with the year & semester of the activity. Any unmarked items will be permanently discarded and eliminated from the laboratory.

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Lab Hand Tools

## **3-0 Lab Hand Tools**

### **Lab Hand Tools for Student Use**

There are a number of areas where hand tools are available in the lab.

There is a red toolbox in the northeast corner of the lab directly across from the door to room 1114E. This toolbox is for the use of all aerospace students using the lab within the guidelines of this document. Tools in this toolbox should be marked with a spot of orange paint. Tools in this toolbox may be used by students.

Students are expected to completely clean any mess or residue resulting from their use of the hand tools. This cleaning should include sweeping and/or vacuuming of debris and wiping off of surfaces with a disposable cloth or towel and appropriate cleaner.

After using hand tools, students are expected to wipe them clean first with a disposable towel or rag, and then with a lightly oiled rag.

After cleaning the tool, students are expected to return the tool to the correct drawer of the red student-use toolbox.

Students are expected to be alert for hand tools improperly left out in the lab by others, and to clean and return them to the appropriate drawer of the red student-use toolbox.

### **Lab Hand Tools Requiring Additional Permission for Access & Use**

There are many other toolboxes and cabinets containing tools in the lab. These should be locked and students should not use them or attempt to access them without prior permission from the lab director, Dr Todd Coburn, or another aerospace faculty advisor.

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Large Tools & Non-Test Machinery

## **4-0 Large Tools & Non-Test Machinery**

### **Large Tools for Student Use**

There are a number of larger tools, saws, and presses in the lab. Most of these are intended for student access and use.

Additional information and guidelines for the use of these tools will be added herein in the future.

Please see the Lab Director, Dr Todd Coburn, or another aerospace faculty advisor, for permission prior to using these tools and machines.

### **Large Tools Requiring Additional Permission for Access & Use**

Currently, until further direction and guidelines are available, please clear usage of any of the larger tools and machines with the Lab Director, Dr Todd Coburn, or another aerospace faculty advisor, prior to using these tools and machines.

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Test Equipment &amp; Machinery

## **5-0 Test Equipment & Machinery**

### **Test Equipment & Machinery for Student Use**

Test machinery in the lab may not be used by unescorted students without additional authorization.

Test machinery in the lab is intended for ARO3570L students, for research, for student projects, and for engineering club activities. Yet students are not authorized to use this equipment outside of the scheduled ARO3570L classes without prior approval of the Lab Director, Dr. Todd Coburn. Being granted access to the lab does not constitute approval to use the test machinery.

Students wishing to utilize the test equipment and machinery are encouraged to follow the process below to initiate becoming authorized.

Once again, students may not use the test machines in the Structures Laboratory without a faculty member present unless authorized by the Lab Director, Dr. Todd Coburn. See below for details of getting authorized.

### **Test Equipment & Machinery Requiring Additional Permission for Access & Use**

Test machinery in the lab is intended for ARO3570L students, for research, for student projects, and for engineering club activities. Yet students are not authorized to use this equipment without prior approval of the Lab Director, Dr. Todd Coburn. Being granted access to the lab does not constitute approval to use the test machinery.

The Aerospace Department *does* want to encourage students to take innovative action in engineering, building, and testing. Yet students wishing to do so need to secure approval so that faculty can ensure they have been properly trained and prepared for safe and effective usage.

Students wishing to utilize test machinery in the future can start by preparing themselves first, as follows.

- Start by accessing the free copy of the ARO3570L Lab Manual from Dr Coburn's website: <http://toddcoburn.com/Cpp/ARO357L%20Lab%20Manual.pdf>.
- Read the portions of the lab manual that pertain to your interest.
- Study the lab manual sections covering the test machinery you hope to use.
- Be sure to carefully read the safety procedures in the ARO3570L Lab Manual since some of them differ slightly from the safety guidelines for approved unescorted users.
- See Dr Coburn or your faculty advisor to request permission to run the machine.
- After securing approval to use the machine, be sure to follow the lab procedures in the ARO3570L Lab Manual carefully. Alert the Lab Director, Dr. Todd Coburn, to any issues encountered or updates to the procedures identified.

Once again, students may not use the test machines in the Structures Laboratory without a faculty member present unless authorized by the Lab Director, Dr. Todd Coburn.

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Commitment to Aerospace Structures Lab Access, Usage, & Safety Guidelines

**Commitment to Aerospace Structures Lab Access, Usage & Safety Guidelines**

By signing this form, I verify that I have carefully read this entire manual and agree to abide by its terms and limitations.

I agree to use my best judgement and to accept responsibility for myself & for the lab and its machinery, equipment & tools each time I set foot in the lab.

I agree that I am responsible for my own safety while in the lab and for the safety of others due to any of my actions, whether intended or otherwise.

I agree to clean up after myself and to strive to leave the lab in a better condition when I leave than when I enter.

I agree to report to Aerospace Engineering Leadership any actions by myself or others in the lab who do not abide by this document or who show poor judgement or unsafe actions while in the lab.

<u>Bronco ID</u>	<u>Last Name</u>	<u>First Name</u>	<u>Signature</u>	<u>Date</u>
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