

Curriculum Overview

The Pacific Crest National Scenic Trail (PCT) spans 2,650 miles from Mexico to Canada. As the “voice” of the trail, the Pacific Crest Trail Association (PCTA) seeks to protect, preserve, and promote this trail for the enjoyment of hikers and equestrians.

Because wildfires, wind storms, floods, gravity, and vegetation growth are constant threats to the PCT, the annual maintenance and reconstruction of the trail is a never-ending and monumental undertaking. Such work, historically carried out by government trail crews, is increasingly done by hundreds of volunteers organized by the PCTA. These volunteers perform hard, physical labor so that others may safely enjoy the beauty and challenge along the trail.

To help our volunteers be successful in their trail work, PCTA collaborated with many partners to develop this curriculum. It is designed for training workshops held along the trail each year where volunteers and agency instructors train new and returning volunteers who are eager to increase their knowledge and skills. The curriculum is now freely available for all who wish to use it, whether our partner groups working along the PCT, or others working on trails around the world.

BACKGROUND

The development of this curriculum was funded through a grant from REI. The PCTA worked with USFS seasonal employee John Schubert to develop the text. These documents are free to be copied and reproduced provided the PCTA and John Schubert are acknowledged as the source. Student Conservation Corps and Volunteer for Outdoor Colorado images are used with permission.

This curriculum is written for volunteer and agency instructors to train new PCT trail volunteers. As such, it aims to provide a shared perspective, vocabulary, and approach to working on the PCT. The Instructor Planning Guide is meant to help with course preparation and to serve as a guide to insure all important topics are covered. The Field Reference is to be photocopied, used in the field and as a take home for students.

While the material here may be of interest to students, it is not written for a beginner to trail work, but rather for those experienced and ready to instruct others. There are many excellent trail work skill manuals written for beginners listed in the bibliography. The most concise is the Forest Service’s *Trail Construction and Maintenance Notebook*, available for free (see bibliography) and small enough to carry in a trail worker’s pack.

This curriculum is written specifically for the PCT, a trail that is designed and maintained only for horse and hiker use, generally at an easy or moderate level of difficulty. As such, the trail has specific standards to be followed. Mountain bike, snow, and motorized trails will have somewhat different specifications, and issues.

The PCT often passes through Congressionally-designated Wilderness areas in National Forest, BLM, and National and State Parks thus requiring the use of non-motorized hand tools in remote areas. Other sections of the trail are more easily accessed by road and allow power tools such as chainsaws, though some such areas may be remote. Be sure to know the regulations in the area you work.

Tool names used in this curriculum, in most cases, are taken from the Forest Service publication, *Trail Construction and Maintenance Notebook* (see bibliography).

Trail terminology used by the PCTA is defined in a special section. The first time a term appears in a class curriculum it appears in **bold underlined italic type**.

The underlying assumption of this “trail college curriculum” is that a “student” new to trail work will start with several 100-level classes before moving on to 200-level classes. Even if a student has some basic trail work experience elsewhere, because there are regional differences in trail skills terminology and technique, they are strongly encouraged to start with the 100-level classes to ensure they are learning standardized PCT trail skills. This also ensures uniform maintenance and construction along the entire 2,650 miles of the PCT.

All classes are intended to be eight hours, unless otherwise specified. At least six of the eight hours must be in the field emphasizing hands-on trail work (less talk, more action). The desired outcome of all classes, except 101, is students are not only exposed to, but practiced in, a finite skill set so they can perform it independently on the PCT. The PCTA suggests one Lead Instructor (coordinates any other instructors) and sufficient instructors to ensure a 1:4 teacher to student ratio. Class work sites must be carefully selected to provide optimal skill practice for each specific class.

Throughout this curriculum we have sprinkled what we call “Trail Maxims.” These are fun sayings we’ve made up or heard from other crew leaders along the trail that distil the critical lessons to their essence.

INSTRUCTORS

All instructors will ideally have the following qualities:

- Genuine enthusiasm for trail work that infects students.
- Patience with those new to the subject.
- A positive attitude about volunteerism, PCTA, and agency partners (negativity erodes volunteer interest and commitment and undermines relationships).
- A clear speaking voice and the ability to communicate in easily understood language.
- A clear understanding of the importance of safety and why PPE is important.
- At minimum, current Standard First Aid and CPR training, and ideally, more advanced certification such as Wilderness First Aid or Wilderness First Responder.
- A clear understanding of PCTA Emergency Action Plans (EAP) and communication protocols for the work area.
- Current Standard First Aid and CPR certification, though Wilderness First Aid or Wilderness First Responder certification is preferable.

Instructors must teach in such a way to help students leave the class with actual skills and knowledge that they can use with confidence on the trail. To achieve this they should not hesitate to require students to demonstrate understanding of concepts and competence in the skills taught.





Instructors commonly spend too much time talking and demonstrating, rather than getting tools in the hands of students. While some talk and demonstration is important, students need to learn by doing, to insure that they are ready to do good trail work on their own. Critiquing student work and then having them practice more is the best way to develop their skills. Trail work is mostly about learning physical skills, with just the right amount of critical thinking, best developed by practice.

Ideally those who have never taught trail work before will team up with an experienced instructor for a class or two before becoming a lead instructor. It is imperative when there are multiple instructors who are co-teaching a class to meet or have a conference call before the actual day of the class to discuss who is teaching what, different teaching techniques, etc.

Most classes aim to prepare students to take on independent trail work and thus practice during and after classes is essential before moving on to a next level class. At least three days in the field doing the work learned in the first class is suggested.

TEACHING KEY CONCEPTS

In an effort to distil this curriculum to its core concepts, we encourage instructors and students to see how most trail work skills fall under five main topics:

- 1) Safety Awareness 
- 2) Trail Fun 
- 3) Quality Work 
- 4) Trail Eyes 
- 5) Tool Care 

The symbols attached to each are meant to give students a visual cue to focus extra attention to mastering these topics.


THE THREE-LEGGED STOOL:


SAFETY AWARENESS 


TRAIL FUN 

QUALITY WORK 

Trail work is physically demanding, includes significant hazards, and requires exacting standards to be durable. To ask such work of volunteers requires those who lead them to give equal attention to three essential ingredients: safety, fun, and quality work. As with a three-legged stool, if any one of the three “legs” of volunteer trail work is neglected, the endeavor will “fall over” or fail.


Though all three legs of the stool are essential, Safety Awareness  is listed first because if trail volunteers are regularly injured, PCTA will be unable to continue using volunteers for trail work. Below and elsewhere in this curriculum are numerous critical procedures and protocols that leaders must follow to insure volunteer safety. Suffice it to say for now, crew leaders must lead by example and give clear safety instructions to engender a culture of safety throughout a project, from beginning to end. Anything less is just not an option if we want all volunteers to come home safe and be eager to return. Safety Awareness Maxim: “No job is so important that it must be done in a way that puts the worker at risk.”

As for Trail Fun , crew leaders can learn many tricks of the trade from fellow instructors to insure their crew members have fun. Some trail volunteers will derive fun simply from contributing to a better trail by doing satisfying work. Others will take a little more attention, so a crew leader must be attentive to the varied needs of individuals. Obviously, providing praise and encouragement to everyone is essential. Encouraging the development of friendships is often important which can mean allowing time to socialize. Trail Fun Maxim: “Life is too short not to have fun as a volunteer.”

Insuring that volunteers do Quality Work  is essential, but can be tricky. Many volunteers are not used to doing physical labor or trail work in particular, so have a hard time recognizing just what quality trail work is and how important it is. The trick is to both teach and inspire new trail workers to want to take the time necessary to get a task right. Teaching them involves

emphasizing that it makes no sense to do a job half way, only to have it quickly fall apart or not function at all. Stress that the natural forces of water, wind, gravity and users (especially horses) feet are powerful and thus our work must be up to the task of withstanding them. As for inspiring students to do Quality Work, of course instructors must demonstrate Quality Work in everything they do. Also, make it clear that redoing or continuing to work on a task is an essential part of learning Quality Work. Stress that it is not punishment, but an opportunity to make a lasting contribution to trails. Quality Work Maxims: “If a task is worth doing, it’s worth doing well.” “If a job seems mindless, you probably need to give it some more thought.” Finally, “Trail work is a little bit engineering, a little bit craft, ecology, user psychology, and a whole lot of labor, hopefully, labor of love.”

MORE ON SAFETY AWARENESS

 Trail work is part of a long tradition of woods work that dates to the 1930s era of the Civilian Conservation Corps (CCC) and to earlier logging. Woods workers, because of the many hazards they face, wear standard safety gear known as PPE. While the hazards of trail work are often not as great, sometimes they are, so we get to wear the same gear.

Personal Protective Equipment (PPE):

Government agencies require their trail crews to wear at all times working: hard hat, long pants, long-sleeved shirt, sturdy leather boots, eye protection, and gloves. This is for a variety of reasons, most importantly to provide at least one layer of protection between sharp tools, rocks, and trees and the fragile human body. The PCTA’s lead partner agency, the U.S. Forest Service, extends to all its volunteers (including those of PCTA) both liability and workers compensation coverage, as long as they follow Forest Service safety guidelines. It is also critical that PCTA volunteers follow all prudent safety procedures to protect our organization from liability lawsuits.

While it may be safe to do some trail work tasks without a given item of PPE, circumstances can change in a moment, then requiring a particular PPE item that might not be at hand. Thus the safest practice, by far, is to wear all standard PPE at all times. While this may lead to some grumbling, whenever you catch yourself saying,

“Why the heck am I wearing this ____?”, use that as a reminder to shift your focus to a more important question, “How can I carry out this task even safer?” As for the most common complaint, if the weather is hot, simply wear a light weight shirt and pants, and wear a moist bandana under the hard hat.

Job Hazard Analysis (JHA): a formal Forest Service document signed annually by a District Ranger or his designee. It describes the hazards of a particular trail project and how to reduce them. A crew leader reviews this document with their crew before beginning work and each crew member signs it.

Tailgate Safety Session (TSS): a discussion of the hazards about to be encountered and how best to reduce them. Generally held at the beginning of each day before leaving vehicles, though if tasks or circumstances change during the day (such as a thunderstorm approaches or a particularly dangerous task arises), it should be revisited. A copy of each TSS form should be turned in by crew leaders to their PCTA contact at the end of the project.

Emergency Action Plan (EAP): a PCTA form to be filled out by a crew leader and reviewed with the crew before leaving the trailhead. Designates roles for who will be the situation manager, first aid leader, and communications leader.

Ten Essentials: All instructors should carry the ten essentials in their packs at all times and should encourage all students to do the same. A first aid kit is an absolute requirement.

Go/No Go: All trail workers must constantly analyze whether they should proceed with a task or walk away to insure their safety. Crew leaders sometimes exercise such judgment for a group, but it is essential that every trail worker develop these critical thinking skills for when they work on their own. Such analysis evaluates all the hazards present and balances them against the skills they have. The most important thing every trail worker needs to know is that it is totally OK and they show the very best judgment when they walk away from danger.

To reiterate, the primary objective of PPE, TSS, JHA, EAP, the Ten Essentials and Go/No Go analysis is to send every volunteer home healthy and ready to return to have fun doing trail work another day. Nothing we do should jeopardize

that and everything we do should insure it.

Safety Trail Maxim: “There is no bad weather, only bad gear.” and its corollary “There are no problems for those adequately prepared.”

TEACHING “TRAIL EYES”

As with any new endeavor, a trail worker needs to develop a heightened awareness of the trails they travel. Because new trail workers have been trail users for some time, they have well-developed habits of awareness that are, quite naturally, focused on the scenery, their horse, etc., rather than on drain dips, berm, waterbars and tread erosion. They were quite busy enjoying themselves without paying attention to the trail, other than obvious hazards.

The need to develop a heightened awareness of trail maintenance issues is essential, quite simply, because if a new trail worker fails to notice the work needing to be done, they won't stop to do it. This initial lack of awareness can't be underestimated; I have seen many new trail workers instinctively duck under branches along a trail, without noticing they needed to be cut out. The ability to see a nearly full drain dip really does take well developed “trail eyes.”

There are many ways to help new trail maintainers develop trail eyes, but a common approach asks one student at a time to walk in front of the group identifying for the class several trail problems or well functioning features. A little humor never hurts, encouraging them to “put on their beautiful trail eyes” to carry out this assignment. Another technique is to give each student several pin flags and assign them each a stretch of trail to mark where work needs to be done, as well as good work, and then reporting to the group.

If students have difficulty seeing trail problems initially, instructors can place the pin flags along the trail as a hint where they should notice a problem or something excellent. Such exercises might best be done after doing some trail work. There is nothing like physical work to shift ones awareness of trails.

Trail Eyes Maxim: “Develop and enjoy the mixed curse of trail eyes. You'll never see trails the same way again.”

TEACHING TOOL CARE

It is essential to encourage students to properly use, carry, maintain, and store tools so they are safe, sharp, effective and never lost. Stress using the right tool for the job and discuss how easily tools are broken if the incorrect tool is used (and how difficult they are to repair). Of course, inform students that a sharp, well maintained tool makes the work easier. Since trail work is hard enough, it is critical to have every advantage possible.

Many government fire fighting caches replace tools regularly, often making the old tools “surplus property” and thus available to volunteer trail crews. Ask your agency contact person if they can obtain such tools for volunteers. If there are enough such tools, assign or give one or two tools to regular volunteers. After they have refurbished the tools, they likely will treat them with extra care as their own.

Before leaving the trailhead, demonstrate safe carrying of tools: 1) at side, not on the shoulder; 2) on downhill side (toss downhill if tripped; 3) sharp end forward where you can keep track of it; 4) safe spacing between tool carriers.

When on the trail, choose a method to insure that all the tools go home at the end of the day. Out in the woods, with all the vegetation and trading tools all day among workers, it is amazingly easy for tools to disappear. There are a variety of ways to prevent this; choose a couple: 1) paint a portion of each handle a bright color; 2) make a list of the tools that go out with you and be sure you have them all at intervals throughout the day; 3) designate a tool collection point off the trail (a large tree or rock) whenever you’ll be working or resting in one place for a while, rather than putting them down over a wide area. Of course, be sure to place all tools that are not being used, uphill of the trail so they are easily seen and out of the way of hikers or other workers passing by.

At the end of the day, involve everyone in cleaning all the tools and sharpening any that need it. All tools should be clean and dry before they are put away. Any tools left out overnight at a work site must be covered to protect them from rain and dew. Tools that are prone to rust, should be oiled lightly before being stored away- if they have already rusted, use fine steel wool or a similar product to remove the rust before oiling. This should include proper care of PPE.

Eye protection should be cleaned and put away, at the very least, in an old sock to preventing lens scratches. Hard hats should be cleaned off and especially the sweat band should be rinsed in water to prepare it for the next user.

Tool Care Maxims: “Let the tool teach you how it wants to be used.” “The tool is the best teacher, so listen carefully.” “Respect your tools and they will serve you well.”

TEACHING SUGGESTIONS

Because competency is the desired outcome of all classes, testing in some form is appropriate to assess our success. If we do not know that our students can do quality work safely, we put them and the trail at risk. Of course, making such testing fun is highly desirable. Fun pop quizzes, either on the trail or in camp, are one way to test and reinforce knowledge. Developing a version of Trail Jeopardy could be worthwhile to help foster retention of concepts. Trail Olympics might be another way to encourage competency, especially if everyone who demonstrates success is recognized (not just the best). Even simple trail pop quizzes can provide review and reinforcement for each class. Such a quiz could happen during breaks, at the end, or even during the commute home.

COURSE OFFERINGS

The underlying assumption of this “trail college curriculum” is that a “student” new to trail work will start with several 100-level classes before moving on to 200-level classes. Even if a student has some basic trail work experience elsewhere, because there are regional differences in trail skills terminology and technique, they are strongly encouraged to start with the 100-level classes to ensure they are learning standardized PCT trail skills. This also ensures uniform maintenance and construction along the entire 2,650 miles of the PCT.

SAW CLASS NOTE: Volunteers who wish to lead log out of trails with a crosscut or chain saw must have sufficient experience and knowledge to pass a certification test. The following pre-certification classes are intended to give novices an orientation to the tools and get them ready to safely assist certified sawyers. After sufficient further experience they may wish to take a

certification test. Someone who already has considerable experience with saws may choose to take the certification class without these pre-cert classes, though they will benefit from 104 if they have never done trail work.

100-Level Classes

These are the classes intended for people new to trail work. In most cases, completing classes 101-103 (or demonstrating the equivalent experience) is strongly recommended before taking 200-level and above classes.

100. Intro to Trail Maintenance: This introductory sampler class is intended for people brand new to trail work who want an overview. One quarter of the class covers “how trails work,” i.e. basic trail design concepts; one quarter covers trail work safety protocols; one quarter covers hands-on brushing and hand-saw clearing; and one quarter covers hands-on drainage cleaning. This sampler class does not prepare students to work independently. Instead students will understand a range of trail work tasks and have a good idea of what they want to do under a crew leader, or what class they want to take next.

101. Brushing and Scouting: Intended for those new to trail work who want to learn how to cut brush and small logs to help clear a trail to proper specifications. After discussion of general safety protocols, students learn about safe and effective use of hand saws and loppers. This class also includes how to complete an early-season trail survey to identify and report major problems, especially blown down logs, by their number, location, and size.

102. Tread and Drainage: The effects of water and gravity constantly threaten our trails and thus we must learn how best to deflect them. This course begins with basics of hillside hydrology and how trails work when they shed water properly. Includes introduction of “trail eyes” for recognizing tread erosion patterns. Hands-on practice removing slough and berm, and effective cleaning and maintenance of existing water bars and drain dips.

103. Basic Saw Crew Training: Are you interested in helping certified sawyers to clear trails, but don't have much experience working with or around saws? Regardless if you aim to become a certified sawyer yourself, learning to

be a saw crew member is an important place to start and takes know-how to do safely. This class provides field experience with crosscut saws and axes, but most of the principles are also applicable to chainsaws. Therefore, this class is the place to start, no matter what trail clearing tools you expect to use in the future. The session begins with an introduction to crosscut saws and axes of various types, and how they work. It then covers their safe and effective use, including a review of trail clearing specifications, safety equipment, the forces of tension and bind, and the practice of situational awareness. This class is an introduction; it does NOT provide saw certification, which is required for those who wish to be lead sawyers.

104. Intro to Chain Saw for Prospective Sawyers (4 hours, classroom only): Intended for students who have already taken Saw Crew Training (104) and are interested in an orientation specifically to chain saws, in preparation for a chain saw certification class. The class will not use chain saws in the field, but it will cover things you need to know if you've never handled a chain saw before, including how they work and why they are potentially dangerous. Also included is a review of specialized safety equipment & clothing needed, and how to start saws safely. If time allows, we will disassemble a saw to clean and sharpen it.

107. Hand Tool Field Maintenance: (4 hours) Learn how to care for trail tools and protective gear. Keeping tools sharp is critical for working efficiently and safely. We'll cover how to properly sharpen basic trail tools and discuss why we don't sharpen others.

200-Level Classes

Intended for people who have taken most of the 100-level classes (especially 101-103) or have had plenty of previous trail work experience.

200. Basic Trail Design: For curious trail workers who want to understand why so many trails are in bad shape because of how they were made. Learn how better design and layout makes trails more sustainable and less prone to erosion. Introduction to different trail design standards appropriate for different kinds of trails. This class is for anybody interested in these topics, but students with some trail building and maintenance experience will benefit the most.

201. Drainage Design and Drain Dips:

Intended for someone who has taken 102 Tread and Drainage and/or has experience doing drainage work. Learn how to design and locate effective drainage structures. After a comprehensive explanation of hillside hydrology and how trails work when they shed water properly, this class shows students how to design and construct long, rolling drain dips as a way of reducing erosion on existing trails.

203. Waterbars and Checks: Intended for someone who has taken 201 Drainage Design and Drain Dips and/or has considerable experience doing drainage work. Where earthen rolling drain dips are not feasible, drainage features are sometimes armored using rock or log. Learn contemporary techniques to build water bars and checks with both rock and log. The class will include a review of outdated techniques, and how to convert “old school” waterbars to a more effective design.

205. Tread Re-Construction: Review the concepts of hillside hydrology and basic trail layout. Re-excavate badly slipped and cupped tread to re-establish outslope and restore the tread to original or ideal specs. (Pre-requisite: 102, or equivalent experience)

207. Trail Decommissioning and Wildland Restoration: Learn how to put an abandoned campsite or section of trail to bed so that it returns to nature without erosion. Some call this Zen and the art of wilderness gardening, or trail magic because if properly done the old trail disappears. Includes transplanting, seed collection, and rock placements.

208. Trail Sign Installation & Inventory: Understand sign specifications and learn how to install signs and keep proper records in conjunction with land managers. Learn about agency standards for signs. Making needed signs is very gratifying, though navigating the Forest Service sign manual requires special attention to detail.

210. Initial Crosscut Saw Bucking Certification (8 hours): One of every two crosscut saw operators must be certified to insure safe and quality work. This session is for volunteers who do not have a certification card, but have sufficient previous crosscut saw experience in the field assisting a certified sawyer. The course will include a review of key crosscut safety procedures and best practices

for clearing trail effectively in challenging and potentially hazardous situations. After testing the instructor will determine whether each sawyer is ready to receive a one-year certification at the A (<8” logs) or B (<24” logs) level. At this time, falling certification is not available for volunteers.

211. Initial Chain Saw Certification (8 hours): Every chain saw operator must be certified to insure safe and quality work. This session is for volunteers who do not have a certification card, but have sufficient previous chain saw experience in the field. The course will include a review of key chain saw safety procedures and best practices for clearing trail effectively in challenging and potentially hazardous situations. After testing the instructor will determine whether each sawyer is ready to receive a one-year certification at the A (<8” logs) or B (<24” logs) level. At this time, falling certification is not available for volunteers.

300-Level Classes

300. Rock Retaining Walls: Learn fundamentals of rock construction including an emphasis on effective and safe use of rock bars the critical tool for all rock work. We’ll tackle basic rock placement techniques for walls to last the ages. Recommended after taking 203 or equivalent experience.

304. Crew Leadership: Managing a Volunteers: For students with moderate to extensive trail building experience who want to lead trail crews and work parties. Not a construction techniques class; this is about effective leadership. Students will have classroom and field work in the following topics: Work Day Responsibilities; Risk Assessment and Safety; Tool Safety & Tool Talks; Leadership & Team Building; Practical Experience Leading Trail Crews

310. Crosscut Saw Re-Certification (4 hours): An annual refresher and re-certification test to insure safe sawing habits, up-grade skills, and provide the opportunity for a higher level of certification (including possible nomination to become a certifier).

311. Chainsaw Re-Certification (4 hours): An annual refresher and re-certification test to insure safe sawing habits, up-grade skills, and provide the opportunity for a higher level of certification (including possible nomination to become a

certifier).

400-Level Classes

These classes are only for advanced trail workers with several years of solid experience under their belts. Special application may be required for some classes.

400. Crew Leadership: Trail Analysis and Project Management: Learn the steps for estimating time and materials, and setting up a work project. Learn about trail triage: how to prioritize and what techniques to use when total trail reconstruction to ideal specs is not an option. Understand environmental concerns and policies that may impact projects. Learn what to look for when scouting a trail and how/when to schedule work.