



Avalanche Operations Level 1 Student Equipment List – town-based courses

Note: Past students have been arriving to course with inadequate transceivers which have affected their course outcome. Please read transceiver requirements carefully.

<p>Course Materials</p> <ul style="list-style-type: none"> ➤ Laptop/tablet computer (recommended) ➤ USB stick (recommended) ➤ Pocket calculator ➤ Pen or pencil and note paper 	<p>Snow Observation Equipment*</p> <ul style="list-style-type: none"> ➤ 10x (or greater) Loupe ➤ Snow crystal screen (plastic recommended) ➤ Thermometer(s) ➤ 2 metre folding ruler ➤ 1 metre folding ruler (recommended) ➤ 2 or more mechanical pencils
<p>Touring Equipment*</p> <ul style="list-style-type: none"> ➤ Avalanche transceiver ➤ Probe & shovel ➤ Snow saw (35cm length) ➤ Touring skis or splitboard, poles, boots and skins OR see below for snowmobile courses ➤ Day pack (>30 litres recommended) ➤ Water bottle / thermos ➤ Personal first aid kit (blisters, sun protection) ➤ Personal repair kit (for your bindings or snowmobile) ➤ Compass, clinometer, altimeter¹ <p>¹There are many altimeter, compass, and clinometer apps available for Android and iOS devices. Also, Gaia GPS is a popular app for navigation</p>	<p>Touring Clothing</p> <ul style="list-style-type: none"> ➤ Warm winter boots (for AM/PM weather readings) ➤ Synthetic or wool long underwear (tops & bottoms) ➤ Warm socks ➤ Hat, extra mitts / gloves ➤ Thin gloves (for handling snow study equipment) ➤ Gore-Tex type jacket & pants ➤ Fleece, wool sweater and/or down jacket ➤ Sunglasses / goggles ➤ Headlamp
<p>Snowmobile Equipment (for sled courses only)</p> <ul style="list-style-type: none"> ➤ Snowmobile adequate for course objectives and in good repair ➤ Appropriate tools and equipment for snowmobile maintenance ➤ Fuel (depending on course location) ➤ Scratchers for snowmobile ➤ DOT Helmet ➤ Day pack (>30 litres, worn as a pack, not attached to sled) 	<p>You will be provided with the following on course:</p> <ul style="list-style-type: none"> ✓ a hard copy of the Introduction to Avalanche Operation PDF ✓ a waterproof field book and mechanical pencil ✓ CAA Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanche Occurrences (2016)

* to assist you with selecting the best equipment for this course, we created a list of specific recommendations (see next page)



Recommended personal equipment for Avalanche Operations Level 1

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Avalanche transceiver – The accepted standard for avalanche operations work is a modern 3-antenna digital transceiver. Modern is considered to be a model that is currently offered, supported, and/or recommended for professional use by the transceiver manufacturer.

“Single antenna (analog) transceivers are considered obsolete. Need convincing? Three antennae digital transceivers generally won’t find single antenna transceivers as well as digital units. That means if two people are buried close together, the one with the digital transceiver is likely to be isolated first. Signal overlap can also be a significantly bigger issue with old transceivers in a multi-burial scenario.” Avalanche Canada, 2016

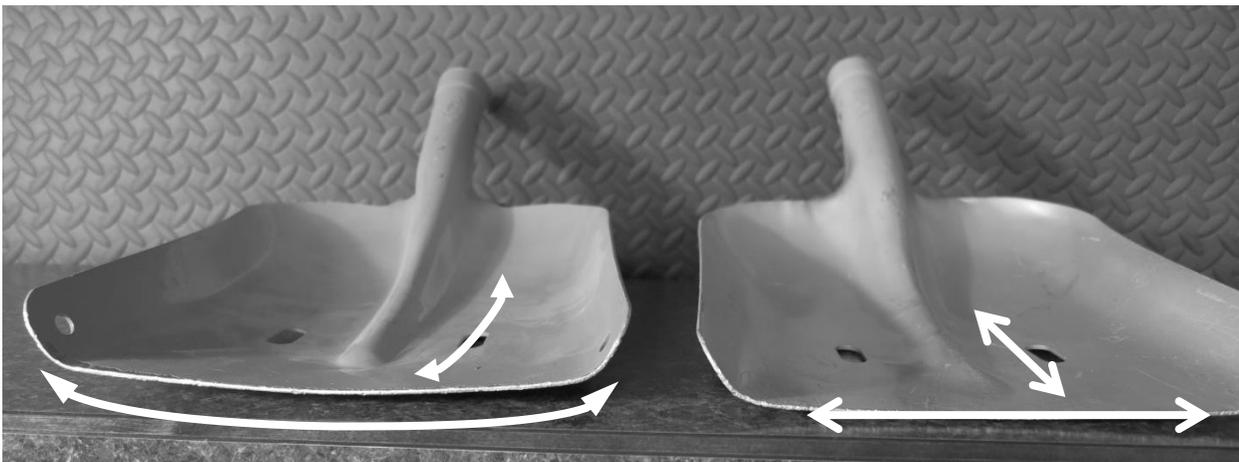
<http://www.avalanche.ca/gear>

Shovel & probe – These are dual purpose, essential for avalanche rescue though used on a regular basis for making snowpack observations. Designs available may work well for one purpose and be less than ideal for the other. What are described here are features / designs that work well for observations and still serve the avalanche rescue purpose adequately.

A **probe** marked in centimeter gradations is very useful, without the marking it is difficult to determine the thickness of the snowpack when observing the depth of snow to ground or ice. Though a shorter (around 2.5 m) probe is typically lighter to carry and adequate for rescue work, a longer probe (3 m or more) is preferred for observations and other purposes (e.g. probing for crevasses).

There are two key design criteria for a good snow observation **shovel**: blade size and shape. Though smaller shovel blades fit in packs better and may be more efficient for smaller rescuers, their use in digging snow profiles typically results in individuals spending noticeably longer periods of time during the excavation and observation wall preparation. Experience has suggested blade sizes with width and length dimensions of less than 25 cm typically fall in the “frustratingly small” shovel size.

The second design benchmark of blade shape relates to effort in making smooth and straight snow profile wall surfaces. Curvature of the blade or any protuberances (e.g. handle attachments) towards the back of the blade make preparing smooth observation surfaces extremely difficult and sometimes near impossible. The photo below of the same shovel model from two different production seasons illustrates the problematic curvature. The shovel on the left has a pronounced curve across the blade width along with a curve along the length of the blade. The shovel on the right has no curve across the blade width and none along the length of the blade. When selecting an avalanche shovel for snow work, seek straight backed blades without curvature across or along the blade.





Snow study tools – There is a minimum set of field tools that an individual needs to complete the Avalanche Operations Level 1 course. These include a snow saw, a thermometer, a crystal screen, a magnifying loupe or hand lens, a 2-metre folding rule, pencil and field book. This subset will likely stay with you your whole career.

A second subset is made up of necessary tools for which there are multiple options whose choice will vary based on where you are in your career. Go with the minimum for your current situation (work or otherwise) that meets the observation goal. This subset includes a length of accessory cord (3 metres minimum), a compass, a method to measure slope angle, and a method to measure elevation.

Snow saw – Key points in selecting a snow saw are length and stiffness, secondary are type of teeth. Column tests are typically 30 cm into the snow pit wall so the blade length should be 35 cm or longer not including the handle. A blade that is very flexible requires patience and practice to be able to cut straight edges. Sharp, wood cutting teeth make the saw dual purpose however they require diligent attention both in use and packing to avoid serious damage to glove and pack fabrics.

Thermometer (°C) – There are three types of thermometers that are acceptable: dial stem, digital, and alcohol. Have an extra battery in your field kit if you use a digital. They should be rigged with a piece of light cord so they can be hung in the shade for measuring air temperature. If multiple thermometers are used it is strongly recommended that they be the same type of thermometer. Please calibrate as per instructions in OGRS.

Crystal screen – A card with measurement grid is necessary for observing snow grains. Polycarbonate and metal ones are available. Metal screens transfer heat much faster than polycarbonate and can be frustrating to use when air or snow temperatures are warmer than -5 C°. Recommended manufacturers for these include: <http://snowmetrics.com/> and <https://backcountryaccess.com/>

Magnifier – A reasonable quality (read moderately-priced) magnifying loupe or hand lens is required for observing snow grains. The proper choice will make both learning and doing observations far easier and successful. A loupe or hand lens should be no less powerful than 10x and no more than 20x. Fold up ones should be avoided. Ideal examples include these two manufactures: <http://carson.com/products/lumiloupe-ll-15/> or <http://www.bausch.com/our-products/vision-accessories/professional-magnifiers/coddington-magnifiers>

Folding ruler - A 2 metre plastic folding ruler is necessary. Inexpensive ones typically have short lives; they flex and often break easily when extended. Ideal examples include ones from a ruler manufacture (e.g. Lufkin, Rigid, Hultafors) or Swiss-made.

Accessory cord – A length of 4-7 mm diameter accessory cord (3 metres or longer if used for Rutschblock or cornice cutting) is used for cutting out column tests larger than 30 x 30 cm. Overhand knots tied every 20-30 cm can help to effectively cut the walls. A snow saw that can be extended through a solid attachment to a ski pole is a replacement for this tool.

Compass, slope angle tool – Both are necessary, choose ones appropriate for your situation. There are numerous options for these ranging from a compass with a built-in inclinometer to individual high-quality instruments to smart phone apps that do both.

Elevation method or tool – You need to be able to determine the elevation at which you make observations. This can be in the form of reading a map, altimeter, or GPS. Choose the appropriate method for your situation.

Field book – An Avalanche Operations-specific waterproof field book will be provided at the course.

Pencil – It's always advisable to have an extra pencil for making field notes.