Canadian Avalanche Association

Avalanche Operations Level 1: Town-Based Courses
Student Equipment List

Classroom Materials:
- Laptop or tablet.
- Pen or pencil and note paper.
- A folder or notebook (to collect handouts).
- 2 or more pencils for fieldwork.

Snow Study Equipment **(see pages 2-3 for guidelines)**
- 10x (or greater) Loupe
- Snow crystal screen
- Digital thermometer
- 2 metre folding ruler
- 1 metre folding ruler (recommended)
- Folding knife
- 3-5m knotted cord for cutting snow columns for tests

Touring Equipment **(see pages 2-3 for guidelines)**
- Avalanche transceiver.
- Probe & shovel.
- Snow saw (35cm length)
- Touring skis or splitboard, poles, boots and skins
  - SLED courses: see below
- Day pack (30-40L recommended)
- Water bottle / thermos
- Personal first aid kit (blisters, sun protection)
- Personal repair kit (for your bindings or snowmobile)
- Compass, clinometer, altimeter[1]

[1]There are many altimeter, compass, and clinometer apps available for Android and iOS devices. Also, Gaia GPS is a popular app for navigation.

Touring Clothing & Special Equipment
- 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
- Helmet (recommended)

Equipment for SLED courses only:
- 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)

You will be provided with the following:
- ✓ *New 2025/26: All students have access to a virtual, downloadable copy of ITP course manuals. Hard copies of this textbook are available for an additional fee on Amazon Direct Publishing – click here to order a physical copy. Shipping through Amazon Direct Publishing uses an expedited method and may arrive within a few days.*
- ✓ *Lift passes at the host resort.*
- ✓ *A waterproof field book and pencil*
- ✓ *A hard copy CAA Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanche Occurrences (OGRS 2024)*

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NOTE: It is your responsibility to ensure your equipment is in working order, that you understand how to use it, and that it is operable throughout the duration of your course.

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Gear Requirements and Recommendations (for all ITP Courses)

Avalanche Transceiver – Required features:

- ☐ Modern, digital and three-antenna
- ☐ Marking function or signal suppression
- ☐ Ensure that your transceiver:
  - Has fresh batteries.
  - Battery compartment has been inspected for corrosion.
  - Is updated with the latest firmware.
  - Has been maintenance tested as per manufacturer recommendations.

Note: The transceiver features listed above are **required** for this course. For more information, find websites that provide current transceiver reviews and information regarding transceiver features and their respective functionality. Upon registration, the CAA will ask what transceiver brand and model you currently have. The course leader will contact you before the course begins if your transceiver is not appropriate and will give guidance on what actions to take.

Probe

Recommended features:

Length equal to or greater than 300cm.
First segment interfacing with the tip is a different colour than all the other remaining segments.
Unique band of colour at 150cm.
Metric scale clearly marked on the entire probe length.
Good condition with no obvious cracks, bends, damaged cable or locking mechanism.

Shovel

Recommended features:

Handle is easy to hold and can be used with gloves on.
Shovel blade and shaft are strong and made of metal.
Shaft is extendable.
Shovel blade has a relatively large surface area and flatter blade edge (useful for avalanche rescue and snow science applications).
Not a camping shovel or a shovel made for roadside vehicle emergencies.

Note: The International Climbing and Mountaineering Federation (UIAA) provides probe and shovel testing and certification, however UIAA-certified probes and shovels are not always the best choice for avalanche search and rescue (AvSAR) or snow science work. For example, a UIAA-certified shovel may have a blade shape appropriate for AvSAR work but is not effective for creating smooth snow profile walls for snow science. Another example is that a UIAA-certified shovel might not have a hoe mode, this mode can be used to quickly carve out flat helicopter landing areas or move snow efficiently during excavation efforts of a buried subject or clearing snow for a snow profile. There are many probes and shovels on the market that meet the above lists of recommendations but are not UIAA-certified.

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Snow Study Equipment

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 (^{o}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^{o}. 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.

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

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Chris' Snow Study Tools

Welcome to the Operations Level 1 course! My name is Chris Dyck and I'm the curriculum specialist for the CAA and a ski resort avalanche forecaster. I've instructed many Level 1 courses over the years and have seen numerous students show up with sub-standard gear. Having quality tools in your snow study kit makes all the difference in the world. Here's what I have in my kit:

Ruler

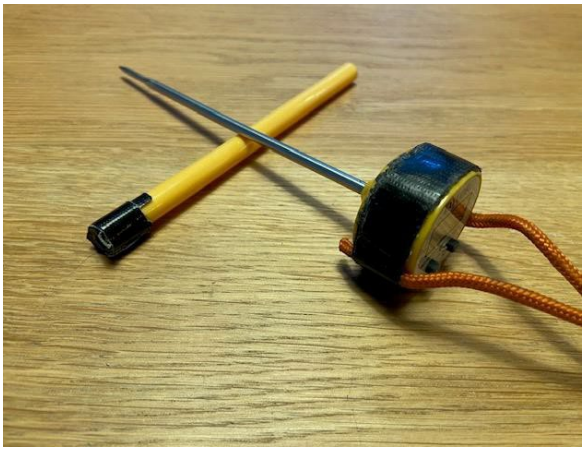
I have a 1m and a 2m folding ruler. I use the 2m ruler in the corner to measure the layer boundaries and temperature gradient. I use the 1m ruler to make other measurements, such as when setting up instability tests. If you only have room for one ruler I would suggest the 2m length.

Loupe

The loupe shown here has a clear plastic windshield to protect your sample from being blown away, while still allowing light to pass through. I personally like the 10x magnification, I find anything more than that to be too close.

Crystal Screen

Either metal or plastic (like the one shown here) are great. It's important to have a grid on the screen to aid in accurate grain sizing. This plastic one allows light to pass through from under the sample which some observers like, but some don't, so perhaps try a few before choosing (I like this one for working in the dark).



Digital thermometer

I prefer digital thermometers because of their speed in reporting temperatures, this helps me with efficiency and reduces the amount of time the observation wall is exposed to air temperature while recording the temperature profile. I have taped a loop of cord onto mine to make it easier to hang from a ski when taking air temperatures. The model shown has a screw that can be turned to calibrate it which is a really nice feature but not a dealbreaker.

Compass & Inclinometer

When recording your snow profile you will need to determine both aspect (the direction the slope is facing) and the incline of the slope. The compass shown has both capabilities but these could be separate instruments. Phone apps work too but can be problematic in wet cold environments. A compass is also very useful for determining your profiles orientation to the sun on cloudy days. We don't want to see you guess!

Pencil

Layer resistance is recorded as:

1. Fist
2. Four finger
3. One finger
4. **Pencil**
5. Knife
6. Ice

You need to use an unsharpened non mechanical pencil like the one shown. (Bonus: the CAA is going to give you one of these on your course).

Knife

Layer resistance is recorded as:

1. Fist
2. Four finger
3. One finger
4. Pencil
5. **Knife**
6. Ice

You need to use an actual knife to determine knife resistance (we don't just record "knife" for anything denser than pencil!)

Layer ID tools
These are nonspecific tools that are used to assist in layer boundary identification. They are pulled down through the layers to feel for density changes. I have some broken ruler bits in my kit but anything that's not too sharp should work (metal crystal screens are too thin).

Cord/Wire saw
Often called a Rutschblock cord, this is used for cutting and isolating snow columns to prepare instability tests. In the picture I have one made with wire and brass crimps; excellent for cutting through crust layers but murder on your probes; the other one is made with 6m of utility cord with overhand knots tied approximately every 5cm; not effective for crusts but gentle on your gear.

Organizer
Up to you how you want to organize and carry your tools. I've used backpack pockets, zip-lock bags, stuff-sacks, etc…

Hope this helps! Maybe I'll see you on your course.

Cheers