

# **COURSE SYLLABUS - UAS PE 118 Avalanche Evaluation and Theory Level 1**

Spring Semester, Winter of 2012-13

PE CRN 37184 Sec. J01; ODS CRN 37156 Sec. J01

Course Dates 20130402 - 201130415, 2 credits.

Begins: required classroom 7:00 - 9:30 pm Tues., April 2; ends: evening classroom, Monday, April 15

All Classroom Sessions JREC 115

Evening classroom sessions Tuesday and Thursday, April 2,4,9, and 11; Monday April 15

Required Outings are Saturdays and Sundays; April 6,7,13,and 14

Instructor Bill Glude

## **Instructor Information**

### **Name:**

Bill Glude

### **UAS office:**

I do not have a UAS office, but I am available for a short time immediately after classes to meet with students, or you can contact me directly to set up a time and place to meet.

### **Home office (mailing) address:**

PO Box 22316, Juneau, Alaska 99802

### **Phones:**

586-5606 home office, 523-8900 work office, 206-617-7703 cell.

### **Personal E-mail:**

I will list it in two parts to foil the spammers' web crawlers that automatically harvest e-mail addresses from websites. The username, or first part, is snowcom01, and the name of the server, which follows the conventional symbol for at is me.com. I may not be able to respond immediately, but I do check it daily when I am in town or able to get a decent Internet connection.

## **Course Website**

We will be using the PE section course website on [UAS Online](#) for our announcements, syllabus, and other special items for this UAS course. We will post the course handouts as class time approaches. We usually post updates before each topic is covered during the fall course and as new information or improved presentation comes up during the season. Be sure to check the course site before each session for the latest updates and course announcements.

Go to [UAS Online](#) and search the appropriate semester for "avalanche", then go to the PE section.

## Course Schedule

NOTE: This schedule is a framework, not a fixed schedule. It will evolve as we customize the course to group interests, weather conditions, and available materials. We may juggle components to suit our needs. Check the date at the top of the syllabus to be sure you have the most-current version.

Note that this course begins with an evening classroom session, from 7:00 to 9:30 pm on the first day. This first session and all four field sessions are strictly required; you must be there if you want to complete the course. Field sessions begin at 8:00 am and will go to about 6:00 pm, including travel back to UAS.

This schedule is intense and it will be exhausting! Get extra rest before the course. You will not have time for any reading during the course, so be sure to read the course handouts and at least skim the textbook and the fieldbook key pages before the course begins.

### Day 1 - Evening Classroom, 7:00 to 9:30 pm

VIDEO (Out of Ophirica)  
INTRODUCTIONS (10 min)  
COURSE FORMAT DISCUSSION (10 min)  
AVALANCHE OVERVIEW (45 min); LIABILITY & RISK MANAGEMENT, FORMS  
RESCUE - CLASSROOM (45 min)

### Day 2 - Evening Classroom, 7:00 to 9:30 pm

QUIZ ON SYLLABUS (15 minutes)  
TERRAIN (45 minutes)  
PRACTICAL EXERCISE, TERRAIN (15 min)  
SNOWPACK I MECHANICS & WEATHER (45 min),  
FIELD TRIP LOGISTICS (10 minutes)

### Day 3 - Rescue Field Session

Meet 6:45 am Rec Center, around left side of building through the gate, to back side at the ODS gear room if it is raining hard; or out in front if weather is decent.

Climb to Rescue field area; arrive 10 - 11 am.

#### Rescue:

**Probing**

**Single Beacon Search**

**Multiple Beacon Search**

**Practice and Scenarios**

Descent at about 3:30 (1 hour, timing depends on season and darkness, headlamps mandatory).

### Day 4 - Snow Study 1 Field Session

7:15 am UAS; 7:45 am Eaglecrest.

Travel to Eaglecrest; climb to field area.

#### Snow Study:

**Stability 1 Observations**  
**Stability 2 Slope and Traveling Tests**  
**Stability 3 Snowpits, note taking for classroom session**

Descent at about 3:30 (1 hour, timing depends on season and darkness, headlamps mandatory).

**Day 5 - Evening Classroom, 7:00 to 9:30 pm**

SNOWPACK II, METAMORPHISM & HOW SNOW CHANGES (45 min)  
DR. SCIENCE (30 min)  
SNOWPACK III, STABILITY EVALUATION (45 min)  
VIDEOS (Know Before You Go; Haines Burial)

**Day 6 - Evening Classroom, 7:00 to 9:30 pm**

HUMAN FACTOR 1 - RISK MANAGEMENT (45 min)  
WRITING UP FIELD OBSERVATIONS (30 min)  
HUMAN FACTOR 2 - DECISION-MAKING (45 min)

**Day 7 - Snow Study 2 Field Session**

7:15 am UAS; 7:45 am Eaglecrest.  
Travel to Eaglecrest; climb to field area.

**Snow Study:**  
**Coached Stability Evaluation**  
**Note-taking**  
**Route-finding as time permits**

Descent at about 3:30 (1 hour, timing depends on season and darkness, headlamps mandatory).

**Day 8 - Putting It All Together Field Session**

7:15 am UAS; 7:45 am Eaglecrest.  
Travel to Eaglecrest; climb to field area.

**Small-group Practical:**  
**Route-finding**  
**Stability Evaluation**  
**Risk Management**  
**Decision-making**

Travel back about 3:00 to 4:00 pm, depending on daylight.  
Course Wrapup in field after session.  
Arrive UAS about 5:00 to 6:00 pm.

**Day 9 - Evening Classroom, 7:00 to 9:30 pm**

DECISION-MAKING GAMES (45 min)  
PRACTICAL - CASE HISTORIES (45min)

## Course Requirements

(NOTE - STUDY THIS MATERIAL! THERE WILL BE A QUIZ ON THIS SECTION, AND THE REQUIRED PERSONAL FIELD GEAR SECTION, ON OUR SECOND DAY OF CLASS.)

If you are looking for a couple easy credits or just a chance to go skiing and snowboarding, you are in the wrong course! Drop it or change to an audit right now, and we will all be happier. On the other hand, if you are looking for a challenging and rewarding course in which you will learn fascinating things about living in places with snow and avalanches, this is where you belong.

Avalanche study is a complex subject, and your understanding of it can make a life or death difference. We make it fun to learn, but dealing with avalanches is a serious topic. This class is comparable to an in-depth emergency medical course in that you need to learn the underlying scientific principles and be able to apply them under stress. We cover a lot of material in a short time, you will need to be present and focused throughout to keep up.

In order to pass, you must at least meet the minimum American Avalanche Association standards for a Level 1 avalanche course, which includes the topics covered in all three mandatory field sessions, at least five of the six classroom sessions, and at least a 70% average score on the tested skills. You must have the UAS liability release, medical history, and insurance forms filled out before the field trips, must attend the pre-trip logistics session, and must have all the required gear to go. Arrange your schedule now to keep the field trip times free, get the forms in, and attend the pre-trip logistics session. If you get sick or have to work, we are sympathetic, but you will not have completed the requirements and we will not be able to pass you.

We are fortunate to be able to do this course within the University system. Risk management for our group is a primary concern. We must strictly observe the following rules for our field trips:

- \* We go out as a group and we return as a group - no exceptions. If you arrive late, after we have left the trailhead, you will not be allowed to join the group. No early departures are allowed. If anyone has trouble in the field, we must all be prepared to stick together and stay to help for as long as it takes. Arrange your schedule now so you have the evenings after field days open.
- \* We function as a group in the field. No one goes ahead of the instructor without specific permission, and we must stay within easy communication distance of each other. This rule does not change when we heading in at the end of the day. Anyone who disregards instructions for safety and conduct of the class, or engages in activity that puts any or all of us at risk will not be allowed on further field trips.
- \* The field trips require a high level of physical fitness to reach suitable areas. We will not be camping, but we must climb anywhere from 280-710m (900-2,300 feet) and travel 2- 5km (1-3 miles) through trail-less country each field day. Conditions may include mud, swamp, and bushwhacking as well as snow, which may be deep or wet. Our usual field area is Mt. Troy, the mountain on the left above the upper cross-country loop as you ride up the lift at Eaglecrest.

- \* You must be comfortable with whatever you will have on your feet on 20-25 degree slopes (like Hooter lift at [Eaglecrest](#)) in good snow; and be able to travel effectively when the snow is bad or the slope is 35-45+ degrees (like the advanced runs at Eaglecrest).
- \* You need not be an expert skier, boarder, or winter mountaineer by any means, but you must have the physical conditioning and winter travel skills necessary for safety in our field conditions and for keeping to our schedule. This course is not for outdoor novices. If you do not have the necessary basic fitness and winter travel ability, we cannot allow you to participate in the field trips.
- \* The course also requires the gear and skills to stay comfortable and warm outdoors for long periods in sometimes-terrible weather. If you show up without the required equipment, food, fluids, and clothing, you put all of us at risk and we cannot allow you to go with us into the field. Review the equipment list and be sure you bring everything on it.
- \* Sorry, we like dogs, but both University and ski area policies prohibit them on our field trips.
- \* No earbuds during field sessions! This includes our time climbing the uptrack, where we will be pausing periodically to discuss observations. The course will require your undivided attention.
- \* Any injuries on field trips must be reported promptly to the instructor.
- \* No one leaves the parking lot at the end of the day without checking with the instructors. We must confirm that everyone is back safely.
- \* If we are out several days in a row, you may keep gear that has been checked out to you until the end of that session but must turn it in before you leave on the final day. We must confirm that your gear is checked in before you leave the parking lot.

We also must note that this course is dependent on snow conditions which are beyond our control. If there is not enough snow in our field areas, we will have to defer all the grades until we can complete the field portion of the course. We will do our best, but will only be able to schedule a maximum of two makeup opportunities.

## **Scope of the Course**

This is a field-oriented backcountry avalanche course covering rescue, terrain analysis, snow study and stability evaluation, route-finding, decision-making, and safe travel. It more than satisfies the American Avalanche Association requirements for a Level 1 avalanche course, and has substantial additional time for in-depth material and practical exercises.

We try to put as much hands-on learning into the course as we can, but a Level 1 course must cover more fundamental topics and thus has less practical exercise time than a Level 2. The first four classroom sessions cover the essential overview, rescue, terrain, snowpack, and weather segments. Once we have covered those fundamentals and are into the second half of the course, we are free to do more scenarios, exercises, simulations, projects, practice, discussion, and work aimed at making the basic principles come alive.

The snow does not usually arrive until near the end of fall semester, so the few weekends we have scheduled for fieldwork are critically important. Be sure to clear your calendar so you can attend the three mandatory field sessions, and the fourth if you are in the ODS program.

These three field days present a sequence of essential course components. The first field day focuses on rescue, the second on snow tests, and the third on decision-making. Each of these component days builds on skills developed in the previous ones. Completion of the entire sequence is necessary to fulfill the Level 1 course requirements.

## Required Texts and Field Snow Study Equipment

1. ***Staying Alive in Avalanche Terrain***; by Bruce Tremper, [The Mountaineers Books](#), Seattle, WA 2009. This is an excellent recent text that contains lots of information without being overly technical or irrelevant. It is very readable and well presented. We use it for both Level 1 and 2 courses. It is available locally at the bookstore.
2. **Fieldbook** - You will need a fieldbook for our snow study sessions. A looseleaf avalanche fieldbook designed for these courses should be available at the bookstore, and a spiral-bound version is in the works. We use these for both Level 1 and 2 courses. Replacement pages for the looseleaf books are available online through [Alaska Avalanche Specialists](#).
3. **Clinometer/crystal card** - You will need a clinometer/crystal card like the ones produced by the Alaska Mountain Safety Center and available at the bookstore. We use these for both Level 1 and 2 courses.
4. You will need a **10x hand lens** for snow study. Set up the crystal card with the hand lens as the clinometer weight. We use these for both Level 1 and 2 courses. The bookstore should have these, too.

## Personal Field Gear

(NOTE - STUDY THIS MATERIAL! THERE WILL BE A QUIZ ON THIS SECTION, AND THE COURSE REQUIREMENTS SECTION, ON OUR SECOND DAY OF CLASS.)

### Clothing

You must have enough clothing to be out in the field all day, regardless of the weather. Our studies require us to stand around and be in contact with the snow far more than you do on a typical recreational day. Bring at least two layers more than you usually wear. Bring chemical heat packs if you have chronically frosty fingers or toes or if it is a cold day. If you are snowshoeing and tend toward cold toes, hiking boots are not warm enough for cold days. Wear insulated boots like Sorels or a warm pair of snowboard boots, big enough for two pairs of socks without being too tight, and keep the laces loose. Wear extra-warm layers on your legs and torso, too.

Do not rely on movement for warmth. We must be able to stop for variable and often long periods in order to teach the course. We cannot move just because you are cold. Your warmth is your responsibility.

Similarly, we cannot move because you are impatient. We must pace ourselves to slower group members and will spend far more time talking, observing, and practicing skills than you do on a recreational day. This is a course, we are here to learn. You can travel fast and ride hard on other days.

## Required Clothing

long underwear - synthetic, silk, or wool; NOT cotton!  
shirt or turtleneck - synthetic, silk, or wool; or heavy long underwear  
at least three warm insulating layers, such as: fleece vest, fleece jacket, wool sweater, fiberfill coat or vest, or pile coat or vest  
shell parka - waterproof breathable preferred; NOT cotton!  
pants - shell and insulation, such as: wool pants, warmup bibs, or fleece pants plus waterproof breathable bibs; NOT cotton; no jeans or Carhartts!  
gaiters - if they are not built into your pants  
warm boots and socks  
warm hat - like a stocking cap or beanie  
mitts or gloves

## Recommended Clothing

neck gaiter or scarf  
baseball hat for warm, sunny days  
extra set of mitts or gloves

## Field Gear

### Required Field Gear

+ beacon  
+ probe  
\* shovel - sturdy, lightweight avalanche shovel - NOT a discount store shovel!  
\* day pack - a good rucksack with straps or pockets for all your gear, including shovel and boards  
A way to get around efficiently in the snow - no postholing!  
1.) Mountain skis, telemark or alpine touring, with skins and poles. (+ Alpine Trekker touring adapters and skins for your alpine ski gear are available through ODS, but you need to arrange to fit them in advance.)  
2.) OR snowboard with \* snowshoes or approach skis and poles for uphill travel.  
3.) OR splitboard with skins and poles.  
4.) OR \* good mountain snowshoes. (Will be fine for both uphill and downhill; ski poles strongly recommended.)  
\* head lamp, likely to be used in the course so be sure to bring it!  
pocket knife  
lunch  
insulated water bottle or thermos - at least one liter of fluids  
sun glasses - required after mid-February; optional early season  
sun screen and lip protection - required after mid-February; optional early season  
toilet paper and lighter  
blister kit and band aids  
fieldbook and pencil  
clinometer - we have combination clinometer/crystal cards  
hand lens - 10x best, for snow study

## Recommended Field Gear

map and compass  
emergency medical kit - strongly recommended  
camera with memory cards and spare batteries  
spare headlamp and beacon batteries  
ski poles - essential for ski travel; strongly recommended for snowshoers  
goggles - strongly recommended for skiers and snowboarders  
helmet - strongly recommended for skiers and snowboarders  
snow saw  
binoculars  
cell phone (emergencies-only, otherwise keep it off)

\* Items available for checkout at the Student Activity Center; must be picked up ahead of departure time, during normal SAC hours. Adjust snowshoe straps to your boots before the field trip, it is much easier indoors.

+ Items available for checkout from the ODS program. Skins and Alpine trekkers must be fitted ahead of time. We will check out the other ODS gear at the end of the first evening class session.

TEST NEW OR BORROWED GEAR BEFORE THE COURSE!

## Group Gear

### Required Group Gear

group emergency medical kit  
snow study kit  
maps  
fire starters  
radio or phone

### Optional Group Gear

foam pad  
bivvy sack or tarp  
wax  
bush saw

## Additional Resources

1. *The Avalanche Handbook*, by McClung and Schaerer, [The Mountaineers Books](#), 3rd Edition 2006. This is the best technical overview. It is readable and full of photos and graphics. It should be available locally at the bookstore, or from the [Alaska Avalanche School](#) in Anchorage.
2. *Snow, Weather, and Avalanches: Observational Guidelines for Avalanche Programs in the United States*, by the American Avalanche Association and the USDA Forest Service National Avalanche Center, [The American Avalanche Association](#), PO Box 2831, Pagosa Springs, CO 81147. This is the most-current and best observations handbook available anywhere. This is a Level 2 text that will be of interest to serious Level 1 students.



3. *The Avalanche Review*, published by the [American Avalanche Association](#), PO Box 2831, Pagosa Springs, CO 81147. (Full conflict of interest disclosure: I serve as this organization's Treasurer.) The best current information from the professional association of avalanche specialists in the US, anyone can subscribe. If you want to be plugged into the avalanche network, this is your best periodical.
4. These videos are highly recommended. Both should be at the UAS library:
  - \* *Winning the Avalanche Game*, Wasatch Interpretive Association, Salt Lake City, 1993. This is the best avalanche video. A little dated but still mostly accurate. Content is aimed at all back-country travelers, echoes the course format we use. This one is becoming a bit dated but still has good content.
  - \* *Riding Safely in Avalanche Country*, [Friends of the Sun Valley Avalanche Center](#), 1998, PO Box 819, Ketchum, ID 83340. This is a good snowmachine-oriented avalanche video. The sleds are not the latest, but the principles are accurate.

## Avalanche Websites

- \* [Westwide Avalanche Network](#)  
<http://www.avalanche.org>  
The source link to most North American and European avalanche centers, accurate and current forecast information from the Forest Service and European centers; variably accurate information from others.
- \* [Alaska Avalanche School](#)  
<http://www.alaskaavalanche.com/>  
The Anchorage-based avalanche and mountain safety education nonprofit for Southcentral, western, Interior, and northern Alaska.
- \* [Cyberspace Avalanche Center](#)  
<http://www.csac.org>  
Comprehensive avalanche information: education, accident reports and statistics, resources, articles, forecasts from most US forecast centers in a standardized format.
- \* [Canadian Avalanche Association](#)  
<http://www.avalanche.ca/>  
The original source of Canadian avalanche information.

## Grading

Ordinarily, I tell avalanche students that the motivation to learn this material is that it may very well save your life. The true final exam comes in about thirty years. If you are still out in the mountains, you have passed. You flunk if you get killed, but you also flunk if you get so scared that you quit going out and having fun in the snow.

Staying alive and happy should be enough motivation, but the University requires that we evaluate your participation by grading on at least a pass-fail basis, unless you audit. Much of what we will be doing involves *learning by screwing up*, scenarios and exercises where you learn best by jumping in

enthusiastically, with both feet. We will not grade on activities where you need to experiment, practice, and learn without being judged, especially in the field.

### **PE Requirements for Pass Grade:**

In order to pass the course, you must at least meet the minimum American Avalanche Association standards for a Level 1 avalanche course, which includes the topics covered in **all three mandatory field sessions**, attendance at a **minimum of five of the six classroom sessions**, and at least a **70% average score** on the syllabus quiz, field observations writeup, and field skill tests. Arrange your schedule now to keep the required times free. If you get sick or have to work, we are sympathetic, but you will not have completed the course requirements and we cannot pass you.

Basic skills are graded pass-fail. You must be checked off in the field on **beacon search, both analog and digital, leading a probe line, picking and evaluating good ascent and descent routes, finding suitable test slopes, and identifying and avoiding high consequence terrain**. All of these skills must be demonstrated in order to pass.

There is no written final exam or midterm.

Independent study projects are optional for PE students, but I encourage them as a great way to learn, and will give extra credit for them.

### **Additional Requirements for Outdoor Studies Students:**

We have to give a letter grade for the ODS students. We will emphasize leadership skills in those areas we evaluate. We will grade with equal weighting on the

1. syllabus quiz
2. field observations writeup
3. picking and evaluating good ascent routes
4. picking and evaluating good descent routes
5. finding suitable test slopes
6. identifying and avoiding high consequence terrain.

**We may add some graded exercises to the fourth field day.**

**We have dropped the requirement that ODS students do an independent study project because in the two-week format our time is short, but we still encourage you to do them if you can. There are lots of possible projects, research topics, experiments, and studies you can choose from. Check with me and we will set it up.** I have many ideas, and will help you pick a good fit for your interests. I will be happy to coach and advise you through the project, but it is your responsibility to ask for help, as you need it. We encourage group projects and collaboration.

### **Credentials**

Everyone who successfully completes the course gets a card that certifies course completion. This course meets and exceeds the American Avalanche Association standards and our cards satisfy training requirements for most employers, insurance companies, and agencies except for Canada, where credentials from other countries are not accepted.

## **Conferences**

If you have anything to discuss, grab me after class, or give me a call, or send me an e-mail, and we can set up a time.

## **Late Assignment Policy**

Most of our exercises and assignments are designed to be completed on the day we do them in class. Independent projects are due for presentation at the last regular class session.

## Registration and Withdrawal Policy

Those who show up for the first class session will be given a place in the class, up to our limit. If there are people on the wait list who show up and you are registered but are not there, they will get your spot. You may withdraw anytime before the last official withdraw date for this semester without penalty.

## Units

The American Avalanche Association guidelines recommend use of the metric system because it is by far the easiest system to use for snow measurement, and it allows us to communicate with workers from other countries.

It is so easy that we are surprised that the US has still not officially changed over. For the metrically challenged, the Units page of the Education section of the [AAS website](#) has a number of helpful hints. We will try to offer translation, but will be using metric units as our primary measurement system.

## Sources

If there is any way they can do it, most shops will give a price break on avalanche gear if you order with a group of friends and prepay. We urge you to support your local shops.

If you are having a hard time affording good field clothing, check the secondhand stores. Juneau is a wealthy town, and many very usable fleece and shell garments find their way to them. Also see what you can borrow from your friends, we only have a few field days per course.

In Juneau, [Foggy Mountain Shop](#), Gravity Plan, and Outdoor Headquarters have stocked at least some avalanche gear and can order items they do not stock. Little Bear snowshoes are hard to find locally, but can be ordered online. (Small snowshoes, inexpensive and functional. Get the ones with the aluminum traction pegs.) Foggy Mountain will check their copy of the video *Winning the Avalanche Game* out for home viewing. Other shops may do the same.

The [Alaska Avalanche School in Anchorage](#), 907-345-0878, carries a full range of avalanche gear and textbooks at good prices, and offers very good courses based out of Southcentral Alaska.

[Alaska Avalanche Specialists](#), 907-523-8900, (full conflict of interest disclosure: my business) sells G3 avalanche gear (probes, shovels, Rutschblock cords), AAS avalanche fieldbooks and pages, and related gear like G3 skis, bindings, and skins, and Ozone snow and water kites.

The Alaska Mountain Safety Center in Anchorage, 907-345-3566, is the bulk source for the text *Snow Sense*, and does avalanche hazard management consulting and custom training of very high quality.

The UAS Bookstore should have all the texts and supplies for our UAS courses. Books can also be ordered from your local bookstore, and there is a list of avalanche videos and sources on the National Avalanche Center website.

A number of out-of-state online sources now have avalanche gear, but prices are often as good in-state, and we build a better community when we support our local businesses.

## Student Rating of Instruction

During the last three weeks of the course, you can rate it online. Notification is sent to your UAS e-mail account when the questionnaires become available. Please help us improve our courses by taking a few minutes to fill out the rating forms!

## Course Outcomes

When you finish this course, you should:

- 1.) Know the basics of urban avalanche issues in our region:
  - a.) Understand the location, history, and effects of Juneau-area urban avalanche paths.
  - b.) Understand the basic concerns with and procedures for urban avalanche rescue.
- 2.) Be able to serve effectively as a first-response leader or trained team member in an avalanche rescue:
  - a.) Know why YOU are the rescue party if you are on-scene.
  - b.) Have your plans in mind as avalanche victim, witness, and rescuer.
  - c.) Evaluate scene safety and decide if and how to search. Know that the number-one rule of rescue is that the well-being of the rescuers comes first.
  - d.) Organize and direct a backcountry search team.
  - e.) Communicate effectively as leader or team member.
  - f.) Know and be able to use the key pieces of avalanche rescue equipment.
  - g.) Know how to search systematically using initial search, clues, eyewitness information, beacon search, and probing.
  - h.) Know when to call for help, and understand how to integrate first-response team efforts with organized rescue groups.
- 3.) Recognize avalanche terrain.
  - a.) Know the key terrain questions.
  - b.) Know the types of paths and path nomenclature.
  - c.) Know how to evaluate the history of a path.
  - d.) Know the key terrain factors and how to interpret them in the field.

- e.) Know how to analyze consequences of a slide in different terrain types.
- 4.) Understand the snowpack and weather factors.
  - a.) Understand the mechanics of fracture.
  - b.) Understand the basics of stability evaluation.
  - c.) Understand the role of explosives in avalanche reduction work.
  - d.) Know what slab, point release, and other special case avalanches are and be able to recognize them in the field.
  - e.) Know the recipe for a slab avalanche.
  - f.) Be able to evaluate snow stability at a basic level using a combination of observation, probing, slope tests, and pits.
  - g.) Know the key observations: signs of instability; weather; clues.
  - h.) Know how to test the snowpack with a probe and interpret the results.
  - i.) Be able to choose representative, low-risk test sites and accurately perform and interpret slope tests and snowpit data, including the key tests of digging, smoothing, brushing, finger hardness, grain type, rutschblock, integrated shear block, no-excuse block, isolated column, slab, and jump tests, as well as the optional tests.
  - j.) Know the Quick Pit Chant and be able to use it to make practical, real-world use of snowpit study.
  - k.) Be able to collect and integrate data in the field from a wide variety of sources to make an accurate stability evaluation, and then make sound decisions based on it, while recognizing how complexity theory and spatial variability limit the accuracy of stability evaluation and avalanche forecasting.
  - l.) Understand the key concepts of how weather affects snow stability.
  - m.) Understand the basic types and mechanisms of snow metamorphism, their practical significance, how to identify those grain types in the field, and know how to use that information for practical stability evaluation and decision-making. Understand the difference between and significance of rounds, facets, melt-freeze, surface hoar, near-surface facets, rime, and ice crusts.
  - n.) Understand how rime and surface hoar form, and know what their significance is to snow stability.
- 5.) Understand how to use data to evaluate snow stability and deal with the human factor:
  - a.) Know the key human factor questions.
  - b.) Know how to use the traffic light model in combination with the 4 key avalanche factors as a decision-making matrix for field use.

- c.) Know how to proceed when there is uncertainty in the data, and know what conditions warrant more conservative decision-making.
- d.) Understand how attitude influences decision-making.
- e.) Know your own personal biases and be able to factor them into your evaluation.
- f.) Know how to make decisions effectively as a team. Understand various decision-making models and group dynamics.
- g.) Develop patience. Take the time to observe, think, and include everyone.
- h.) Be able to identify both the bombproof conditions and the extreme instability. (The gray areas in between are likely to remain difficult, their patterns take years of field time to learn.)
- i.) Know how to pick good routes and practice risk management in your travel procedures, and minimize consequences if you are caught.
- j.) Know the basic principles for reducing risk on the steeps.
- k.) Know the key differences in route-finding and risk management considerations between modes of travel, such as skis, snowboards, and snowmachines.
- l.) Have the basic tools to allow you to get out in the field and learn more about snow