

AVALANCHE TRAINING AT NOLS – THE STATE OF OUR PROGRAM

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ABSTRACT: The National Outdoor Leadership School (NOLS) has been operating since 1965 and running winter courses since the winter of 1970. Winter courses run in several mountain ranges of NW Wyoming and SE Idaho. On average there are ~2500 winter student days and 400+ staff training days. In the past five years we have typically run eight winter-specific courses each year, and 14 winter sections - part of our semester programs. Over the years, the training for winter instructors has evolved from a "have you ever been on skis before" approach to our current program. The road to our current level of staff training was not entirely smooth, and we learned some valuable lessons the hard way. These lessons have been incorporated into our Level 1 and Level 2 Professional Avalanche Seminars, Winter Instructor Seminar (ten days of winter camping and travel in avalanche terrain), and training days that run prior to the start of all winter courses. Better training of our instructors has resulted in higher achieving courses for our students. All winter courses teach at least an avalanche awareness curriculum, and some meet the Level 1 guidelines of the American Association of Avalanche Professionals. Through examination of our current avalanche training program we hope to present an effective model for other programs developing their avalanche training.

KEYWORDS: avalanche education, NOLS, professional avalanche training, outdoor education.

1. HISTORY

The mission of the National Outdoor Leadership School is to be the leading source and teacher of wilderness skills and leadership that serve people and the environment. (NOLS, 1995) NOLS is a non-profit institution which runs programs all around the world. NOLS courses teach a myriad of skills from caving in South Dakota to sea kayaking in Chile. The experiential education that NOLS offers has been found to be highly effective in teaching skills that make our students wiser and safer users of the environment (Kellert, 1998). NOLS runs summer mountaineering courses in avalanche terrain in Western North America (see Figure 1), Chile, and India. NOLS winter programs have evolved from the "Advanced Winter Mountaineering Courses" that made winter ascents in the Tetons in the 1970's to a mixed bag of courses offered out of our Branches in Driggs, Idaho and Lander, Wyoming. Although there is quite a bit of variation between winter course types; a "typical" winter course will spend 3 to 5 days in town - (issuing gear, taking ski lessons at Grand Targhee, taking a day tour on skis, having classroom based avalanche instruction, and

packing for the field). Next, courses spend 7 to 13 nights out travelling on skis and camping out in snow shelters and tarps.

During the 30 years we have offered winter courses, there have been two fatal avalanche accidents, one in 1974 (Williams and Armstrong, 1994) and one more recently in 1992. Nothing puts you under more scrutiny than a fatality, and this has certainly been the case with our program. A few other avalanche incidents have occurred at NOLS, but have not resulted in injuries. Following the accident in 1992, Mark Udall of the Colorado Outward Bound School and Jim Haberl of the ACMG, audited our winter program (at our request). Their frank critiques were instrumental in creating the program we have today. Outside feedback and criticism is essential to the growth of any organization and has become a cornerstone of our winter program. We solicit outside speakers for our Professional Level 2 avalanche seminars to stay up to date on avalanche practices. This allows us to refine our training even more.

In 1994, the Rocky Mountain Branch Director, the Idaho Base Manager, the Risk Management Director, and the Safety and Training Manager decided to create a five month position for a Winter Course Coordinator. This person's responsibilities were primarily to brief and debrief winter courses, disseminate new information to field staff (through briefings, paid training days, and articles in the *NOLS Newsletter*), and to work in conjunction with the Training Manager in designing and refining our Winter and Avalanche Seminar curricula. This

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person also became the point source of local snowpack observations and profiles. The winter coordinator helped the school develop a common language when communicating information about avalanches, snowpack, etc. This was especially important following the renaming/reclassification of snow grains and their metamorphic processes (Colbeck and others, 1990).

2. WINTER STAFF

Our field staff go through a rigorous selection and training process in order to work in the winter program. At the outset each person must apply for either a 5 week Instructors Course, or a 2 week Professional Instructor Course (for outdoor educators with 50 or more weeks of professional experience). This month-long training assures all NOLS instructors have a similar baseline of good map-reading skills, leave no trace ethic, group management techniques, and teaching proficiency. With approximately 465 instructors working schoolwide each year, and approximately 120 new instructor course graduates each year there is a wide variety of skill brought to the school. NOLS is not a protocol driven program and instructors are expected to make decisions in the field based on their judgement and experience, thus the high level of training, and proficiency, required to work for the school.

In order to work in the winter program, instructors must continue their education by taking our Professional Level 1 Avalanche course and the Winter Instructor's Seminar (WIS), or have comparable winter expedition experience. Upon successful completion of the seminars, instructors are ready to work winter courses. To work as the Course Leader (Lead Instructor), instructors must have worked at least a few winter courses, obtained approval from their supervisor that they meet the expectations for this position, and have taken the NOLS Professional Level 2 seminar.

Additional training occurs with each course briefing so instructors can sharpen their skills, learn new techniques and concepts, or just practice with someone available to give feedback.

3. AVALANCHE TRAINING AND SEMINARS

An important aspect of our training is that we teach information that is relevant to our audience. By asking ourselves what the outcome for a particular seminar or course is,

we can effectively design curriculum and classes that address those specific targets. Teaching a student who is new to avalanches all about snow crystals is not as relevant to him or her as getting them to identify what an avalanche path looks like. At the same time, on our Professional Level 1's, it is important that instructors come away with the ability to identify snow grains, since they need this skill in order to properly document the snow pack and communicate their findings. We try to target our outcomes to what will be most useful to staff or students. We also try to use a progression that builds upon and reinforces what has previously been learned.

Examples of these progressions can be found by looking at the seminar schedules in the appendix of this paper.

NOLS avalanche training is very experiential. Our program is expedition based, so we spend lots of time out in the snow. This allows us to focus on what one needs to be observing or looking for, while travelling in avalanche terrain, versus talking about it in a classroom.

We also use Fredston and Fesler's avalanche triangle, and red, yellow, green decision-making scheme (Fredston and Fesler, 1994) for our winter courses, and seminars. This common language has greatly improved communication among instructors, and aided in teaching to students.

3.1 Winter Courses – Student Avalanche Training

NOLS winter courses, in addition to winter camping and expeditioning skills, offer students some level of avalanche instruction. The depth to which avalanche curriculum is covered varies upon the length of the winter course and the motivation of the students. On shorter courses students come away with at least basic avalanche awareness, a solid understanding of avalanche terrain, and rescue skills. Longer courses such as the Winter Outdoor Educator Course will cover the full level 1 curriculum as recommended by the AAAP (Elder, 1999). All courses spend a minimum of 7 days in the field, so there is ample time to practice with transceivers, route-find in avalanche terrain, and perform simple stability tests.

3.2 Professional Level 1 Avalanche Seminar

NOLS requires instructors to take the Professional Level 1 avalanche seminar, or

have comparable experience evaluating winter avalanche conditions and managing groups, before working in the winter program.

We make a distinction between the Level 1 and Level 2 courses taught by other organizations and our professional level seminars. We meet the AAAP guidelines for level 2 courses on our Professional Level 1 seminar, and place greater emphasis on group risk management and decision making. The Professional Level 1 spans a five day period. The days are very busy and are often 10-12 hours long.

Prior to the seminar, participants are asked to read *Snow Sense*, and other articles that are sent to them. (NOTE: instructors taking seminars are designated participants - not students - and are expected to be active and thoughtful contributors to the seminar.) They are also sent a map exercise, human factor exercise, and pre-test to be completed before the seminar. This prior work gets participants keyed into the fact the seminar will have both academic and field components. It also assures a minimum standard of knowledge before the start of the seminar that is reinforced during it.

On our avalanche seminars, we offer several class room scenarios that challenge the participants' understanding of maps, weather, and the snow pack. The scenarios range from simple map exercises to multi-hour map and snowpack problems that ask questions regarding proposed routes, what additional information participants would want in order to make decisions, and what their group management strategies would be.

Both professional seminars are Pass/Fail, though currently only the Professional Level 1 has a written exam at the end. Evaluations of the participants are based on their field performance and intown class involvement. Participants receive written evaluations at the end of the seminar and have a chance to discuss their performance and areas for improvement with the seminar instructors.

3.3 Winter Instructor Seminar

The Winter Instructor Seminar (WIS) is a 10 day seminar in the backcountry. This seminar extends the field component of the Professional Level 1 seminar as well as teaches other skills needed to be a winter instructor. Major emphases of the WIS include building snow shelters, managing groups in a winter environment, skiing, and travelling efficiently in avalanche terrain. Participants are expected to

assess weather, snowpack, terrain, and human factors and make significant "go or no go" decisions on a daily basis while travelling in avalanche terrain. While the level 1 involved a lot of role modeling and teaching on the seminar instructor's part, the WIS puts the onus upon the participants to make decisions and safely manage travel days. Our training areas include the Tetons and the Snake River Range of NW Wyoming and SE Idaho (see figure 2). Participants who pass the Pro. level 1 and the WIS are ready for work in the winter program upon approval.

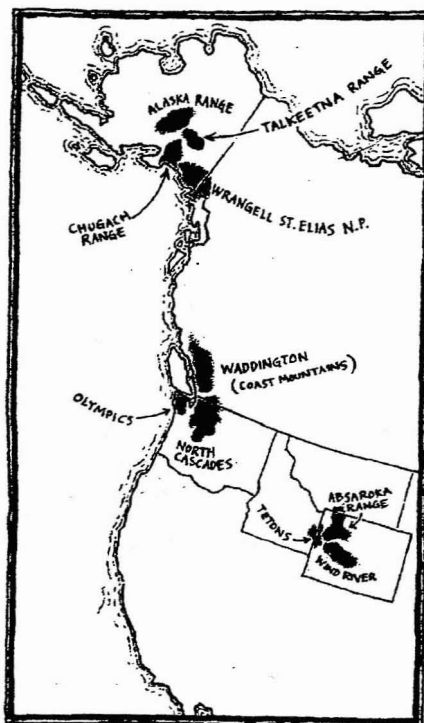


Figure 1: NOLS operating areas in North America that involve avalanche terrain.

3.4 Professional Level 2 Avalanche Seminar

The NOLS Professional Level 2 avalanche seminar is designed for NOLS winter instructors who wish to become winter course leaders (lead instructor). Group management and decision making form the emphasis on this seminar as well as an in depth review of all the principles covered in the level 1. In order to qualify for the level 2, participants must have prior winter course experience, and submit at least 10 documented study pits for review.

The level 2 allows experienced winter instructors a chance to compare instructional, management, and risk assessment techniques

they have been using with what others in their field are doing. In addition, they learn new skills and get additional practice assessing avalanche hazard in new and challenging terrain. A big part of the level 2 has been our practice of inviting 2 non-NOLS guest instructors to join the seminar for 2 days. These guest speakers and observers have been invaluable in keeping us up to date with recent developments and thoughts in avalanche education and hazard assessment. In addition they have provided us with important feedback in how to improve our program and training.

As with the Professional Level 1, participants practice with class room scenarios and receive written evaluations on their performance. Successful completion of the Professional Level 2 is a necessary step towards becoming a winter Course Leader.

3.5 Terrain Tours

Instructors for NOLS have a training day built into their work contracts for most winter courses (on semester courses this training day is optional). Goals for these terrain tours (as they are called) depend somewhat on the experience of the staff who are on contract. In general, there will be an hour or two of practice with transceivers with the goal being that instructors hit our two minute standard of finding a shallowly buried beacon in a 30 by 30 meter area. We may also practice locating deeply buried beacons as well. Reviewing stability tests, snow profiles, and documentation standards will also take place throughout the day's travel in avalanche terrain. Other winter training topics such as waxing techniques may take place on these days, not to mention a little skiing.

Terrain tours are run by the winter program supervisor or other senior winter staff.

3.6 Spring and Summer Avalanche Seminars

In addition to our professional avalanche courses for winter staff, we run avalanche seminars for our summer mountaineering staff in Alaska and the Pacific Northwest. These courses run for 3 days (10-12 hours/day) and focus on terrain evaluation, basics of snowpack formation and metamorphism, and an in depth study of isothermal snowpack phenomena. This focus on wet snow covers the most prevalent hazard our summer mountaineering courses face, but these courses do not prepare our instructors for dealing with the intricacies of the

winter intermountain and continental snowpacks. For these skills instructors are required to complete the Professional Level 1 Seminar.

Table 3.1 sums up the avalanche training offered by NOLS for winter and mountaineering instructors.

3.7 Continuing Education

NOLS Instructors are encouraged to seek out and obtain addition avalanche training outside of NOLS. Many are Professional or Affiliate Members of the AAAP. The ISSW has been well attended in the last few years. A few instructors have taken upper level avalanche courses from organizations such as the Canadian Avalanche Association (CAA) and the American Avalanche Institute (AAI). The CAA Level 2 training has been especially useful for program supervisors overseeing the winter program.

Winter instructors are also updated on new material via education articles in our Staff Newsletter. Examples of these articles include synopses of ISSW presentations (McCammon and Sharaf, 1998), and reviews of new avalanche beacons (O'Bannon, 1999). New curriculum resources can be found at the branches that host winter courses so winter instructors can keep current.

3.8 Documentation

NOLS Field documentation (SnowPit Technologies, 1998) on winter courses follows the Canadian Avalanche Association format quite closely, using standard abbreviations and recording techniques (CAA, 1995). We require instructors to document their pits accurately, and to also monitor and document changing snow and weather conditions.

When in avalanche terrain, instructors must use a section of their field books that has a stability rose, to keep notes on signs of instability they are, or are not seeing (pertinent negatives) and gather information from stability tests they perform. In addition to aiding decisions in the field this information is reviewed at the end of courses to understand the rationale behind various decisions made on the course. It is also used to pass on more detailed snow pack information to future courses visiting that particular area. Avalanche events are recorded on USGS quadrangles to create an avalanche atlas of our user areas. Salient information is passed on to the local forecast center.

Table 1: NOLS WINTER INSTRUCTOR TRAINING

Seminar	Audience	Duration	Prerequisites
Instructors Course	Anyone desiring to become a NOLS instructor	35 days – 32 continuous days in the field	Selection Process – outdoor teaching experience; extended trip experience; and climbing, sea kayaking or whitewater skill
Professional Level 1 Avalanche	NOLS Instructors desiring to instruct winter course	Five 10 hour days – split 35/65 between classroom and field	Intermediate or better skier with a desire to work in the NOLS winter program
Winter Instructor Seminar (WIS)	NOLS Instructors desiring to instruct winter course	10 continuous days in the field	Selection Process – Instructors must submit a winter resume. Professional Level 1 Avalanche Seminar or similar experience
Professional Level 2 Avalanche	NOLS Instructors desiring to course lead winter courses	Five 10 hour days	Pro. Level 1, WIS, Winter Course experience, >10 documented snow profiles
Terrain Tour	Instructors working Winter Courses	One 5-8 hour day prior to meeting students	Winter contract work
Alaska Avalanche Seminar	NOLS Instructors desiring to work Alaska Mountain Courses	Three 10 hour days	---
Pacific Northwest Avalanche Seminar	NOLS Instructors desiring to work North Cascade or Coast Range Mountain Courses	Three 10 hour days	---

4. THE FUTURE

While the overall format of our avalanche training has not changed for the last several years, the content continues to remain dynamic as new information becomes available, and we learn better techniques. We aim to raise the standard of training for our instructors, as the standard of the industry become higher. We plan to continue inviting non-NOLS affiliated avalanche professionals to instruct at our level 2 courses. As more NOLS instructors attend ISSW's or non-NOLS avalanche training programs they become efficient conduits for passing on new ideas to the winter program.

Starting in the winter of '00-'01, we plan to offer a Professional Level 1 to people outside of NOLS. The objective of this course will be to give interested persons avalanche training and group management strategies similar to what we provide our staff. If enrollment and interest is good for this course, then NOLS may offer a Professional Level 2 in the future. Ultimately, we would like to tie our professional courses into AAAP guidelines for Professional Courses or Certification, but the fight for standards among American guides is a slow one.

5. CONCLUSIONS

NOLS avalanche training has come a long way since 1992. The creation of a supervisors position to oversee the winter program helped tremendously in this evolution. This position still helps to provide consistency, information, and oversight to the winter program.

In addition there are a number of things have contributed to making our avalanche training successful.

- Creation of an in depth training program that is focused on training staff to become effective winter instructors.
- Development of a common language among instructors for sharing data and information on avalanches quickly and effectively.
- Open minds – readiness to accept critical feedback from those within and outside of our program.
- Experiential education - the ability to use terrain that requires real decisions to deal with potential hazards. At the same time, we still must remain institutionally conservative.
- History that demands we review our mistakes and learn from them so we don't make them again.

- An emphasis on continuing education and dissemination of that information as effectively as possible.
- Constant review of what instructors are practicing through documentation and debriefings.
- Creating and maintaining standards for admission to and/or passing, avalanche/winter seminars. Asking more of participants frequently means we get more from them as a result.
- Development and constant tweaking of our curriculum and teaching progression. We keep looking for a better way.
- Bringing in outside instructors to review and update our program makes the program dynamic and current.

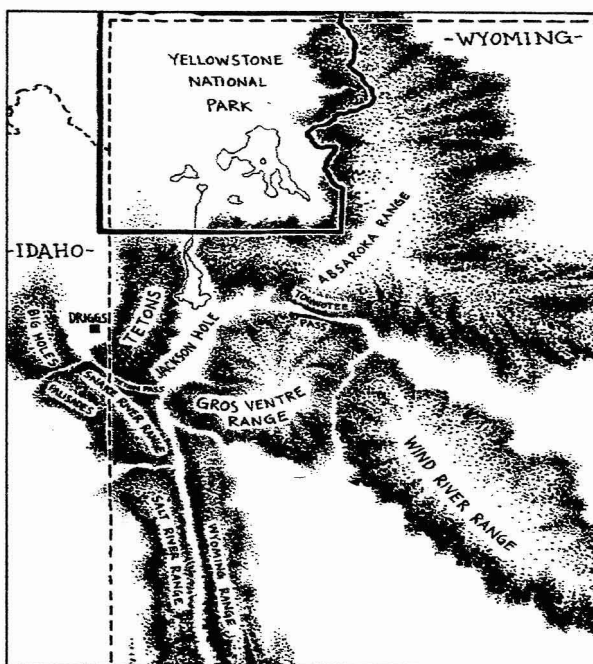


Figure 2: NOLS Course Winter Operating Areas

6. ACKNOWLEDGEMENTS

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APPENDIX 1: KEY TO ACRONYMS IN THIS PAPER

AAAP – American Association of Avalanche Professionals
AAI – American Avalanche Institute
ACMG – Association of Canadian Mountain Guides
CAA – Canadian Avalanche Association
NOLS – National Outdoor Leadership School
WIS – Winter Instructor Seminar

APPENDIX 2: SAMPLE SCHEDULES FROM RECENT AVALANCHE SEMINARS

Professional Level 1 Avalanche Seminar:

EVENING Introduction
Orientation, seminar goals, gear issue - 1 hour

Review the pre-test, review of human factor scenario - 1.5 hours

DAY 1 *Terrain*

MORNING

Weather briefing & aval. forecast - 15 min.
Basic avalanche types - 30 min.
Introduction to avalanche beacons - 15 min.
Range and function check - 30 min.
Pinpoint search - 45 min.
Tangent search - 30 min.
Terrain, route finding & safe travel practices - 1 hour

AFTERNOON

Depart for field, 3 separate groups: Analysis of terrain and snowpack variations using hand shears, pole tests, test slopes, etc. - 6 hours

EVENING

Compare observations - 20 min.
Red, yellow, green system of avalanche decision making - 30 min.

DAY 2 *Snowpack*

MORNING

Weather & avalanche forecast - 15 min.
Overview of snow formation & ID - 45 min.
Effects of wind, heat and time on the snow surface (crusts, slabs, settled snow, surface hoar) - 30 min.
Rounded-grain metamorphism and sintering - 30 min.
Wet snow and melt-freeze metamorphism - 30 min.
Faceting, depth hoar - 45 min.
Mixed forms and near-surface faceting - 30 min.
review of snow forms - 30 min.

AFTERNOON

Documenting a study pit (field books) sintering - 30 min.
Depart for study pit site, Study pit techniques & practice, Beacon practice - shallow burial - 3.5 hours

EVENING

Participants present study pit findings - 30 min.
Review of NOLS avalanche incidents: Sarnoff review sintering - 30 min.

DAY 3 *Snow Stability*

MORNING & AFTERNOON

Weather briefing & aval. forecast - 15 min.
Documenting field obs. (stability rose) - 15 min.
Depart for field, 3 separate groups: stability tests, terrain analysis, route finding, supervision of students - 8 hours+

EVENING

Compare stability findings - 30 min.
Stability tests: Review and Limitations - 30 min.

Review of NOLS avalanche incidents: Level 1 '95 - 30 min.

1/21 DAY 4 *Rescue*

MORNING

Weather briefing & aval. forecast - participant - 15 min.
Coarse search strategies/ overview of rescue practices - 20 min.
Depart for field, 2 groups: deep burial practice, full-scale rescue practicals (debrief after each).
Probing clinic. - 4 hours

AFTERNOON Return to Base, participants share lessons - 30 min.

Perceived and Unperceived Pressures on Winter Instructors and Guides - 30 min.
Hand out & explain Map Scenario - 2.5 hours
EVENING - no evening meetings or classes

1/22 DAY 5 *Practical exam*

MORNING

Weather briefing & aval. forecast - participant - 15 min.
Depart for field, 3 separate groups: participant led tours in new terrain - 6.5 hours
LATE AFTERNOON
Review of map scenarios - 45 min.
Written test - 1 hour/Review - 30 min.
Seminar Debrief - 15 min.
Adjourn

Professional Level 2 Avalanche Seminar:

2/4 EVENING *Introduction*

Introductions, goals & expectations, schedule, gear issue, hand out field books - 45 min.
Internet Avalanche Resources - 20 min.
Level I exam - 30 min.

2/5 DAY 1 *Review and Snowpack*

MORNING

Weather briefing & aval. forecast - 15 min.
Level 1 exam review - 30 min.
Transceiver range check - 15 min.
Beacon search practical - 30 min.
New snow, settled snow & crusts - 1 hour
Rounding, sintering & wet snow - 1 hour

AFTERNOON

Faceting, depth hoar, Near Surface Facets & mixed forms - 1 hour
Surface hoar - 45 min.
Orientation to study pit documentation - 15 min.

Depart for study pit site - Instructors demo study pit technique, then participants do their own study pits in pairs 2.5 hours

EVENING

Participants present study profiles - 30 min.

Terrain review - 30 min.

Route planning and alpha angles - 30 min.

Guest Instructors arrive this evening

DAY 2 *Snow Stability*

MORNING & AFTERNOON

Weather briefing and avalanche forecast (done by a seminar participant) - 15 min.

Stability analysis and stability tests - 45 min.

Field documentation (stability rose) - 30 min.

Depart w/guest instructors - 2 groups: Test + pits, terrain features, stability rose - 7 hours

Participants prepare field data.

EVENING

Participants present field data - 30 min.

Interpreting Stiffblock Tests - Guest Instructor - 45 min.

Analysis of an avalanche accident - "Losing the big picture" - Guest Instructor - 45 min.

"What do stability tests mean?" - Limitations of Stability Tests - 30 min.

DAY 3: *Mechanics and Terrain*

MORNING & AFTERNOON

Weather briefing and avalanche forecast (participant) - 15 min.

Avalanche Mechanics: Fracture and Failure - Guest Instructor 1.5 hours

Depart w/guest instructors

2 groups: Test + pits, terrain features, stability rose, group management - 7 hours

EVENING

Participants present field data - 30 min.

A Review of New Beacons and the Funnel Method - Guest Instructor - 45 min.

Decision making in avalanche terrain - Four models - Guest Instructor - 45 min.

DAY 4: *Terrain*

MORNING & AFTERNOON

Depart for field in 3 groups - 8+ hours

EVENING - off

DAY 5: *Rescue*

MORNING & AFTERNOON

Weather briefing and aval. forecast (participant) - 15 min.

Organizing & managing aval. rescue - 45 min.

Depart for rescue site in 2 groups, 3 large scale rescue scenarios each (including a probing clinic) - 5 hours

Alaska Avalanche Seminar:

EVENING *Introduction*

Go over curriculum and travel plans, pre-test review, course and participant goals, video - *Winning the Avalanche Game*

DAY 1: *Avalanche Factors/Rescue*

MORNING

Alaska avalanche resources available on the Internet - 15 min.

Overview of snowpack (snow above the surface, on the surface, and below the surface) - 1.5 hrs

An overview of weather and terrain - emphasis on a common language and the red/yellow/green decision making model - 1.5 hours

Alpha angles - 30 min.

AFTERNOON

AK winter weather and snowpack and how this relates to our summer snow pack. - 45 min.

Leave for Hatcher Pass - transceiver work & mini-scenarios (no more than double signals) - 3 hours

EVENING

Lecture on wet snow avalanche formation, evaluation, and control - 1 hour

DAY 2: *Snow Stability and Human Factor*

MORNING & AFTERNOON

Weather's effect on present avalanche conditions - draw representative profile of the snowpack - 45 min.

Drive to Hatcher Pass - Snow pit and slope analysis. Test pit techniques, quick stability tests, fracture line profiles - 7 hours

EVENING

Review of the day's findings - 20 min.

Human Factor (perceived and unperceived pressures on mountain guides) - 30 min.

DAY 3: *Terrain and Group Management*

MORNING & AFTERNOON

Arrive Turnagain Pass - spend day traveling with emphasis on route finding, decision making, supervision of students, travel precautions in avalanche terrain. Test pit(s), ski cutting, and sluff management - 10 hours (including drive time)

EVENING

Decision making scenario (terrain, snowpack, weather, and people card-game) - debrief of the day and the course - 1.5 hours