

**American Avalanche Association
Professional Avalanche Training 2
Guidelines and Proficiencies**

Version 3.0



AMERICAN
AVALANCHE
ASSOCIATION

Mission Statement: This course is a professional level advanced avalanche training, designed for avalanche workers progressing into leadership roles within their operations. The Pro 2 is for experienced workers who desire to continue to develop their forecasting and risk management leadership skills. Workers will analyze information from various sources and make operational decisions on multiple spatial and temporal scales.

1.0 Introduction

This document contains the guidelines set by the American Avalanche Association (A3) for the standard proficiencies and marking strategies for the Professional Avalanche Training 2 (Pro 2) course. These guidelines are intended to provide commonality of training and evaluation in professional avalanche education in the United States. Questions on the contents of this document can be addressed to the A3's Professional Training Coordinator.

2.0 Pro 2 Structure and Requirements

Course Length: Minimum 6 days

Course Providers: All Pro 2 courses must be taught by an A3-approved course provider. See AAA Structure and Oversight document for information on becoming an approved provider.

Course Trainers: All courses will be staffed with at least one A3-approved Lead Trainer and additional Course Trainers as needed to maintain appropriate student-to-instructor ratio. For pro trainer qualifications see A3's Structure and Oversight document.

Student: Instructor Ratio: 5:1

Student Requirements for Enrollment (1 – 3 all required):

- 1) Course applicants have completed the following A3-recognized courses prior to enrollment:
 - a) Pro 1 Certificate

Applicants who believe they have the educational equivalent of the above-listed prerequisites can apply to the Pro Course Provider of their choice for a Prior Learning Assessment (PLA) review. Course enrollment in these situations is at the discretion of the Pro Course Provider.
- 2) Work Experience
 - a) A minimum of 40 days of operational avalanche experience over two winter seasons, and
 - b) Letter of recommendation from a supervisor (A3 Pro Member recommended) verifying:
 - 40 days minimum work experience over two operating seasons (note, this can be in the same year if the worker has worked in both the northern and southern hemispheres). This includes participation as a team member, attending daily ops meetings, and participation in operational activities that requires avalanche risk management.
 - Avalanche rescue (companion) practices with team leader responsibility. The applicant has participated in multi-team organized avalanche rescue exercise(s).
 - The applicant is able to complete the tasks required of a route leader or ski guide or avalanche forecaster.
- 3) Submit examples of the following professional documentation:
 - a) two profiles, two operational meeting forms, two pages from two days of field observations



Learning Outcomes/Student Proficiencies: See section 3.0 Pro 2 Learning Outcomes and Proficiencies, Table 1.

Marking and Evaluation: 70% total marks are required to pass the course. Specific categories requiring a “categorical pass” of 70% to pass the course include: Technical Skills and Knowledge, Avalanche Hazard and Risk Assessment, and the Written Exam. Tables 2 through 10 address student assessment principles, marking categories, criteria, and rubrics.



3.0 Pro 2 Learning Outcomes and Proficiencies

Table 1: Pro 2 Student Skills and Proficiencies

Skill	Proficiencies			
Map avalanche terrain	Identify -- using field observations, resources -- the principal avalanche paths in an operational area on a map and photo.		Estimate return interval, magnitude, and hazard to the element at risk.	
	Describe, measure, map, and record avalanche path characteristics.		Propose mitigation methods that may reduce the risk.	
Demonstrate a knowledge of avalanche formation and release	Classify the physical characteristics, including morphological sub-classification, of deposited snow using IACS international terms and guidelines.	Explain and demonstrate how to prioritize snowpack layer / interfaces using a combination of observations: structural indices from profiles, fracture/shear character in snowpack tests, and propagation propensity from large column tests. Explain how to manage the likelihood of error in the observation and testing process.	Describe each avalanche problem by the mechanics of how each avalanche type forms and releases and the tests used to identify and assess the problem in the field. Identify risk management strategies associated with each avalanche problem.	
			Relate and forecast how fracture and release can change as conditions change.	
Analyze, observe, forecast, and document the avalanche hazard and risk	Monitor, analyze, and profile snowpack instability trends from daily telemetry datasets. Efficiently conduct and communicate field observations to team members.	Draw a hypothetical snow profile over varied terrain from station weather/ snowpack data. Identify microclimate zones and explain snowpack variation from elevation, exposure to sun and wind, and influence of vegetation and terrain shape.	Interpret the mountain weather forecast for a drainage and slope scale. Identify sources of uncertainty in the daily forecast and target field observations specific to reducing uncertainty.	Forecast the daily avalanche hazard and risk within a given spatial and temporal scale. Rate the stability and danger.
	Record daily weather, snowpack, and avalanche data on operational forms and checklists according to best practice established in industry. Compare recording techniques between different industries.	Assess relevancy of data in terms of: 1) strength and weight of that data and 2) extrapolation and interpolation.		Describe factors that affect forecaster confidence.
Describe and contrast operational avalanche risk treatment techniques	Explain the spectrum of passive and active mitigation strategies employed by ski areas, highways and guiding operations including applications, limitations, and communication strategies.		Describe and contrast effective team decision-making and communication strategies for large team and small team operations.	

Identify best practices for workers in avalanche terrain	Explain the foundations of an avalanche risk management plan.	Identify characteristics of high reliability organizations (HRO) and relate this to different avalanche operations.	Identify strategies for workers working alone or remotely in avalanche terrain.	Identify and apply effective communication strategies for avalanche mitigation and guiding teams.
Demonstrate effective leadership in a team	Explain and demonstrate factors that promote teamwork.	Demonstrate leadership during operational meetings and trip planning sessions.	Explain the responsibilities and scope of practice of a team leader/lead guide in an avalanche operation.	
	Choose terrain that facilitates group management and reduces risk to the individual and team.	Identify strategies to acknowledge and minimize personal and organizational biases when making decisions.	Explain and demonstrate the characteristics of a "professional" and describe effective mentoring.	
Prepare a professional technical report for external review	Identify and summarize key factors when reviewing a notable event (i.e. incident report).	Demonstrate professional communication of a notable event.		



4.0 The Pro 2 Student Evaluation Criteria

4.1 Assessment Principles

Table 2: Student Assessment Principles for Professional Course Providers.

1. Marks are derived from assigned tasks. Students are informed of instructor expectations and the nature of course assignments prior to the course start date in order to facilitate student preparation.
2. Assigned tasks are evaluated after each student has received adequate instruction, coached application, and constructive feedback on that task. Student self-evaluation is encouraged throughout the learning process.
3. The marking assignments reflect the course goals and learning outcomes and are scheduled to facilitate learning and coached application.
4. Combined oral and written responses ensure that oral communication, literacy, and knowledge are evaluated.
5. 70% total marks are required to pass the course. In addition, 3 specific categories (tech skills and knowledge, av hazard and risk assess, and the written exam) require a “categorical pass” of 70% to pass the course. Retest options are described in the marking scheme.
6. Each student will be evaluated by a minimum of two assessors. A course provider will strive to avoid all conflicts of interest in evaluating students. Any concerns or complaints about unfair assessments will be directed to the AAA for review.
7. Students receive a written performance assessment in a timely manner following the course conclusion. The written evaluation represents the combined opinion of all instructors and informs the student of the following:
 - a. Course outcome: pass or fail. A certificate is awarded to successful students.
 - b. A topical analysis of course marks and feedback on areas where the student excelled and topics requiring improvement.
 - c. Options for unsuccessful students.
8. Each student is informed of and provided with the option of appealing his or her marks.



4.2 Marking Categories

The skills and proficiencies listed in Table 1 have been divided into two marking categories, each of which accounts for 50% of the course mark: 1) Technical Skills and Knowledge (50%) and 2) Avalanche Hazard and Risk Assessment (50%).

Table 3: Marking Categories 1 & 2

Marks	Category 1: Technical Skills and Knowledge (50% of course mark)	
10	Storm Profile <ul style="list-style-type: none"> o Data Evaluation 	No retest
10	Issuing an Avalanche Forecast <ul style="list-style-type: none"> o Identify avalanche problems, o Danger rating. 	
15	Written or Oral Technical Report <ul style="list-style-type: none"> o Notable event o Incident reporting 	Retest available
15	Written Exam topics match proficiencies and include <ul style="list-style-type: none"> o Worker safety, o Heuristics/bias, o Avalanche formation and release, o Application of snowpack data to decisions. 	No retest

Marks	Category 2: Avalanche Hazard and Risk Assessment (50% course mark)	
10	Avalanche Mapping Project <ul style="list-style-type: none"> o Field identification as a group exercise. o Classroom; path description, path character, frequency/magnitude, suggested techniques to mitigate, manage, or avoid risk. 	No retest
10	Operational Exercise <ul style="list-style-type: none"> o Identify likely weather station locations. o Identify proposed snow study plot locations. o Identify key terrain pertinent to the operation. o Given weather and snowpack data, identify terrain options, avalanche danger, snow safety task, and risk treatment. 	
30	Terrain Use and Decision-Making <ul style="list-style-type: none"> o Meeting facilitation and risk assessment. o Field observations (choice of observation, site selection, quality and efficiency of observation). o Risk estimation & terrain choice. o Group management & risk reduction. o Debrief with accuracy & relevance. 	



5.0 Instructor Marking Rubrics and Guidelines for Applying Marks

5.1 Technical Skills and Knowledge (50% of Course Marks)

Table 4: Storm Profile Marking Rubric (10 Marks)

Mark	Description
Exceeds Standard 8-10 (>80%)	Student accurately evaluates weather and snow data given for the storm period by recognizing changes in snow density, grain type/size, and structure. The student places emphasis on pertinent information and relates data to the most significant weak layer/interface, timing of greatest avalanche hazard, and impact of the avalanche cycle on the operation. Student selects appropriate risk treatment for the operation and clearly articulates impacts of weather pattern on daily operations. Given local avalanche terrain information (e.g. avalanche atlas), the student identifies key paths that may impact the operational activities.
At Standard 7-7.5 (>70%)	The student correctly evaluates weather and snow data for the given storm period with only minor errors in snow structure. The student correctly identifies the most significant weak layer/interface; however, then makes minor errors in estimation of greatest avalanche hazard and impact on the operation. Student selects appropriate risk treatments for the operation but has difficulty articulating impacts on daily operations. Given local avalanche terrain information (e.g. avalanche atlas), the student has difficulty identifying key avalanche paths that may impact operational activities.
Below Standard <7 (<70%)	The student does not correctly evaluate weather and snow data for the given storm period. The student cannot identify changes in snow structure. The student does not correctly identify the most significant weak layer/interface. Given local avalanche terrain information, the student incorrectly identifies key avalanche paths and their impact on operational activities. Student's inability to accurately evaluate data and draw conclusions potentially creates a dangerous work environment for the given operation.

Table 5: Issuing an Avalanche Forecast Exercise Marking Criteria (10 Marks)

Mark	Topic	Description
2	Avalanche Hazard	Student accurately identifies avalanche danger at all elevations and danger trends for the scale of the exercise. Student recognizes changes in danger over the time scale of the forecast.
3	Avalanche Problem	Student accurately identifies avalanche problems and prioritizes in a logical and supported manner. Student correctly identifies terrain in which the avalanche problem(s) exist and provides slope feature information where appropriate.
2	Snowpack Discussion	Student summarizes current and forecasted snowpack conditions in a simple and easy to understand format. Information is clear, concise, and complete.
2	Risk Treatment	Student communicates appropriate advice for terrain selection, mitigation and/or avoidance to the intended audience. Advice is in line with current avalanche problems forecasted.
1	Communication	Student summarizes avalanche forecast into one or two sentences for intended audience. The message is a clear summary of pertinent information.



Table 6: Written Technical Report Marking Criteria (15 Marks)

Mark	Topic	Description
5	Technical Writing	The report contains all content and chapters recommended by the provider*. The information is presented in a logical and readable fashion, using correct grammar, spelling, and notations. The author introduces the topic and findings and draws links between background info, evidence, event, and summary conclusions.
5	Report Content	The author accurately considers the strength and weight of evidence and data when compiling the report. The report's content is supported by the winter summary. The author considers: <ul style="list-style-type: none"> o individual or group bias, o a sequence of errors, and o important human factors or other factors that led to the incident or event. The author uses images, photos, references, and appendices when appropriate.
5	Conclusions	The author draw links from conclusions to implementation in the workplace. The author demonstrates the importance of lessons learned for professionals. The report is a professional document that is consistent with the standards of the industry.

*C. Zacharias example

Technical Report Writing: Oral Report Option (15 Marks)

Mark	Topic	Description
10	Content	<ul style="list-style-type: none"> o The presentation meets the information requirements of the assignment. o Information is presented in logical sequence/structure. o Information on slides reflects an understanding and effective summarization. o Information has not been simply copied and pasted from another source. o The report's content is supported by the winter weather summary. CONCLUSIONS: The author considers: <ul style="list-style-type: none"> o Individual or group bias, o a sequence of errors, o and important human factors or considerations that led to the incident or event. o The author draws links from conclusions to implementation in the workplace. The author demonstrates the importance of lessons learned for professionals. The report is a professional document that is consistent with the standards of the industry.
5	Design & Presentation	<ul style="list-style-type: none"> o Slides display elements of effective design. o Fonts, colors, backgrounds, etc are effective, consistent and appropriate to the topic and audience o Animations and/or sounds have been used effectively to emphasize important points. o Text is clear and easy for the audience to see. o Presentation is free of spelling and grammatical errors. o There is not too much text on a slide. Each slide contains a limited number of talking points as opposed to complete paragraphs. o Presenter was familiar with the material and did not read from slides or rely on notes. It is evident that the presentation was rehearsed. o Presenter spoke clearly and slowly enough to be heard by the audience. o Presenter showed enthusiasm for the subject matter and encouraged audience interest. o Presenter made eye contact with audience.

Table 7: Written Exam Marking Criteria (15 Marks)

Marks	Category 3: Knowledge/Written Exam (15)	
15	Written exam <ul style="list-style-type: none"> o The exam should encompass a selection of topics from the course to provide evaluation of student comprehension, continued learning, and material delivery. o Test should be no more than 50 questions long and take no longer than 1.5 hours on average. o Test should use a variety of test techniques (short answer, essay, matching, multiple choice, etc.) to assess student understanding. o All tests will be closed book. o Accommodations should be made for students with testing, learning, and/or reading disabilities and for non-native English speakers as needed. 	70% on the written exam is required to pass course. Retest after 14 days.

5.2 Avalanche Hazard and Risk Assessment (50% Course Marks)

Table 8: Avalanche Mapping Project Marking Criteria (10 Marks)

Mark	Topic	Description
3	Path Description	Student correctly delineates the path and its physical characteristics. Information may include max slope angle, aspect, elevation, max runout, linear drop, etc.
2	Path Character	Student identifies general weather events, avalanche problems, and snowpack structures typical of the path in question.
2	Frequency and Magnitude	Student estimates the maximum potential avalanche for a given path. Student estimates return frequencies of various size avalanches within the terrain.
2	Operational Impact	Student accurately identifies under what conditions this path typically impacts normal operational activities.
1	Risk Reduction	Student selects appropriate risk reduction for the path to mitigate risk and minimize operational impact.

Table 9: Operational Exercise Marking Rubric (10 Marks)

Mark	Description
Exceeds Standard 8-10 (>80%)	Student correctly identifies appropriate locations within the operational terrain to gather baseline consistent weather and snowpack information. Student demonstrates understanding of how information from these locations can be reflected in other terrain within the operation. The student identifies terrain features pertinent to the operation's goals and assesses their relevance to daily operations. Given weather and snowpack data from the operation area, the student accurately forecasts avalanche hazard, recommends terrain use, and selects risk treatments.
At Standard 7-7.5 (>70%)	The student identifies appropriate locations with the operation to gather weather and snowpack information, though the locations may not be relevant or the student fails to demonstrate the ability to relate these locations to other operational terrain. The student identifies terrain features pertinent to the operation's goals but does not demonstrate their relevance to daily operations. Given weather and snowpack data from the operational area the student draws sound but incomplete conclusions for avalanche hazard, terrain use, and risk treatment.

Below Standard <7 (<70%)	The student selects inappropriate locations to gather weather and snowpack data within the terrain. Data from the selected locations is anomalous within the operation and largely unusable. The student misses key terrain features pertinent to the operational context. Given weather and snowpack information from the operational area, the student incorrectly forecasts avalanche hazard, which results in poor terrain recommendations and inappropriate risk treatment leading to a potentially dangerous operational environment.
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Table 10: Terrain Use and Decision-Making Marking Rubric (30 Marks)

Mark	Topic	Description
5	AM Sheet	Record daily weather, snowpack, and avalanche data on operational forms according to best practice established in industry.
2	Field book	Student’s notebook is neat and complete. All fields are appropriately filled in. Written information is easy to interpret and does not need follow up from instructors.
5	Communication	Provides timely input, contributes to decisions, listens well
5	Terrain Choice	Maintains appropriate terrain margins for current conditions. Recognizes when conditions create a hazard in non-defined avalanche terrain and applies appropriate route finding to reduce risk.
5	Group Management	Conducts group equipment checks prior to departure. Leads group through challenging terrain with few or no errors. Manages group when appropriate. Considers vulnerability and exposure in selection of safe zone and spacing. Regroups in non-exposed terrain
2	Pit Site Selection	Chooses representative sites to gather information to appropriately modify field decisions.
6	Pit Efficiency, Accuracy and Proficiency	Performs snowpack analysis accurately and efficiently. Student chooses tests appropriate for conditions. Student demonstrates competence with all appropriate tests. Scribing dictation is organized and clear.

Mark	Description
24-30 (>80%) Exceeds Standard	Leads group through challenging terrain with few or no errors. Conducts group equipment checks prior to departure. Chooses representative sites to gather information to appropriately modify field decisions. Recognizes when conditions create a hazard in non-defined avalanche terrain and applies appropriate route finding to reduce risk. Manages group when appropriate: maintains appropriate terrain margins; provides adequate communication; considers vulnerability and timing, exposes only one person at a time, and regroups in non-exposed terrain.
21-23.5 (70-79%) At Standard	Has the essential skills described above. Makes minor errors but has the experience to correct the errors before the risk or exposure is serious. Examples of minor errors include: individual fails to conduct a trailhead gear check but checks transceivers soon after and prior to entering avalanche terrain; requires a little coaching with site selection but recognizes when conditions create a hazard in less defined terrain; appropriate route finding but requires coaching when applying a “narrow” safety margin; regroups where exposure is reduced but requires coaching to maintain adequate group communication; identifies exposure and vulnerability but requires some coaching with potential consequences (for example when ski cutting).

<20.5 (<70%) Below Standard	Does not demonstrate appropriate travel in challenging terrain. Does not adequately error correct to reduce risk or apply a sufficient safety margin when route finding. Several minor errors may combine or a major error may have the potential to compromise group safety. Examples include: inappropriate site selection when information gathering and/or inappropriate application of observations; poor timing with avalanche terrain exposure; inadequate communication to group prior to entering avalanche terrain; fails to recognize exposure/vulnerability and does not reduce risk adequately for group members. Excessive coaching or an intervention is required by the instructor to mitigate risk to the group in avalanche terrain
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