



2017 Classroom Agenda  
(as of 6/26/17)

**Sunday, 10/22**

1:00 – 7:00 pm	Registration Desk Open	3rd Floor Foyer
7:00 – 8:30 pm	Introduction & Welcome An Operational Case Study <i>Paul Baugher</i>	Colorado Ballroom
8:30 – 9:45 pm	Meet & Greet Reception	Coppertop III

**Monday, 10/23**

8:00 – 8:30 am	Announcements The Avalanche Hazard & Risk Conceptual Model <i>Bruce Tremper</i> Between 2008 and 2010, a committee of avalanche program leaders from both the U.S. and Canada met regularly to hammer out the basic concepts and components of avalanche hazard and risk. What is avalanche hazard? What is avalanche risk? What are the components of avalanche hazard and risk? Most of us only had a vague, intuitive notion of what they were and how they worked. We first had to come up to speed on the international standards used to describe hazard and risk in other natural hazards fields. Then we came up with an overall, conceptual model of hazard and risk that would work for all aspects of the avalanche community.  This conceptual model has since become the industry standard in how we deal with avalanches and communicate with each other about avalanches, and it has also been adopted outside of North America as well. This lecture covers all the aspects of the Conceptual Model including: <ul style="list-style-type: none"><li>• Avalanche Character</li><li>• Avalanche Problems</li><li>• Avalanche Hazard</li><li>• Avalanche Risk</li></ul>	Colorado Ballroom
8:30 – 8:45 am	Break	3rd Floor Foyer
8:45 – 10:00 am	Mountain Snowpack <i>Ethan Greene</i> This lecture covers the growth and decay of ice crystals as it pertains to snow layer formation and avalanche release. We will discuss the mechanisms of snow metamorphism and how they manifest into three regimes, how to identify the structures created by each regime, and how they create the ingredients of an avalanche. We will also discuss a few special cases with practical implications for avalanche forecasting as well as how snow layers vary in both time and space. We will also briefly touch on the concepts of snow creep, glide, and settlement.	Colorado Ballroom
10:00 – 10:15 am	Break (move to workshops)	
10:15 – 11:45 am	Workshop–Mountain Snowpack	Various Rooms
11:45 – 12:45 pm	Lunch (on own)	
12:45 – 1:45 pm	Avalanche Formation & Release <i>Karl Birkeland</i> A basic understanding of how avalanches are triggered is critically important for safe travel in avalanche terrain. Although the physics behind avalanche release is not fully understood, fracture mechanics still provide a solid framework for us to better understand avalanche release. This lecture will look at the mechanical properties of snow slabs, will briefly touch on a few models of avalanche release, and will emphasize the practical implications of the most recent research. We will also learn about the spatially variable nature of the snowpack, and the implications of that variability for avalanche forecasting and mitigation.	Colorado Ballroom
1:45 – 2:00 pm	Break	3rd Floor Foyer

## Monday, 10/23 (continued)

2:00 – 3:00 pm	<b>Snow Profiles, Stability Tests &amp; Interpretation</b> <i>Doug Chabot</i> A basic understanding of how avalanches are triggered is critically important for safe travel in avalanche terrain. Although the physics behind avalanche release is not fully understood, fracture mechanics still provide a solid framework for us to better understand avalanche release. This lecture will look at the mechanical properties of snow slabs, will briefly touch on a few models of avalanche release, and will emphasize the practical implications of the most recent research. We will also learn about the spatially variable nature of the snowpack, and the implications of that variability for avalanche forecasting and mitigation.	Colorado Ballroom
3:00 – 3:15 pm	Break (move to workshop)	Various Rooms
3:15 – 4:45 pm	<b>Workshop – Snowpit Profiles, Stability Tests &amp; Avalanche Release - Part 1</b> Create a snowpit profile, review various snowpit structures and stability tests, and examine historical examples of avalanche formation and release.	

## Tuesday, 10/24

8:00 – 8:30 am	<b>Announcements</b> <b>Mountain Weather Facts</b> <i>Max Forgens</i> Basic facts about weather that are pertinent for avalanche professionals will be described. Students will be guided through basic calculations such as PI, SI, SWE and snow density, valuable information that is a daily part of operational work and forecasting.	Colorado Ballroom
8:30 – 8:45 am	Break	
8:45 – 9:45 am	<b>Weather Data Collection &amp; Display</b> <i>Janet Kellam</i> Weather data has become easily accessible to anyone with a smartphone or a laptop, and is a vital part of any avalanche operation. But with the volume of data available, how to make sense of it all? This lecture will cover the different types of weather data used in avalanche operations and where it comes from. The student will learn how to readily interpret the data displays and to apply this information in the real world of avalanche work. What does this weather data tell you (or not tell you), about avalanche conditions?	Colorado Ballroom
9:45 – 10:00 am	Break (move to workshop)	
10:00 – 11:45 am	<b>Workshop – Basic Weather Calculations (45 min)</b> <b>Workshop – Snowpit Profiles, Stability Tests &amp; Avalanche Release - Part 2 (1 hr)</b> Decision making exercise using snowpack and weather observations, stability assessments and snowpit data.	Various Rooms
11:45 – 12:45 pm	Lunch (on own)	
12:45 – 1:45 pm	<b>Avalanche Hazard Evaluation—Practical Applications</b> <i>Bruce Tremper</i> As professional avalanche workers, evaluating avalanche hazard is obviously an extremely important skill. We accomplish this through a number of standard techniques and procedures developed by avalanche professionals through science and many years of trial-and-error experience. This lecture covers the practical basics of: <ul style="list-style-type: none"><li>• What kind of avalanche character we are dealing?</li><li>• What is its distribution?</li><li>• How sensitive is it to triggers?</li><li>• What is the expected destructive size?</li><li>• What is our strategic mindset</li><li>• What are our mitigation measures?</li></ul> We do this through observation of avalanche activity, snow surface conditions, snow profile tests, explosive tests and test slopes, weather observation and weather forecasts. Finally, after we have gathered the evidence, what is our strategic mind set—our overall strategy for managing the hazard?	Colorado Ballroom
1:45 – 2:00 pm	Break	3rd Floor Foyer
2:00 – 3:00 pm	<b>Explosives &amp; the Snowpack</b> <i>Scott Savage</i> This lecture will cover the concept of detonation and examine how detonations impact a seasonal snowpack. Energy, detonation velocity, detonation pressure, and attenuation will be discussed. The lecture will cover different types of explosives and introduce common explosive delivery methods. Subsequent lectures will examine operational applications and problems in greater detail.	Colorado Ballroom
3:00 – 3:15 pm	Break (move to workshop)	
3:15 – 4:45 pm	<b>Workshop – Avalanche Hazard Evaluation</b> Using the framework of the Avalanche Hazard Conceptual Model to describe conditions and hazards.	Various Rooms
5:00 – 6:00 pm	<b>Optional Session: Clarification &amp; Review</b> <i>Karl Birkeland &amp; Janet Kellam</i>	Colorado Ballroom

## Wednesday, 10/25

8:00 – 9:00 am	Announcements Avalanche Protection Fundamentals <i>Paul Baugher</i> Avalanche Protection Fundamentals are the core principals and techniques used to reduce avalanche risks in an operational setting. The discussion will begin with the basic elements of identifying the risk to life and property and designing an appropriate protection scheme that is not too risky and not too conservative or impractical.  Strategies for protection, both active and passive, will be examined. The benefits and limitations of a variety of avalanche hazard reduction techniques, including the use of explosives will be discussed.	Colorado Ballroom
9:00 – 9:15 am	Break	3rd Floor Foyer
9:15 – 10:05 am	Where Professional Make Mistakes <i>Chris McCollister</i> In this section we will review Todd Guyn's paper from ISSW 2016 entitled "10 Common Misssteps of Avalanche Practitioners." This will be followed by examining three case studies that resulted in ski patroller fatalities at the Jackson Hole Mountain Resort. Each case study will examine the snowpack, weather and terrain factors leading up to the avalanche followed by the outcome of the event.	Colorado Ballroom
10:05 – 11:00 am	Ski Area Operations <i>Paul Baugher</i> Inbounds avalanches and other issues facing ski area operations will be discussed. This will include selected case studies demonstrating forecasting and mitigation for deep and or persistent slab structure and post control release.  Boundary management and communicating the risk of inbounds avalanches to ski area guests will also be covered. A brief discussion of legal implications for ski area avalanche operations will also be addressed. A brief description of the snow immersion suffocation (SIS) phenomenon and some basic safety considerations will conclude the presentation.	
11:00 – 11:15 am	Break (move to workshop)	
11:15 – 12:30 pm	Workshop – Operational Avalanche Programs	Various Rooms
12:30 – 1:30 pm	Lunch (on own)	
1:30 – 2:30 pm	Operational Avalanche Rescue <i>Mike Rheam</i> Without question, the highest chance of survival for a person who is buried in an avalanche lies with the people who are with the buried party and witnesses the event. This type of rescue (Companion Rescue) is the covered by recreational level avalanche courses and basic principles and statistics will be summarized. The focus of this section will be on the much more complex strategies involved with Organized or Operational rescue planning. This type of rescue requires development of protocols, procedures and training within an organization. It also demands inter-agency procedural planning as different agencies often team up to conduct organized avalanche rescues. Utilizing group rescue fundamentals as described by the International Committee for Alpine Rescue (ICAR) and FEMA's structure for Incident Command System (ICS) can help to make the integration of different organizations such as SAR groups into an avalanche rescue both smooth and efficient.  Although the best chance of survival remains with one's companions, make no mistake that groups such as ski patrollers, that are trained and ready to execute their operational rescue plan can arrive on scenes quickly and utilize both tools and talents that can and will save lives.  This component of the National Avalanche School will provide a basis to understand, modify and even develop an operational avalanche rescue plan for any professional organization.	Colorado Ballroom
2:30 – 2:45 pm	Break (move to workshop)	
2:45 – 3:45 pm	WRITTEN QUIZ – Final Exam Part 1 Mountain Snowpack, Avalanche Release	Various Rooms
3:45 – 4:30 pm	POST QUIZ – REVIEW OF ANSWERS	
4:45 – 5:30 pm	Optional Lecture: Advanced Weather Tools Colorado Avalanche Information Center Staff Introductions <i>Ethan Greene</i>	Colorado Ballroom
5:30 – 5:45 pm	Optional Lecture: US Forest Service – Snow Rangers <i>Sean Wetterberg</i>	Colorado Ballroom
6:00 – 7:30 pm	Trade Show Reception	3rd Floor Foyer

## Thursday, 10/26

	Announcements	
8:00 am – 8:50 am	Avalanche Rescue Technology <i>Dale Atkins</i> Avalanche rescues can range from simple to complex, and technology can play crucial roles in all phases of avalanche search and rescue/recovery to make rescuers easier, faster, and potentially safer for rescuers, too. While technology can benefit rescuers and avalanche victims it can also hinder avalanche rescues. This lecture will address the changing dimensions of avalanche rescue and discuss the use of technologies within a modern framework of a systems approach to avalanche rescue. We will learn how technology has shifted interventions from search/find to rescue/save of avalanche victims. We will discuss what types devices—advantages and disadvantages can be used, and the implications and how to manage distracting signals and signal interferences.	Colorado Ballroom
8:50 – 9:05 am	Break (move to workshop)	
9:05 – 10:05 am	WRITTEN QUIZ – Final Exam Part 2 Snowpits: drawing and interpreting, Weather Data: interpretation & basic calculations	Various Rooms
10:05 – 10:50am	POST QUIZ – REVIEW OF ANSWERS	
10:50 – 11:00 am	Break (return to ballroom)	
11:00 – 12:00 pm	Wet Snow & Wet Avalanches <i>Simon Trautman</i> How water affects the relative stability, or instability, of seasonal snowpacks is an important part in the avoidance, or mitigation, of snow avalanches. This lecture illustrates how liquid water changes the physical properties of snow and presents a framework used to depict the wet snow system. In addition, we will discuss various types of wet snow avalanches and some practical applications and forecasting techniques that are useful in that regard.	Colorado Ballroom
12:00 – 1:00 pm	Lunch (on own)	
1:00 – 2:00 pm	Difficult Avalanche Problems <i>Karl Birkeland</i> The science behind deep persistent slab, post control release	Colorado Ballroom
2:00 – 2:15 pm	Break	
2:15 – 4:00 pm	Professional Training in the US—Update, Field Session Preview Closing remarks <i>Alan Henceroth</i> FINAL EXAM Part 3 (Multiple Choice)	Colorado Ballroom