

**Arctic Science, 16 January – 5 March 2023, 4.5 hp**  
**Schedule with Kiruna meeting, 12<sup>th</sup> – 15<sup>th</sup> February**

<b>Tuesday 17 Jan.</b> 17:15 – 18:15	<b>Zoom</b> <i>Introduction to the course, course registration</i>
<b>Thursday 19 Jan.</b> 17:15 – 18:15	<b>Zoom</b> <i>The physics of the aurora and the aurora observation exercise</i> Carol Norberg
<b>Monday 23 Jan.</b> 17:00 – 18:15	<b>Zoom</b> <i>Snow crystals, Professor Kenneth Libbrecht</i>
<b>Monday 6 Feb.</b> 17:15 – 18:15	<b>Zoom</b> <i>Science of the Arctic, Sea ice exercise introduction</i> Carol Norberg
	<b>Kiruna visit</b>
<b>Sunday 12 Feb.</b> Train from Umeå to Kiruna	Umeå C 06:22 arrives Kiruna 14:27 (1 change) or Umeå C 13:29 arrives Kiruna 20:22 (1 change) Evening: Independent aurora observations weather permitting
<b>Monday 13 Feb.</b> 7:55 Bus departs bus station 8:45 – 9:30  9:30 – 10:00 10:00 – 11:00 11:00 – 11:30  11:30 – 12:15 12:15 – 13:20 13:20 13:29 regular bus to Jukkasjärvi 14:00 15:35 or 16:28	<b>Swedish Institute of Space Physics (IRF), Aula</b> Bus from town arrives Space Campus approx 08:40 (Card payment only on the bus) <i>General information, course assignments</i> Carol Norberg Coffee break <i>Snow and ice in the solar system, Axel Hagermann</i> <i>Current activities of the Swedish Institute of Space Physics, Olle Norberg</i> Tour of the Space Campus Lunch break Group photograph in front of the Institute <b>Visit to ICEHOTEL, Jukkasjärvi</b>  Entry to the ICEHOTEL Regular bus departs Jukkasjärvi Icehotel Evening: Aurora observations weather permitting
<b>Tuesday 14 Feb.</b> 9:00 – 10:00 10:30 – 11:30  13:00 17:00 – 18:00  19:00 – 20:00  20:00 – 23:00 23:00	<b>Kiruna Lapplands Lärcentra, Auditorium</b> <i>Living in a cold climate, Fredrik Kjellberg</i> <i>Space weather and the aurora, Carol Norberg</i> <b>Abisko</b> Chartered bus departs to Abisko <i>Avalanche safety, Avalanche technician Erik Boström, Room Konten, Abisko Tourist Station</i> <i>The climate's impact on the Arctic environment, Keith Larsson at the Abisko Research Station</i> Aurora observation period Chartered bus back to Kiruna
<b>Wednesday 15 Feb.</b> 8:30 – 11:30 13:00 – 15:15  Train from Umeå to Kiruna	<b>Kiruna Lapplands Lärcentra, Auditorium</b> <i>Tour of the LKAB underground mine</i> <i>Snow exercise</i> The exercise comprises an introduction, outdoor snowpack investigation, involving digging in the snow and concludes with a group discussion. Kiruna station 16:09, arrives Umeå C 23:05 (1 change) or Kiruna station 18:29, arrives Umeå C 01:35

<b>Monday 20 Feb.</b> 17:15 – 18:15	<b>Zoom</b> <i>Stories from Svalbard glaciers; past, present and future,</i> Elisabeth Isaksson
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The Swedish Government finances this course. It is a distance course with one meeting in Kiruna in February. We reserve the right to adjust the schedule if necessary. The exact schedule will be somewhat dependent on the weather.

### **Participating lecturers**

Dr. Carol Norberg, Umeå University  
 Professor Kenneth Libbrecht, California Institute of Technology (Caltech), Lennart Nilsson Award for snowflake photography  
 Dr. Olle Norberg, Director of the Swedish Institute of Space Physics  
 Professor Axel Hagermann, Luleå University of Technology  
 Dr. Fredrik Kjellberg, Senior Physician Kiruna Hospital  
 Dr. Keith Larsson, Director of the Arctic Center at Umeå University  
 Erik Boström, Avalanche technician, Abisko Tourist Station  
 Dr. Elisabeth Isaksson, Norwegian Polar Institute  
 Researchers and PhD students, Swedish Institute of Space Physics

### **Course coordinator and examiner**

Dr. Carol Norberg, Umeå University  
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### **Course administrator in Kiruna**

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### **Zoom link for lectures**

Topic: Arctic Science 2023  
<https://umu.zoom.us/j/63802223794?pwd=Y0tpd1pEd0dwc0Q5V1FwT1dvdzV1dz09>  
 Meeting ID: 638 0222 3794  
 Passcode: 555153

### **Cold-weather clothing**

In order to keep warm in the subarctic climate one should dress according to the three-layer principle. In order to regulate the body's temperature it is better to have several thin layers of clothing than one thick layer. The thin layers create several insulating air layers between them.

1. The inner layer should be underwear made of wool, preferably two layers.
2. The intermediate layer should be warming, such as a wool jumper or fleece jacket
3. The outer layer should protect against the weather, a windproof jacket (e.g. down jacket) and thermal trousers.
4. A warm hat and gloves are essential and a scarf is preferred.

A pair of spacious shoes will allow you to fit an extra pair of wool socks and let your toes have room to move. It is advisable to avoid taking a shower or bath before going outside. Avoid using water-based skin creams as these may cause frostbite.