

Welcome to Cryptogams and Nature Conservation 2025–2026!

BI1402, 15 hp

Time: 1 Sept 2025 to 23 March 2026.

Teachers: Mari Jönsson (MJ, course leader), Department of Forest Mycology and Pathology/SLU Department of Ecology, Uppsala, (mari.jonsson@slu.se, tel. 018-672583, mob: 070-6684400). Anders Dahlberg (AD), Department of Forest Mycology and Pathology, SLU. Göran Thor (GT), Department of Ecology, SLU

Language: If English-speaking students are accepted, the course will be given in English, otherwise in Swedish.

Course literature: The Swedish book by Johan Nitare is the overall course book: *Skyddsvärd skog - Naturvårdsarter och andra kriterier för naturvärdesbedömning*. Skogsstyrelsen (2019).

Other relevant books **Lichens:** Nash III, T.H. 2008, *Lichen biology*. 2 uppl.. **Bryophytes:** Goffinet, B. & Shaw, A.J. 2009, *Bryophyte biology*. **Fungi:** several books may be relevant like Boddy, L. & Coleman, M. (eds). 2010, *From Another Kingdom – the Amazing World of Fungi*, Royal Botanical Garden Edinburgh. *Fungi of Temperate Europe* Volume 1+2 by Thomas Laessle and Jens H Petersen are two fantastic books.

Location: The course is a distance course, which is why most of the work takes place from home. We meet three weekends, one weekend in central Sweden in Uppsala, a weekend in the boreal zone in Dalarna and a weekend in the nemoral zone in Degeberga, Skåne.

Equipment: In the field, warm clothes including rain gear and rubber boots/boots, lunch bag, note-taking material and hand lens (8–10 times, a few will be available to borrow).

Exam: For a passed course you need to: pass the home exam, pass assignments (literature assignment and Sofia's choice) and complete the project work in writing and orally. Furthermore, attendance during the excursions (at least two) is obligatory.

Travelling during the course: Unfortunately, SLU cannot pay for the travel from your place of residence to Uppsala or to Kristianstad/Skåne, or your living costs in Uppsala. However, the course pays for accommodation and some of the food during the trip to Dalarna and Skåne as well as transport from Uppsala to Dalarna and from Kristianstad to Degeberga cottage village and field excursions.

To bring on field trips: warm clothing including rain gear and rubber boots/boots, bedding, and hand lens. Pack light in a soft bag. Expect intense days with early mornings and late nights.

1/9-19/9. Includes the following elements:

1. Go to **SLU Artdatabanken's** website and read generally about what SLU Artdatabanken does. Also read specifically what it says about Red list 2020/25 and how the redlisting work is done. Register as a user of **Artportalen** (the Swedish Species Observation System) and register an observation of a species on Artportalen. It doesn't have to be a cryptogam.
2. Go to the **Swedish Forest Agency's** (skogsstyrelsens) website "skogens pärlor" and read what it says about the woodland key habitat inventory ("nyckelbiotoper"). Search for a key biotope near where you live and feel free to visit it if you have not previously visited a key biotope (can be done later during the course).
3. Think about what you want to do for project work (see below). If there is someone who does not have a suggestion of their own, Mari, Anders and Göran are happy to help with suggestions.
4. Feel free to watch a pre-recorded lectures on Canvas under the module for lectures (can also be found in Media gallery).

5. If you have any questions about the course, do not hesitate to contact Mari.

Information about project work

Examples of previous project work can be found on Canvas (the presented work is very ambitious and the level for a pass is lower)

The project work may include:

- Inventory of all red-listed species/indicator species of bryophytes, fungi and/or lichens in a limited area
- Inventory of a certain red-listed species/indicator species in an area
- Literature description of a red-listed species/indicator species/habitat (may also apply outside Sweden)
- Literature review or inventory relating to air/water pollution and cryptogams
- Literature review or inventory relating to land use and management, or methods (e.g., apps, citizen science, indicator schemes, monitoring, SIS, other methods) as tools for cryptogam monitoring and assessment
- Something entirely your own that you come up with yourself

How:

- Work independently or in groups of a maximum of three to four people.
- In terms of time, around three weeks of full-time work.

Workflow during inventory:

- Carefully decide on the area to inventory or alternatively the literature review task/question.
- Find out which species and natural values (e.g., pasture, old trees, deadwood) are reported from here (e.g., Artportalen, Skogens pärlor, interviews, historical maps, documentation) and how these can be managed or conserved.
- Choose which organism groups/species you are gathering information about.
- Inventory natural values and species and report findings to Artportalen.

When?

- You are welcome to start the work whenever you wish

Workflow presentation of project:

- Write a report (at least 6 pages excluding cover page) including a management plan (short and long term) that consider both nature conservation management and other relevant aspects.
- Make a ppt for the report.
- Read the ppt for the person/group you are going to oppose and prepare the opposition (see document on Canvas)
- By 28th of Feb at the latest, the written project report must be sent to Mari (the date can possibly be adjusted after agreement). The work is sent by email to Mari, preferably in advance to receive feedback and support.

- Present the project work orally at a digital meeting on Sunday March 15th 2026 (all day, the date can possibly be adjusted after agreement).

Course start and excursion in Uppsala

Friday 5/9 to Sunday 7/9. Course start and excursions around Uppsala

Participating teachers are Mari Jönsson and Göran Thor

Welcome to the first opportunity to meet and to discuss cryptogams and conservation in the field for three days. Mari gives an introduction to the course and the subject, literature work and project work.

Excursion day Friday 5/9

We gather at **09.00 Friday morning at Ultuna Campus, Hus 5, VHC (round building), room Särimner, Uppsala** to get to know each other, for a course introduction and a first lecture about cryptogams until lunch. After lunch, we have an excursion in Ultuna's immediate surroundings and carry out a systematic inventory of two lichens.

Excursion day Saturday 6/9

Morning: Excursion to Linné's Hammarby.

Afternoon: Krusenberg during the afternoon.

Excursion day Sunday 7/9

Excursion to Hågadalen-Nåstens NR

More details about which premises we will visit and transport will be sent by email a week before. I plan for the possibility of getting to the Uppsala excursion venues with local transport.

We will finish at the last excursion locality on Sunday around 16.00 pm allowing time to travel to Uppsala center and train station by 17.00 pm.

To bring: warm clothes (NOTE!) including rain clothes and rubber boots/boots, lunch for the field, material for notetaking and hand lens.

22/9 - Recorded lectures on Canvas

Watch pre-recorded lectures on Canvas under the module for lectures Media gallery. The themes of the lectures are (may be adopted according to interests):

Cryptogams from an ecological perspective:

- Old-growth forest indicator species ("signalarter") and red-listed cryptogams and their biotopes. Threats to cryptogams – forests and agricultural landscapes (MJ).
- Fungi: biology, ecology and nature conservation (AD)
- Bryophytes: biology, ecology and nature conservation (Tomas Hallingbäck, in Swedish and English)
- Lichens: biology, ecology and conservation (GT, possibly MJ)

Cryptogams in conservation work and environmental monitoring:

- Nitare about nature conservation species (Johan Nitare, in Swedish)
- The Swedish Red List (MJ)

- ArtDatabanken and Artportalen (MJ).
- Cryptogams in nature conservation work and environmental monitoring: Key biotope inventory, NILS, Natura 2000 and Action program for threatened species (Åtgärdsprogram, ÅGP) (MJ).

General theme:

- Academic writing (useful for project work, MJ)

2/9 - Start reading scientific literature and make decisions about project work

1. Start reading the articles in the literature project theme of your choosing
2. Make decisions about project work

Friday 19/9 to Sunday 21/9. Excursion to the lower Dalälven area and boreal forest in Dalarna

The preliminary excursion plan below is based on previous years and may be updated slightly.

Participating teachers are Mari Jönsson and Göran Thor.

To bring: warm clothes (NOTE!) including rain clothes and rubber boots/boots, bedding, and hand lens. Pack light and in a soft bag. Expect three intense days of early mornings and late evenings.

Participating teachers: Mari Jönsson and Göran Thor (possibly Anders Dahlberg and bryologist).

Friday, 19 September

We leave at 08.00 from Uppsala railway station in minibuses. The Lower Dalälven harbors a type of environment that is unique to central Sweden. The nature is partly of a natural forest character and the element of deciduous trees is unusually large for the area - especially in locations close to the water/flooded areas. This means that a very rich cryptogam flora (and insect fauna) has found a haven here, as well as many otherwise unusual woodpeckers and owls. Here there are large populations of red-listed species, even from a European perspective, depending on a combination of cultural history, geology and climate. In its lower course, the Dalälven passes several thresholds (which are almost exclusively used for power production), but between them is quite wide and shallow. Water level changes occasionally cause flooding over large areas, something that strongly affects the composition of the vegetation (and the abundance of mosquitoes). The amount of dead and dying wood is large, which favors many species that are otherwise rare or becoming increasingly rare. We are likely to stop at 1-2 premises with red-listed cryptogams. The first stop will be near Söderfors. Bring lunch, which we eat in the field. During the afternoon we continue towards Gussjöstugan 7 km North of Ludvika where we will probably arrive around 9-10 in the evening. Before that, we stop at a grocery store in Avesta, where it is possible to get breakfast and lunch for the following day. We suggest having dinner at a pizzeria/similar in Avesta. We have access to a kitchen at our accommodation and it is suggested that everyone prepares his or her own breakfast and lunch.

Saturday, 20 September

We leave at 08.15. During the day we excure in boreal coniferous forest, partly with elements of deciduous biotopes, in the areas north of Ludvika. One of the premises we likely visit next is Dragbergsgata (Gyllbergens NR), a canyon-like formation 30 km N of Ludvika. There are at least four red-listed lichens here, *Bryoria bicolor*, *B. nadvornikiana*, *Platismatia norvegica* and *Ramalina*

thrausta, two signal species of bryophytes *Anastrophyllum hellerianum* and *Sphagnum quinquefarium* and a red-listed corticoid wood fungi *Cystostereum murraili*. Just above Dragbergsgata we admire the red-listed wolf lichen *Letharia vulpina*. Another place we are likely to visit is the mountain Predikstolen with the signal species of spiny mushrooms *Hydnellum* spp. and *Sarcodon squamosus*. We prepare a vegetarian/vegan dinner together.

Sunday, September 21

In the morning (8.30) we start the return journey towards Uppsala. We stop at a calcareous forest (Limnäsudden) and an old mining area with red-listed cryptogams and signal species such as mosses *Anomodon* spp. and *Leptogium* spp. in Norberg. At 17.00 we are back in Uppsala.

22/9 - 22/12. Includes the following elements:

1. Compilation of excursion reports.
2. Read and complete the literature assignment.
3. Project work.
4. Mari compiles the inventory of two lichen species done in Ultuna.
5. **Tuesday evening non-obligatory web seminars.** A chance to meet online, have seminars and discuss the course book and lectures. Mari prepares some themes and discussion questions. We can discuss the timing that suits most course participants as well as themes that interest course participants. Nonetheless, preliminary dates include Tuesday evenings:
 - a. **14/10** at 19-21 pm
 - b. **4/11** at 19-21 pm
 - c. **25/11** at 19-21 pm
 - d. **16/12** at 19-21 pm

23/12 2025 - 11/1 2026

Christmas, New Year etc.

12/1 - 25/1 2026. Includes the following elements:

Complete the work on "Sofia's choice" by submitting a written summary and discussion of how you would reason and proceed to solve Sofia's case by 25th of January and email to Mari.

Tuesday 27/1 at 19-21.

Discuss "Sofia's choice" digitally via Zoom. A link will be sent out closer to the date.

28/1- 28/2. Includes the following Project work elements:

Complete and send the written project work to Mari by 28/3, who will post the project work on Canvas.

Sunday 2/3 to Monday 3/3 Home exam.

The exams are sent out by e-mail and posted on Canvas at 07.00 on Sunday and must be sent back to Mari by 23.59 on Monday 3 March.

4/3 – 15/3. Read the work you are going to oppose and prepare your own presentation.

Sunday 15/3. Presentation and opposition of project work via zoom (date can be adjusted according to agreement).

Preliminary date and localities for Skåne excursion - 20-22/3 2025. Course end and excursion in Degeberga, Skåne in southern Sweden

Friday March 20

Everyone makes their own way to Kristianstad, where we meet at the railway station around 10.30 am (time can be updated). From here transport in rented minibuses.

To bring: warm clothes (NOTE!) including rain clothes and rubber boots/boots, bedding, and hand lens. Pack light and in a soft bag. Expect three intense days of early mornings and late nights.

Teachers: Mari Jönsson and Göran Thor (possibly Anders Dahlberg and bryologist Thomas Hallingbäck). Prof. Ulf Gärdenfors (former head of the SLU Artdatabanken and one of the founders of the Swedish red-listing work) will probably also participate and talk about the local environment and nature around Degeberga, Skåne.

We will stay at:

Degeberga cottage village, <https://www.degebergastugby.se/>

We stop to buy breakfast and lunch for Saturday and Sunday.

Accommodation in cottages (with 5 beds) or the hostel and Mari offers a vegetarian/vegan dinner. Trollemöllavägen 52 297 94 Degeberga, 044 - 35 00 60

Excursion sites include:

Maltesholm NR/Natura 2000 (approx. 29 ha) and Maltesholm's castle environment

Mainly old and large beech forest on nutrient-rich soil with patchy lime impact.

- Halfway up the hill. Magnificent beech forest with long tree continuity, e.g. with lichen *Pyrenula nitida*.
- By the creek at the start of the driveway. Old oak trees and e.g. gammelekslav *Lecanographa amylacea* and *Bacidia rosella*.

Åbjär NR/Natura 2000 V about Ö. Sönnarslöv (approx. 92 ha)

Mjöån's stream gorge with beech forest with long tree continuity. Down by the river, the climate is humid, which means that a lot of mosses and lichens grow on trees and blocks. Lichens *Lobaria pulmonaria* NT, *Bacidia rosella* NT, *Lecanora glabrata* NT, and *Pyrenula nitida* NT, bryophytes *Porella* sp S, moss *Neckera complanata* S and lichen *Mycobilimbia pilularis* S are examples of species that thrive here. The fungi found here include, among other things, *Ischnoderma resinosum* NT, *Lycoperdon echinatum* S, and *Russula curtipes* NT.

Forsakar and Degeberga backar until lunch

Forsakar with Lillaforsskogen beech forest NR/Natura 2000 (38 ha)

Beech forest in ravine with e.g. *Pyrenula nitida*. Forsakarbäcken meanders through a hilly landscape formed by the ice sheet. There are two waterfalls and one waterfall has a total drop height of 10.6 meters, which makes it Scania's largest waterfall. The slopes of the Forsakar ravine are covered with lush beech forest with abundant amounts of dead wood in various dimensions and stages of decomposition. Many species of bryophytes, fungi, insects and snails live in the moist gorge. The beetle bokskoglöpare *Carabus intricatus*, which is very rare, has its only location in the country here in Forsakar.

Degeberga slopes NR/Natura 2000 (31 ha)

Degeberga slopes are a sandy steppe with shell gravel. No red-listed lichens but earth stars *Geastrum* and stalked puff ball fungi *Tulostoma* sp. grow here. Between Degeberga and the east slope of Linderödsåsen lies a hill landscape formed by ice rivers whose old name is "Söndre Klack". Here there

is a flora characterized by grazing on the chalk-rich dry soil. The unique sand steppe landscape houses heat-demanding plants, some of which are protected or red-listed. Conspicuous ones are *Dianthus arenarius*, *Anthericum ramosum*, *Medicago minima*, *Pulsatilla vulgaris*, *Thymus serpyllum* and *Helichrysum arenarium*. Many other unusual but less visible plants are found here. For example, the small tufted grass tofsäxing *Koeleria glauca*, which is a characteristic species of sandy steppe. Sand steppe landscape is unusual in Sweden. The sun-facing slopes, with exposed sand and sparse vegetation, belong to the warmest environments in the country. There are a number of rare fungi here, and the easily dug soils and grazing animals also provide good conditions for a rich dung beetle fauna. Among other things, the rare beetle *Copris lunaris* lives on the Degeberga slopes, a large beetle that lives most of its life in animal droppings. Along the stone wall, with a little luck you can see the sand lizard *Lacerta agilis*. It is our largest lizard and the male in the spring is a beautiful emerald green.



Kumlan and Drakamöllan NR/Natura 2000 (162 ha)

Heather heath. The sandy hills that gently undulate were formed when the ice sheet melted away. Man learned early on to use the easily worked lands for cultivation and when the trees were cut down to keep the alum mill in Andrarum alive, the area became even more open. But the lands were not nutritious enough to be cultivated every year. Instead, tree farming was introduced where, after a couple of years with rye and buckwheat, the area was allowed to rest. Sometimes these rest periods could last up to 10–20 years, and then the area was used as pasture. The result was a species-rich environment where plants, fungi and animals that thrive in the mosaic of open sandbars and flowering vegetation found living space. Nectar-filled flowers attract butterflies and here you can find, among other things, the rare *Phengaris arion*. To prevent the heather from growing too large and taking over the open grass heaths, a piece of the heath is burned every year. Sand lily, sand lizard and sand bees *Andrena* sp. are species that thrive in Drakamöllan and Kumlan. *Poronia punctata*, *Tulostoma fimbriatum* and *Geastrum minimum* s. lat. are examples of some of the unusual mushrooms that grow in the area.



Fatsvamp *Poronia punctata* NT stroma on horse dung.

Blåherremöllan

Cultural reserve and beech forest ravine.

Åhus

At this stop we stop and discuss the importance of firewood and cultivated wood in the agricultural landscape. The lichens found on cultured wood (e.g. timber walls, hedge and fence wood and other processed wood in cultured areas) have decreased greatly. Throughout history, the amount of cultivated wood (fence) has reached its absolute maximum around the 19th century, with an increasing need to exclude cattle from the cultivation and mowing fields. Generally, lichens colonize cultivated wood quite quickly, but the four species affected by an action program *Caloplaca furfuracea*, *Cyphelium notarisii*, *Cyphelium trachylioides* and *Sphinctrina anglica* only appear after 100–200 years, *Cyphelium trachylioides* possibly somewhat earlier. The gradually decreasing availability of high-quality wood substrates in the landscape makes them very sensitive to continuity breaks. The amount of available substrate has decreased drastically over the past century, which has hit the populations of cultivated wood species correspondingly hard. We stop to look at poles of cultured wood just S of Åhus which host *Calicium (Cyphelium) trachylioides* CR and also southern lichen *Calicium notarisii* EN is reported from the area as well as several terrestrial fungi of conservation interest.

Trolle-Ljungby

The lichen *Diploicia canescens* is red-listed as highly threatened (EN) in Sweden. Felling of the host trees and tree diseases, mainly elm and ash shoot disease, are the main threats to the species' future existence. Within the framework of the species Action plan (ÅGP), several measures have been implemented in Skåne to improve the conservation status of the species. In the autumn of 2006, an experimental activity was initiated with the aim of investigating the possibility of strengthening the threatened Swedish population of the crustose lichen by artificial propagation. Lichen material was collected in Trolle-Ljungby (the only location with a relatively rich abundance) and the species was translocated to trees in Nymö, Viby, Snogeholm and at the original location. Propagation was carried out partly by transplanting lichen trunks with associated bark, both divided into smaller pieces and as whole specimens, partly by applying soredia and small trunk fragments to the trunks of the experimental/receptor trees. We discuss the results of the artificial propagation and look at the species and other conservation species in the surroundings. We discuss various transplantation measures for the conservation of endangered species (e.g. inoculation of fungi, “re-wilding”/restoration efforts with whole-of-community translocations).

Kristianstad

Visit Naturum and/or the park near the railway station (including polypore *Ganoderma adspersum* VU), return rental cars return home by train around 15.00.