**Course leaders: Paul Kardol and Maria Myrstener**

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| **Module 1: Introduction to Forest Ecosystem Ecology + Writing + R** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Tue 2 Nov | 09:00-09:3009:45-10:30 | IntroductionLecture | Course introductionIntroduction to boreal forest ecosystems | PK + MM | AspenAspen |
| 10:45-12:0013:00-16.00 | Group projectsGroup projects | Introduction to group projects + dividing students into groupsProject group meeting / reading  | PK + SH + + VM + LF + KV + MK + WL | AspenDecide with project leader |
| Wed 3 Nov | 09:00-12:00 | Group projects | Group meeting with supervisors: experimental design  |  | Decide with project leader |
| 13.00-16.00 | Lecture + exercise  | How to write papers that are precise and concise, and easy to grasp | PK | Bokskogen |
| Thu 4 Nov | All day | Group projects | Set-up experiments |  |  |
| Fri 5 Nov | 09:00-12:0013:00-16:00 | Exercise Exercise | Introduction to R: data manipulationR data manipulation | LK +MM | Datorsal 1A-BDatorsal 3A-B |
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| Mon 8 Nov | 09:00-12:0013:00-16:00 | ExerciseOwn work  | R data plottingR practice(+ Group Projects if needed) | LK + MM | Aspen+ Datorsal 1A-B |

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| **Module 2: Carbon** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Tue 9 Nov | 09:00-10.0010.00-11:0011.00-12.00 | LectureLectureLecture | Principles of C-stores and C-fluxes, the roles of production, consumption and physical transport for the fluxes.Methods to estimate carbon stores and fluxesCarbon allocation, carbon budgets ofmanaged forests | MPMP JM | BjörkenBjörkenBjörken |
|  | Afternoon  | Reading |  |  |  |
| Wed 10 Nov | 09:00-10:0010:00-12:00 | LectureExercise | Carbon fixation and individual plant growth, water-use efficiency, controlsDemonstration: measurements of C-fixation and water use efficiencyResponse curve analysis | NHNH | BjörkenBjörken |
| 13:00-16:00 | Reading |  |  |  |
| Thu 11 Nov | 09:00-10:0010:00-11:00 | LectureLecture | Carbon loss from the ecosystem to the atmosphereDegradation of organic matter and soil organic matter accumulation in the boreal landscape | JRMÖ | BjörkenBjörken |
|  | 13:00-16:00 | Exercise | Biosphere – Atmosphere CO2 exchange | JC, JR (MP) | Datorsal 1A-B+Björken |
| Fri 12 Nov | 09:00-12:00 | Exercise | Biosphere – Atmosphere CO2 exchange | JC, JR (MP) | Datorsal 1A-BDatorsal 3A-B |
| 13:00-16:00 | Writing | Summary report writing from exercises | JC, JR (MP) | Datorsal 1A-BDatorsal 3A-B |

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| **Module 3: Water** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 15 Nov | All day | Group projects |  |  |  |
| Tue 16 Nov | 09:00-11:0013.00-16.00 | LectureReading | Water cycle in boreal forests(including assignment instructions)Reading for water week | LK | Björken |
| Wed 17 Nov | 09:00-12:0013:00-16:00 | LectureAssignment(individual) | Eco-hydrology of individual plantsHuman influences on water - modelling | NK | Björken |
| Thu 18 Nov | 09:00-11:0013.00-16.00 | Interactive lectureOptional computer lab | Human influences on the water cyclePlotting in R | LK+NKLK+MM | AspenDatorsal 1A-BDatorsal 3A-B |
| Fri 19 Nov | 09:00-12:00 | Assignment (individual) | Hydrological modelling assignment (deadline Friday 23:59) | LK | Datorsal 1A-BDatorsal 3A-B |

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| **Module 4: Cycling of nutrients, hydrogen ions and element biogeochemistry** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 22 Nov | 09.00-12.00 | Group projects |  |  |  |
| 13.00-16.00 | Reading | Reading for the biochemistry week |  |  |
| Tue 23 Nov | 09:00-10:4511:00-12:0013.00-16.00 | LectureLectureOwn work | Soil components, mineral weathering and acid-base reactionsprocesses and cycling at different temporal and spatial scalesNitrogen cycling and plant uptakeReading | USTN | AspenAspen |
| Wed 24 Nov | 09:00-11:0013:00-16:00 | LectureExercise | Hydrogen ion budgets – theoryIndividual work: Hydrogen ion budgets | US | AspenDatorsal 1A-BDatorsal 3A-B |
| Thu 25 Nov | 09:00-11:0013:00-16:00 | LectureExercise | Microbial-soil redox processes in a landscape perspectiveIndividual work: Hydrogen ion budgets | MÖ | AspenDatorsal 1A-B+Sälgen |
| Fri 26 Nov | 09:00-12:00 | Exercise | Individual work: Hydrogen ion budgets |  | Datorsal 1A-BDatorsal 3A-B |
|  | 13:00-16:00 | Exercise | Individual work and symposium preparation in groups: Hydrogen ion budgets |  | Datorsal 1A-BDatorsal 3A-B |
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| Mon 29 Nov | 09:00-12:00 13:00-16:00 | ExerciseSeminar | Symposium preparation in groups: Hydrogen ion budgetsOral group presentations: Hydrogen ion budgetsDeadline reports: 23:59 | US + MÖ | BokskogenBokskogen |

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| **Module 5: Microbes, soil fauna, and soil food webs** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Where** |
| Tue 30 Nov | 09:00-11:00 | Lecture  | Forest microbial ecology: An introduction Introduction to assignment | KCPK | Zoom / BjörkenBjörken |
| 13.00-16.00 | Group projects  |  |  |  |
| Wed 1 Dec | 09:00-11:00Afternoon | Lecture Reading | Mycorrhizal symbiosis | NH | Björken |
| Thu 2 Dec | 09:00-11:0013:00-16:00 | Lecture Lab demo | Microbial nitrogen fixation Fungi, cyanobacteria, nematodes, tardigrades, collembola, mites | SHMCN + MG + PK | BjörkenForest veg. ecology lab |
| Fri 3 Dec | 09:00-11:0013:00-16:00 | LectureWork on assignment | Soil food web ecology  | PK | Aspen |
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| Mon 6 Dec | 09:00-11:00 13:00-16:00 | LectureWork on assignment  | Plant-soil biota interactions and feedbacks | PK | Bokskogen |

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| **Module 6: The role of biodiversity in ecosystem functioning** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Tue 7 Dec | 09:00-11:0011.00-11:3013:00-16:00 | LectureAssignmentAssignment | Plant species and functional group effectsPlant economic spectra, nitrogen use efficiency Introduction to assignment on *species and ecosystem functions*Own work on the assignment on *species and ecosystem functions* | MGPK | BjörkenBjörken |
| Wed 8 Dec  | 09:00-11:00 | Lecture | Aquatic-terrestrial links and ecosystem functionsCross-ecosystem resource subsidies  | MM | Pre-recorded+ Study questions on Canvas |
| 13:00-16:00 | Assignment | Own work on the assignment on *species and ecosystem functions*(upload video latest by 23:59) |  |  |
| Thu 9 Dec | 09:00-12:00Afternoon | AssignmentOwn work | Ignite talks and discussions *on species and ecosystem functions* | PK | Björken |
| Fri 10 Dec | All day  | Group projects |  |  |  |
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| Mon 13 Dec | 09:00-10:3013:00-16:00 | LectureExercise | Statistical data analysesR - continuous data | LKLK+HB | AspenDatorsal 1A-BDatorsal 3A-B |
| Tue 14 Dec | 09:00-12:0013:00-16:00 | ExerciseExercise | R - categorical dataR - ordination | LK + HB | Datorsal 1A-BSälgen |
| Wed 15 Dec | 09:00-11:0011:00-11:1513:00-16:00 | LectureIntroductionGroup work  | Biodiversity-ecosystem functioning and ecosystem resilienceGroup project “Design your boreal biosphere”“Design your boreal biosphere” | MGMG  | BjörkenBjörken |
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| Thu 16 Dec | 09:00-16:00 | Group projects | Final harvest/data analyses |  |  |
| Fri 17 Dec | 09:00-16:00 | Group projects | Final harvest/data analyses |  |  |
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| Mon 20 Dec | 09:00-10:0010:00-11:0013:00-16:00 | LectureLectureGroup work | Multi-functionality of terrestrial ecosystemsAquatic biodiversity, connectivity and habitat heterogeneity“Design your boreal biosphere” | PKLK  | AspenPre-recorded or zoom |
| Tue 21 Dec | 09:00-12:00 | Presentations | “Design your boreal biosphere”  | MG + PK | Aspen |

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| **Module 7: Global perspectives of forest ecosystems** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 3 Jan | 09:00-16:00 | SimBio  | Ecosystem Ecology  | PK  | Datorsal 1A-BDatorsal 3A-B |
| Tue 4 Jan | 9.00-10.1510:30-11:0011:00-16:00 | Lecture Assignment | Global changes in forest ecosystem ecology – experiments & methodsInstructions for assignment: Current topics in Forest Ecosystem Ecology – controversies and uncertaintiesOwn work on the assignment | PK + MKPK + MK | ZoomBjörken |
| Wed 5 Jan | 09:00-12:0013:00-16:00 | AssignmentDebate | Preparation for debate:Current topics in Forest Ecosystem Ecology – controversies and uncertaintiesCurrent topics in Forest Ecosystem Ecology – controversies and uncertainties | PK + MKPK + MK | BjörkenBjörken |
| Thu 6 Jan | Epiphany |
| Fri 7 Jan | All day | Group projects & R drop-in | Analyses of group project data help  | MK | Datorsal 1A-BDatorsal 3A-B |

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| **Module 8: Group projects: data analysis, interpretation, writing, oral presentations + course wrap-up** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 10 Jan | All day | Group projects  | Data analyses and report writing | Group leaders  |  |
| Tue 11 Jan | All day | Group projects | Data analyses and report writing | Group leaders |  |
| Wed 12 Jan | All day  | Group projects | Report writing + presentation preparation | Group leaders |  |
| Thu 13 Jan | 09:00-12:0013:00-16:00 | Group projects | Report writing + presentation preparationGroup presentations | Group leaders | AspenAspen |
| Fri 14 Jan | All day  | Wrap-up | Finish the Group Projects (written report)Complete the course evaluation! |  |  |

HB = Hélène Barthelemy

JC = Jinshu Chi

JM = John Marshall

JR = Josh Radcliffe

KC = Karina Clemmensen

KV = Kishore Vishwanathan

LF = Leslie Forero

LK = Lenka Kuglerová

MCN = Marie-Charlotte Nilsson

MG = Michael Gundale

MK = Marcus Klaus

MM = Maria Myrstener

MP = Matthias Peichl

MÖ = Mats Öquist

NH = Nils Henriksson

NK = Nataliia Kozii

PK = Paul Kardol

NK = Nataliia Kozii

SH = Stefan Hupperts

TN = Torgny Näsholm

US = Ulf Skyllberg

VM = Vicky Mosquera

WL = William Lidberg