**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 1 Nov | 09:00-09:4510:00-10:45 | IntroductionLecture | Course introductionIntroduction to boreal forest ecosystems | PK + MM | P-O Bäckströms sal |
| 10:45-12:0013:00-16.00 | Group projectsGroup projects | Introduction to group projects + dividing students into groupsProject group meeting / reading  | KV + MK + CS + JLG + MM(PK + MM) | P-O Bäckströms salDecide with supervisor |
| Wed 2 Nov | 09.00-12:00 | Group projects  | Group meeting with supervisors: experimental design, etc. |  | Decide with supervisor  |
| 13:00-15:00 | Lecture | How to write papers that are precise and concise, and easy to grasp | PK | Bokskogen |
| Thu 3 Nov | All day | Group projects | Decide with project leader |
| Fri 4 Nov | 09:00-12:0013:00-16:00 | Exercise Exercise | Introduction to R: data manipulationR data manipulation | LK +RBH | Datorsal 1A-BDatorsal 3A |
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| Mon 7 Nov | 09:00-12:0013:00-16:00 | ExerciseOwn work  | R data plottingR practice(Exercise deadline for Extra task 5 23:59) | LK + RBH | P-O bäckström+ Datorsal 1A-B |

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| **Module 2: Carbon** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Tue 8 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 | MPAK HL | P-O Bäckströms sal |
|  | Afternoon  | Reading |  |  |  |
| Wed 9 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 | P-O Bäckströms sal |
| 13:00-16:00 | Reading |  |  |  |
| Thu 10 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 | JRJR | P-O Bäckströms sal |
|  | 13:00-16:00 | Exercise | Biosphere – Atmosphere CO2 exchange | JR, AK (MP) | Datorsal 1A-B + P-O Bäckströms sal |
| Fri 11 Nov | 09:00-12:00 | Exercise | Biosphere – Atmosphere CO2 exchange | JR, AK (MP) | Datorsal 1A-B |
| 13:00-16:00 | Writing | Summary report writing from exercises | JR, AK (MP) | Datorsal 1A-B |

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| **Module 3: Water** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 14 Nov | All day | Group projects |  |
| Tue 15 Nov | 09:00-12:0013.00-16.00 | LectureReading | Water cycle in boreal forests(including assignment instructions)Reading for water week | LK | P-O Bäckströms sal |
| Wed 16 Nov | 09:00-12:0013:00-16:00 | LectureAssignment(individual) | Eco-hydrology of individual plantsHuman influences on water - modelling | NK | Aspen |
| Thu 17 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-B |
| Fri 18 Nov | 09:00-12:00 | Assignment (individual) | Hydrological modelling assignment (deadline Friday 23:59) |  | Datorsal 1A-BDatorsal 3A |

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| **Module 4: Cycling of nutrients, hydrogen ions and element biogeochemistry** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 21 Nov | 09.00-12.00 | Group projects |  |
| 13.00-16.00 | Reading | Reading for the biochemistry week |  |  |
| Tue 22 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 23 Nov | 09:00-11:0013:00-16:00 | LectureExercise | Hydrogen ion budgets – theoryIndividual work: Hydrogen ion budgets | US | P-O Bäckströms salDatorsal 1A-BDatorsal 3A |
| Thu 24 Nov | 09:00-12:0013:00-15:00 | Exercise Lecture | Individual work: Hydrogen ion budgets Microbial-soil redox processes in a landscape perspective | MÖ | Datorsal 1A-BDatorsal 3ABokskogen |
| Fri 25 Nov | 09:00-12:00 | Exercise | Individual work: Hydrogen ion budgets |  | Datorsal 1A-BDatorsal 3A |
|  | 13:00-16:00 | Exercise | Individual work and symposium preparation in groups: Hydrogen ion budgets |  | Datorsal 1A-BDatorsal 3A |
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| Mon 28 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 29 Nov | 09:00-09:1009:10-11:00 | Lecture  | Introduction to individual assignment Forest microbial ecology: An introduction  | PKKC | P-O Bäckströms sal |
| 13.00-16.00 | Group projects  |  |  |  |
| Wed 30 Nov | 09:00-11:0012:00- 16:00 | Lecture Reading + work on individual assignment | Mycorrhizal symbiosis | NH | Bokskogen |
| Thu 1 Dec | 09:00-11:0013:00-15:00 | Lecture Lab demo | Microbial nitrogen fixation Cyanobacteria, nematodes, tardigrades, collembola, mites | SH + KVKV + MG + PK | Bokskogen Forest Veg. Ecology lab |
| Fri 2 Dec | 09:00-10:0010:00-11:0013:00-16:00 | LectureLectureWork on individual assignment | Soil food web ecologyPlant-soil biota interactions and feedbacks | PKPK | Aspen |

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| **Module 6: The role of biodiversity in ecosystem functioning** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 5 Dec | 09.00-09:1509:15-11:3013:00-16:00 | AssignmentLectureAssignment | Introduction to assignment on *species and ecosystem functions*Plant species and functional group effectsPlant economic spectra, nitrogen use efficiency Own work on the assignment on *species and ecosystem functions* | PK MGMG | Bokskogen  |
| Tue 6 Dec  | 09:00-12:00 | Lecture | Aquatic-terrestrial links and its’ effects on aquatic biodiversity | MM | Bokskogen |
| 13:00-16:00 | Assignment | Own work on the assignment on *species and ecosystem functions* |  |  |
| Wed 7 Dec | 09:00-12:00Afternoon | AssignmentOwn work | Ignite talks and discussions *on species and ecosystem functions* | PK  | Sälgen  |
| Thu 8 Dec | All day  | Group projects |  |  |  |
| Fri 9 Dec | 09:00-10:3013:00-16:00 | LectureExercise | Statistical data analysesR - continuous data | Recorded LKMM | BokskogenDatorsal 1A-BDatorsal 3A |
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| Mon 12 Dec | 09:00-12:0013:00-16:00 | ExerciseExercise | R - categorical dataR - ordination | LKLK | Datorsal 1A-BDatorsal 3AP-O Bäckströms sal |
| Tue 13 Dec | 09:00-10:0010:00-10:1510:30-16:00 | LectureIntroductionGroup work  | Multi-functionality of terrestrial ecosystemsGroup project “Design your boreal biosphere”“Design your boreal biosphere” | PK PK + MG | Bokskogen |
| Wed 14 Dec | 09:00-10:00 | Lecture | Biodiversity-ecosystem functioning and ecosystem resilience | MG | P-O Bäckströms sal |
|  | 10:00-11:00 | Group work | “Design your boreal biosphere” |  |  |
|  | 13:00-16:00 | Group projects | Final harvest/data analyses |  |  |
| Thu 15 Dec | 09:00-11:00 | Presentations  | “Design your boreal biosphere” | MG + PK | Bokskogen |
|  | 11:00-16:00 | Group projects | Final harvest/data analyses |  |  |
| Fri 16 Dec | 09:00-16:00 | Group projects | Final harvest/data analyses |  |  |

**Christmas break**

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| **Module 7: Global perspectives of forest ecosystems** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Tue 3 Jan | 9.00-10.3010:30-10:4511:00-16:00 | 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 | BokskogenBokskogen |
| Wed 4 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 + MK | Bokskogen |
| Thu 5 Jan  | All day | Group projects & R drop-in | Analyses of group project data help  | MK | Datorsal 1A-BDatorsal 3A |
| Fri 6 Jan | Epiphany |  |  |  |  |

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| **Module 8: Group projects: data analysis, interpretation, writing, oral presentations + course wrap-up** |
| **Date** | **Time** | **What** | **Topic** | **Who** | **Room** |
| Mon 9 Jan | All day | Group projects  | Data analyses and report writing | Group leaders |  |
| Tue 10 Jan | All day | Group projects | Report writing | Group leaders |  |
| Wed 11 Jan | All day  | Group projects | Report writing + presentation preparation | Group leaders |  |
| Thu 12 Jan | 09:00-12:0013:00-16:00 | Group projects | Report writing + presentation preparationGroup presentations | Group leaders | Rönnen |
| Fri 13 Jan | 09:00-09:15 09:15- | Wrap-up | Complete the course evaluation + fikaFinish the Group Projects (written report) | MM+PK | Datorsal 1A-B |

AK = Alisa Krasnova

CS = Clydecia Spitzer

JGL = Jose Gutierrez Lopez

JR = Joss Ratcliffe

HL = Hyungwoo Lim

KC = Karina Clemmensen

KV = Kishore Vishwanathan

LK = Lenka Kuglerová

MG = Michael Gundale

MK = Marcus Klaus

MM = Maria Myrstener

MP = Matthias Peichl

MÖ = Mats Öquist

NK= Nataliia Kozii

NH = Nils Henriksson

PK = Paul Kardol

RBH = Ruben Baan Hofman

SH = Stefan Hupperts

TN = Torgny Näsholm

US = Ulf Skyllberg