MV0216. Soil Water Processes in Agro-ecosystems, 15 hp autumn 2022 (HT2022)

Course modules: 1-theory (5 hp), 2-modelling exercises (5 hp), 3-mini-projects (5 hp)

Course components

Chapters refer to the course Book *Introduction to Environmental Soil Physics, Daniel Hillel*

1-Theory

- **Course intro** (2h)
- **Lecture 1:** What is soil? (2h)
- **Lecture 2:** Soil constituents and phase relations & Water potentials (2h)
- **Lecture 3:** Water Flow part I (2h)
- **Lecture 4:** Water Flow part II (2h)
- **Lecture 5:** Water Flow part III (2h)
- **Lecture 6:** Introduction to simulation models (2h)
- **Lecture 7:** Water/energy balances and potential evapotranspiration (1h)
- **Lecture 8:** Plant water uptake and plant response to drought (2h)
- **Lecture 9:** Solute transport I (2h)
- **Lecture10:** Solute transport II (2h)
- **In-class calculation** examples with water potentials, phase relations and water contents (3h) - **7 online Quizzes** (Home work)

-**Mini-workshop** 'Agroecosystems and climate change' (3d):

- Student homework (2d)
- Introduction plus guest lecture (2h30)
- Student presentations (3h)
- **Research presentations** by teachers (3h)
- **Exam preparation** (2h)
- **Written Exam** (3h)

2-modelling exercises

- **STELLA intro** (2h)
- **Stella exercise 1:** Capillary rise (6h)
- **Stella exercise 2:** Steady infiltration (3h)
- **Stella exercise 3:** Plant water uptake (7h)
- **Stella exercise 4:** Water balance of a soil profile (6h)
- **Stella exercise 5:** Solute transport I: breakthrough curves (in the laboratory) (6h)
- **Stella exercise 6:** Solute transport II: Transient leaching under field conditions (6h)
- **EXCEL Exercise:** uncertainty and sensitivity analysis (5h)

3-STELLA mini-projects

-Introduction (2h)
-Group work (9d)
-Oral Presentation & Opposition (6h)

Projects:

1. Pesticide leaching to groundwater: comparison with experimental data
2. Irrigation management in the salt-affected soils of the Marismas (SW Spain)
3. Using Salix as a biofilter for trace metals
4. Climate change impacts on pesticide leaching
5. Rain water harvesting
6. Water balance and grassland production in a changed climate

Days with compulsory attendance are marked with *; i.e. you have to be there to pass the course!
We apply the academic quarter; *i.e.* all lectures & exercices starts a quarter past time announced.

W	Day	Date	Time	Room	Subject	Teach.
35	Mon.	29-Aug*	morning	*ROLL CALLS*		
			14.00-15.30*	R	Introduction to the course	EC, NJ
	Tue.	30- Aug	10.00-12.00	C216	Lecture 1: What is soil?	EC
		30- Aug	13.00-15.00	R	Lecture 2: Phase relations & Water potentials (Chaps. 1-6)	NJ
	Wed.	31- Aug	10.00-12.00	R	Lecture 3: Soil water flow Part 1 (Chaps. 6-8)	NJ
	Thu.	01-Sept*	10.00-12.00	Q	Home Preparation Exercises	
			13.00-16.00*	R	Exercises: In-class calculation examples with water potentials, phase relations and water contents	NJ, EC
	Fri.	02-Sept	10.00-12.00	Y	Lecture 4: Soil water flow Part 2 (Chap.8)	NJ
			13.00-15.00	R	Lecture 5: Soil water flow Part 3 (Chap.8, 14-15,17)	NJ
36	Mon.	05-Sept	Home study ** Complete Quiz1 on water potentials and water flows**			
	Tue.	06-Sept	10.00-12.00	O2	Lecture 6: Introduction to simulation models	NJ
			13.00-15.00*	D1	Introduction to Stella modelling software	NJ, EC
	Wed.	07-Sept	09.00-12.00*	D1	Stella ex. 1: Capillary rise (Chaps. 8, 18) Part 1/2	NJ, EC
	Thu.	08-Sept*	09.00-12.00*	D1	Stella ex. 1: Capillary rise (Chaps. 8, 18) Part 2/2	NJ, EC
			13.00-17.00*	B1 & B2	Stella ex. 2: Steady infiltration (Chaps. 8, 14)	NJ, DN
	Fri.	09-Sept	Home study **Complete STELLA quiz 1**			

W	Day	Date	Time	Room	Subject	Teach.
37	Mon.	12-Sept	9.00-10.00 10.30-12.30	X X	Lecture 7: Potential evapotranspiration Water/energy balances and (Chap. 20) Lecture 8: Plant water uptake and plant response to drought (Chaps. 19- 21)	NJ NJ
		12-Sept	Home study - afternoon ** Complete Quiz2 on PET & water and energy balance**			
	Tue.	13-Sept	10.00-17.00*	D1	Stella ex. 3: Plant water uptake (Chap. 19)	NJ, EC
	Wed.	14-Sept	Home study - morning **Complete STELLA quiz 2**			
	Thu.	15-Sept*	10.00-17.00*	D1	Stella ex. 4: Water balance of a soil profile (Chaps. 8, 19-20)	NJ, KM
	Fri.	16-Sept	Home study ** Complete STELLA quiz 3**			
38	Mon.	19-Sept	10.00-12.00 13.00-15.00	Q R	Lecture 9: Solute transport I (Chap.9) Lecture 10: Solute transport II (Chap.9)	NJ NJ
			Home study ** Complete Quiz3 on solute transport**			
	Tue.	20-Sept	10.00-17.00*	D1	Stella ex. 5: Solute transport 1 (Chap.9)	NJ, DN
	Wed.	21-Sept	Home study			
	Thu.	22-Sept	10.00-17.00*	B1& B2	Stella ex. 6: Solute transport 2 (Chap.9)	NJ, DN
	Fri.	23-Sept	Home study ** Complete STELLA quiz 4**			
39	Mon.	26-Sept	10.00-12.00	R	Invited lecture 1: "*water management and sustainable agriculture*"	JB
			13.00-13.30* 13.30-15.30	R R	Introduction Mini-workshop on agroecosystems and climate change Invited lecture 2: "*Exploiting the root phenome to improve drought and flood tolerance"*	EC TC
	Tue.	27-Sept	Home study **Mini-workshop – Prep. individual: scientific publication reading **			
	Wed.	28-Sept	09.00-12.00	Y	Teachers presentations on current research	All
	Thu.	29-Sept*	09.00-16.00*	D1	Exercise: uncertainty and sensitivity analysis	NJ
	Fri.	30-Sept	***Mini-workshop 1- Prep. individual: scientific publication reading** ***Submit individual report at 12.00**			

	Day	Date	Time	Room	Subject	Teach.
40	Mon.	03-Oct*	***Mini-workshop* *2- Group work to prepare oral presentation***			
	Tue.	04-Oct*	09.00-12.00*	C212	Mini-workshop 3-Group presentations and discussion	EC, KM
	Wed.	05-Oct*	10.00-12.00*	R	Introduction to mini-projects and contact with supervisors	All
	Thu.	06-Oct*	Mini-projects start			
	Fri.	07-Oct*	Mini-projects, continued			
41	Monday 10-Oct* to Friday 14-Oct * Mini-projects, continued					
42	Mon.	17-Oct*	Mini-projects, continued			
	Tue.	18-Oct*	Final version of Mini-project report to supervisors at 15.0			
	Wed.	19-Oct*	***Group preparation – presentation and opposition of mini-projects***			
	Thu.	20-Oct*	***Group preparation – presentation and opposition of mini-projects***			
	Fri.	21-Oct*	10.00-17.00*	T	Presentation of Mini-projects and opposition	All
43	Mon.	24-Oct	Home study			
	Tue.	25-Oct	Home study			
	Wed.	26-Oct	10.00-12.00	R	Questions to teachers before Exam	NJ, EC
	Thu.	27- Oct	Home study			
	Fri.	28- Oct*	**13.00-16.00***	Te1	**Final Written Examination**	

MV0216, autumn 2022: student assignments (A)

Course modules:

1-theory (5 hp),

2-modelling exercises (5 hp),

3-mini-projects (5 hp)

W	Day	Date	Time	A	Subject	How?
35	Fri	2-sept	-	0	Introduce yourself to the classroom	CANVAS
	Thu.	1-sept	13-16	1	Calculation exercises	Attend
36	Mon.	5-sept	-	2	Complete Lecture - Quiz 1	CANVAS
	Tue.	6-sept	13-15	3	Introduction to STELLA software	Attend
	Wed.	7&8-sept	9-12	4	STELLA exercise 1	Attend
	Thu.	8-sept	13-17	5	STELLA exercise 2	Attend
	Fri.	9-sept	-	6	Complete STELLA - Quiz 1	CANVAS
37	Mon.	12-sept	-	7	Complete Lecture - Quiz 2	CANVAS
	Tue.	13-sept	10-17	8	STELLA exercise 3	Attend
	Wed.	14-sept	-	9	Complete STELLA - Quiz 2	CANVAS
	Thu.	15-sept	10-17	10	STELLA exercise 4	Attend
	Fri.	16-sept	-	11	Complete STELLA - Quiz 3	CANVAS
38	Mon.	19-sept	-	12	Complete Lecture - Quiz 3	CANVAS
	Tues.	20-sept	10-17	13	STELLA exercise 5	Attend
	Thu.	22-sept	10-17	14	STELLA exercise 6	Attend
	Fri.	23-sept	-	15	Complete STELLA - Quiz 4	CANVAS
40	Mon.	26-sept	13-14	16	Intro to Mini-workshop	Attend
	Tue.	29-sept	10-17	17	Model sensitivity analysis	Attend
	Fri.	30-sept	-	18	Individual Report Mini-workshop	CANVAS
41	Tue.	4-oct	9-12	19	Group presentation & discussion Miniworkshop	Attend
	Wed.	5-oct	10-12	20	Mini-projects introduction	Attend
42	6-18-oct		Group work on mini-projects			
43	Tue.	18-oct	15.00	21	Submit mini-project report (group)	CANVAS /supervisor
	Fri.	21-oct	10-17	22	Group presentation & opposition Miniproject	Attend
44	**Fri.**	**28-oct**	**13-16**	**23**	**Final written examination**	**Attend**

MV0216, autumn 2022

Course starts: Monday 29st of August 2022 at 15.00

Course ends: Friday 28st of October 2022 at 16.00

- The course has **one written examination**; it will take place on

Friday the 28th of October 2022 13.00 to 16.00 (Tentamenssal 1, Undervisningshuset, plan 2)

- **The** first re-examination **is planned on**

Wednesday 7th of December 2022 8.00 to 11.00 (Tentamenssal 2, Undervisningshuset, plan 2)

- The **second re-examination** is preliminary planned on **January 2023** (more info to come about time and room)

All participants in an examination organized by the Department of Soil and Environment should register at least 10 days before the date of the exam. The registration to the examination is possible from the start of the course and the registration to a re-examination is possible from four weeks before the examination date.

Registration should be done via Studentwebb / LADOK student. If you have any question or request about this registration, please contact the course secretariat mark-kurssekretariat@slu.se

Teachers and guest lecturers

Department of Soil and Environment, SLU, Uppsala

- Nicholas Jarvis (Examiner, NJ): Nicholas.jarvis@slu.se (Soil and Environmental Physics, head)
- Elsa Coucheney (Course leader, EC): elsa.coucheney@slu.se (Soil and Environmental Physics)

Computer exercises (together with Nick and Elsa) & mini-workshop (together with Elsa)

- Katharina Meurer (KM): katharina.meurer@slu.se (Soil nutrient cycling)
- David Nimblad Svensson (DN): david.nimblad.svensson@slu.se (Soil and Environmental Physics)

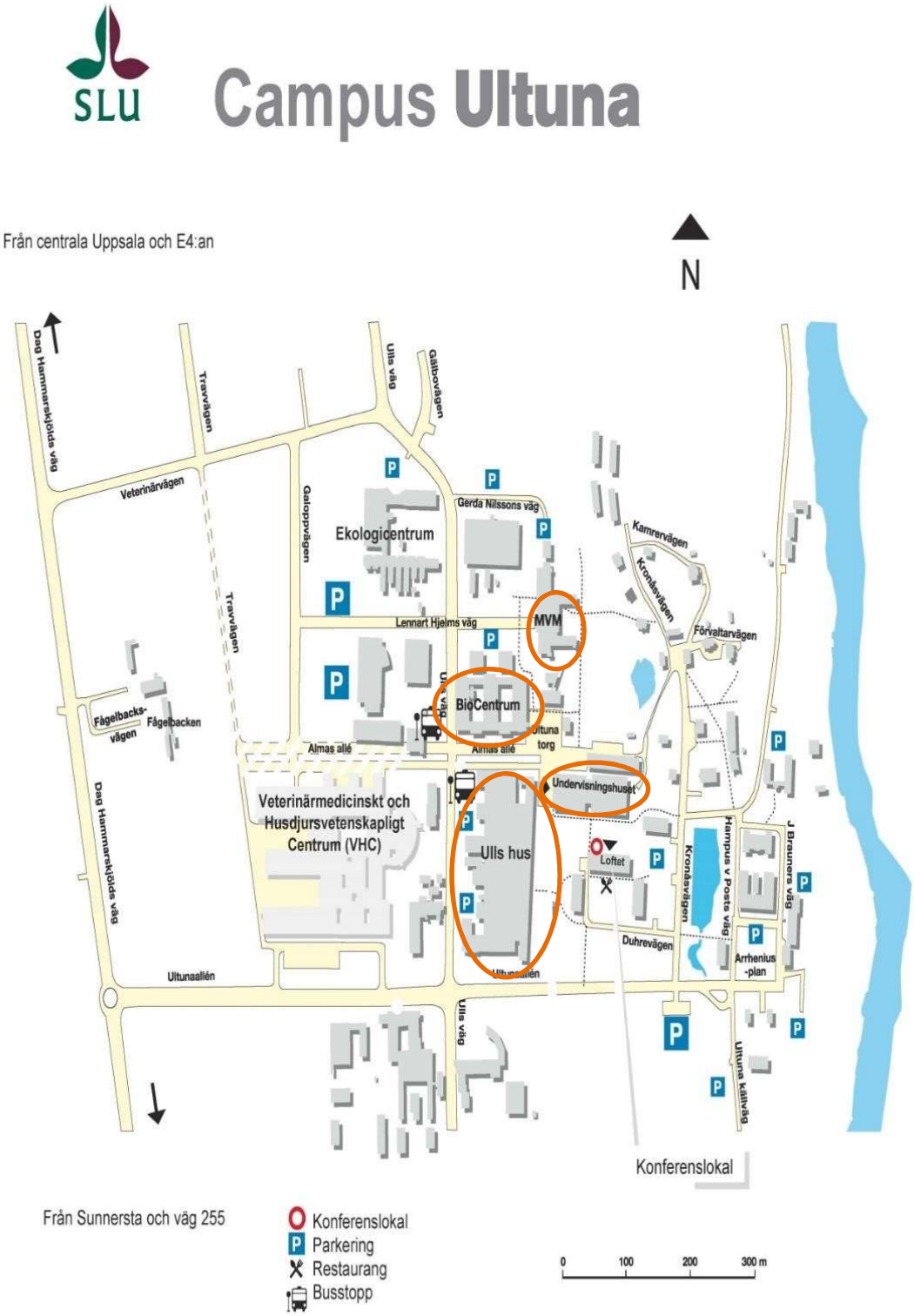
Supervisors on Mini-projects (together with Nick, Katharina and Elsa)

- Omran Alshihabi (OA): omran.alshihabi@slu.se (Precision Agriculture)
- Johannes Koestel (JK): john.koestel@slu.se (Soil and Environmental Physics, Agroscope, Soil Fertility and Protection)
- Mats Larsbo (ML): mats.larsbo@slu.se (Soil and Environmental Physics & Soil Mechanics and Soil Management)

Guest lectures on Sustainable agricultural water management and plant adaptation to climate change

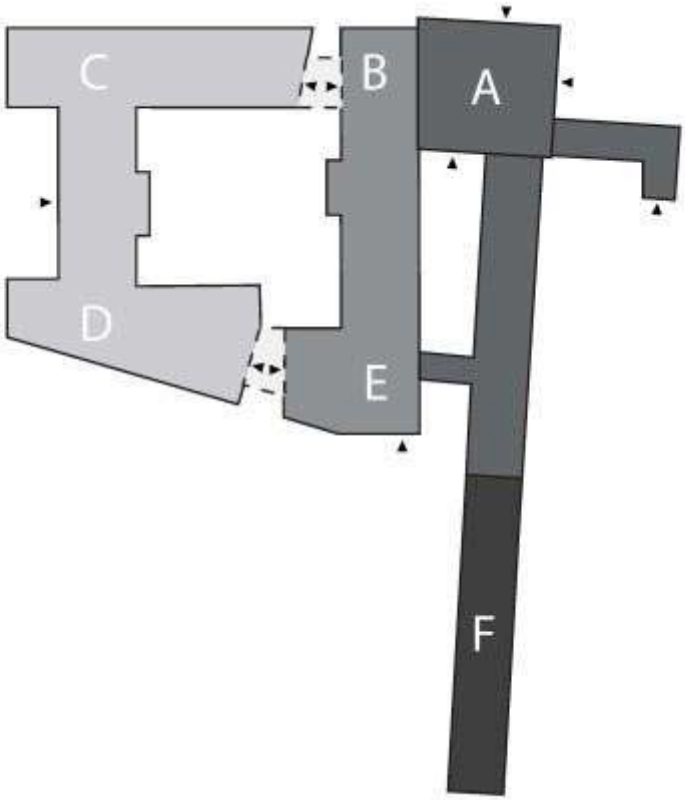
- Jennie Barron (JB): jennie.barron@slu.se (Agricultural Water Management, head)
- Tino Colombi (TC): tino.colombi@slu.se (Soil Mechanics and Soil Management)

Room finder


SLU
Campus Ultuna
Från centrala Uppsala och E4:an
N
Dag Hammarskjölds väg
Travvägen
Ulls väg
Gälbovägen
Veterinärvägen
Galoppvägen
Ekologicentrum
Gerda Nilssons väg
Kamrervägen
Kronåsvägen
Förvaltarvägen
Lennart Hjelms väg
MVM
BioCentrum
Fågelbacks-vägen
Fågelbacken
Almas allé
Ultuna torg
Undervisningshuset
Veterinärmedicinskt och Husdjursvetenskapligt Centrum (VHC)
Ulls hus
Loftet
Hampus v Posts väg
J Braunersv väg
Duhrevägen
Arrhenius -plan
Ultunaallén
Ultuna kallvägen
Konferenslokal
Från Sunnersta och väg 255
Konferenslokal
Parkering
Restaurang
Busstopp
0 100 200 300 m

Ulls Hus https://www.slu.se/ullshus

Rooms Q (Block B), R (Block B), T (Block E), X (Block D) and Y (Block D) are located on the ground floor.

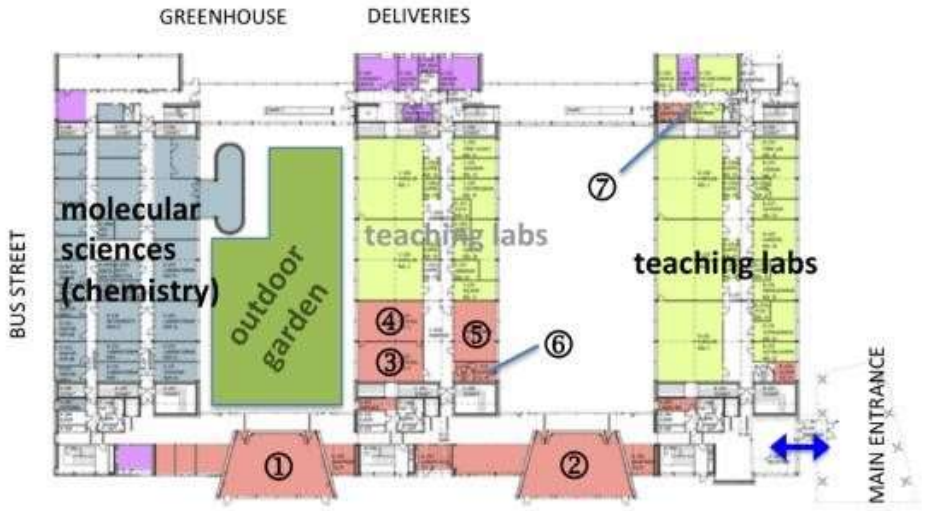


Biocenter https://internt.slu.se/stod-service/lokalercampus/biocentrum/

Rooms C212 and C216 are located on the ground floor.

SLU Biocenter room booking

Ground floor (2nd floor)



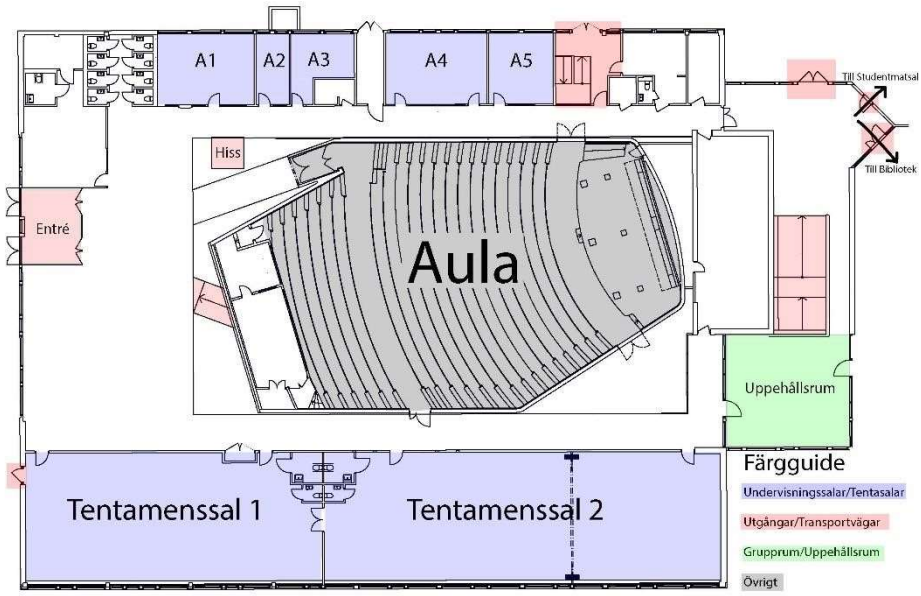
Book using TimeEdit:

1 Lennart Kennes sal (A281, 90 persons)
2 A241 (60 persons)
3 C212 (30 persons)
4 C213 (30 persons)
5 C216 (30 persons)
6 group room C211D (6 persons)
7a group room E202 (6 persons)
7b group room E203 (6 persons)

Outdoor garden (book here, for parties for instance)

Undervisningshuset

Room O2 undergroundlevel and Tentasalen 1 & 2 are located on the ground floor.



Student library (‘Bibliotek’) located in ’Undervisningshuset’

Computer rooms B1 & B2.

MVM huset: https://internt.slu.se/en/support-services/campusand-buildings/mvm-building/

Computer rooms (Datorsal) are all located on the ground floor

Datorsal 1 D1
Datorsal 2 D2.