

## Precision livestock farming for sustainable production

**Schedule 17 January to 23 March 2022.**

The course is a distance course using the Canvas platform to direct the students in the study flow.

The distance course format is based on asynchronous teaching where the learning by the student comprises of several activities including literature, videos, lectures, reports and reflections, all which the student can explore, assimilate and respond to. All the material will be on the Canvas platform.

Each of the subjects are followed by Q&A with teachers on Zoom. This is an excellent opportunity to identify and sort out difficulties and misunderstandings. However, to make the best out of it, students are urged to have done their part, watching the lectures, reading the papers and at least have begun to solve the hand-ins – assignments/discussion contributions.

The release of the content will be primarily done on the Monday of each study week. This format creates a huge flexibility for the student but it is combined with deadlines for hand-ins, which have to be held by students who have the ambition to obtain better grades than pass (3). The higher grades are 4 and 5.

**Synchronous meetings - on Zoom, with Q&A, and student presentations will be held in relation to each theme or lectures are marked in Yellow.** Zoom links will be provided on the canvas platform.

Week 2022	Date	Theme and lectures	Main resources and student activity	Deadlines S=Student T=Teacher feedback
3	2022-01-17	<b>Introduction</b> (Anders Herlin)	Presentation of yourself on canvas – get to know each other!	First week
		<b>1 Introduction to Precision livestock farming</b> (Anders Herlin)	1.1, 1.2 Short reflection on lecture and videos	1.2 Deliverable S: 2022-01-24 T: 2022-01-25
		Wathes et al. (2008) Is precision livestock farming an engineer's daydream or nightmare, an animal's friend or foe, and a farmer's panacea or pitfall? Computers and electronics in agriculture 64: 2–10 Berckmans (2017) General introduction to precision livestock farming. Animal Frontiers 7: 6–11	1.3 Papers to be read followed by Quiz 1.3	1.3 Quiz S: 2022-01-31 T: 2022-02-04
	<b>2022-01-20 16-17</b>	<b>Meet the course leaders, Q&amp;A, on Zoom (Anders and Oleksiy) -</b>		
4 - 5	2021-01-24	<b>2-3 Fundamentals of PLF:</b> Biology, sensors, signal interpretation, data processing, validation. Lecture:		
		<b>2.1 Sensing animals physiology and behaviour</b> (Anders Herlin)		

		Molina et al. (2019) Welfare Quality® for dairy cows: towards a sensor-based assessment. Journal of Dairy Research 87: 28-33	Lecture Read paper and do Quiz 2.12	2.12 Quiz: S: 2022-02-07 T: 2022-02-14
	2022-01-26 16-16:30	Q & A on Zoom (Anders Herlin)		
		<b>2.2 Signals and annotation</b> (Oleksiy Guzhva)	Lecture Exercise	2.21 Exercise S: 2022-02-07 T: 2022-02-09
	2022-01-27 16-16:30	Q & A on Zoom (Oleksiy Guzhva)		
	2022-01-31	<b>2.3 Development of algorithms</b> (Mikael Nilsson)	Lectures Material to read (links) Quiz	2.31 Quiz S: 2022-02-14 T: 2022-02-18
	2022-02-02 16-16:30	Q & A on Zoom (Mikael Nilsson)		
		<b>2.4/3.0 Assessment and validation</b> (Oleksiy Guzhva)	Lecture Papers Quiz	3.1 Quiz S: 2022-02-14 T: 2022-02-18
		Tullo et al. 2016 Technical note: Validation of a commercial system for the continuous and automated monitoring of dairy cow activity. J Dairy Sci 9: 7489–7494  Elischer et al. 2013 Validating the accuracy of activity and rumination monitor data from dairy cows housed in a pasture-based automatic milking system. J Dairy Sci 96: 6412–6422  Burfeind et al. 2011 Technical note: Evaluation of a system for monitoring rumination in heifers and calves J Dairy Sci 94: 426–430		
	2022-02-04 16-16:30	Q & A on Zoom (Oleksiy Guzhva) Cancelled Contact Oleksiy directly		
6 - 7	2021-02-07	<b>4 Application of PLF</b> – integration of perspectives and management		
		<b>4.1 Standard operation procedure SOP, decision support, effects on herd performance</b> (Annica Hansson)	Lectures Videos Exercise	4.11 Exercise in discussion S: 2022-02-21 T: 2022-02-25
	2021-02-10 16-16:30	Q&A on Zoom Annica Hansson		
		<b>4.2 From IR sensor use for udder health, image based diagnostics in dairy production</b> (Elinor Eineren) stand in Ulf Stern, Agricom)	Lectures Literature Reflections	4.22 Reflections in discussion S: 2022-02-21 T: 2022-02-25

		Macmanus et al. 2016. Infrared thermography in animal production: An overview. Comp. Electro. Agric. 123: 10-16		
	2021-02-14 16-1630	Q&A on Zoom Ulf Stern		
		<b>4.3 Production control: Automatic scales – strategy for practice</b> (Henrik Österlund, Hencol)	Lectures, videos, papers Reflections	4.31 Reflection in discussions S: 2022-02-28 T: 2022-03-04
		Arvidsson Segerkvist et al. 2020 Automatic weighing as an animal health monitoring tool on pasture. Livest. Sci. 240: 104157 Chedad et al. 2003 Do heavy broiler chickens visit automatic weighing systems less than lighter birds? Brit. Poultry Sci. 44: 663–668 Kashiha et al. 2014 Automatic weight estimation of individual pigs using image analysis Comp. Electro. Agric. 107: 38-44		
	2021-02-17 16-1630	Q&A on Zoom Henrik Österlund		
8 - 9	2021-02-21	<b>5 PLF applications and the end-user perspective</b>	Lectures, Several papers (see canvas) Video interviews Written report	5.1 Report S: 2022-03-07 T: 2022-03-21
		<b>Evaluating PLF for the end-user</b> (Oleksiy Guzhva)		
		<b>Involving end-users</b> (Oleksiy Guzhva)		
	2021-03-03	Q&A on Zoom Oleksiy Guzhva		
	2021-03-07	Joint seminar on project 13-16 (CET)	<b>Attend seminar, discussion on presentations</b>	
10-11	2022-03-08	<b>Development of a PLF application</b> from beginning to end (R&D cycle including product deployment and infrastructure maintenance) and its role in the digital transformation of smart farming.	Literature to be used in project work (instructions)	6.1 Report S: 2022-03-22 T: 2022-04-02
		<b>Lecture on definitions, examples, multiactors</b> (Oleksiy Guzhva; Anders Herlin)		
	2022-03-11 16-17	Q&A on Zoom OG/AH		
	2022-03-17 16-17	Q&A on Zoom OG/AH		

	2022-03-22		Deadline (report and presentation)	
	<b>2022-03-23</b>	<b>Joint seminar on project 13-16 (CET) on Zoom</b>	<b>Attend seminar, discussion on presentations</b>	
		Feed back to course management 16- (CET) on Zoom	Course evaluation	