Subject name	**Decision Support Systems in Animal Management**	
Subject code	**H.HBDa.DECI.SM.HZOXY**	
Department	**Cattle Breeding**	
Faculty	**Animal Sciences**	
Subject supervisor/Lecturer	**Professor Joanna Makulska; Dr. Magdalena Hędrzak**	
General information	**semester**	**winter**
	ECTS credits	**6**
	Lectures total	**15**
	Laboratories	**30**
Objective and general description	The main objective of the course is presentation of mathematical modeling and computer-based methods such as: simulation and optimization, applied to the support of the decisions in animal management. The surveyed optimization techniques will include: linear and dynamic programming, hierarchic Markov processes, Bayesian networks and influence diagrams. Examples of the decision problems from cattle (dairy and beef), pig, poultry and wild animals' management will be given. **Lectures** Basic concepts of animal management science - definition of various utility functions, classical production theory Methods of monitoring, control and prediction in herd management Modeling technique in the herd management support - phases of modeling Mathematical programming in the support of the herd management decisions, part I: linear programming - simplex method Mathematical programming in the support of the herd management decisions, part II: dynamic programming - hierarchic Markov processes Mathematical programming in the support of the herd management decisions, part III: Bayesian networks, decision graphs (influence diagrams) Simulation methods in the herd decision support (e.g. Monte Carlo method) Examples of decision problems in management of farm and wild animals (replacement and marketing problem, feeding strategies, organization of production and reproduction cycles, livestock health problems, management of wild animals) Bio-economical and ecological modeling – examples of the models **Classes** Linear and dynamic programming - application of standard software (e.g. Solver, Optimization Toolbox MATLAB) Linear and dynamic programming - application of BuFat software in optimization of bull fattening Hierarchic Markov processes - application of Multi-Level Hierarchic Markov Processes software in optimization of	

	replacement beef heifer management Hierarchic Markov processes - application of Multi-Level Hierarchic Markov Processes software in optimization dairy cow management Hierarchic Markov processes - replacement problems in dairy, sow and ewe herd, optimization of steer fattening Simulation methods - application of standard software (e.g. Simulation Analysis/Excel, Simulink/MATLAB, SimFlock) Simulation methods in decision support - Monte Carlo method (SimHerd software in dairy cow management) Application of computer decision support methods in livestock health management Application of STELLA software to determine the optimal management strategy for selected species of wild animals
Assessment method	
References	Dijkhuizen A.A., Morris R.S.: Animal Health Economics. Principles and Applications. Post-Graduate Found. in Vet. Sci., University of Sydney. 1997. Kennedy J.O.S.: Dynamic programming. Applications to Agriculture and Natural Resources. Elsevier, London-New York. 1986. Kristensen A.R., Jørgensen E., Toft N.: Herd management science. University of Copenhagen. 2009. Owen-Smith N.: Introduction to modeling in wildlife and resource conservation. Blackwell Publishing. 2007. Thornley J.H.M., France J.: Mathematical Models in Agriculture. 2nd Edition. CAB International. 2007.