Załącznik 4 / Annex 4

University of Agriculture in Krakow
Faculty of Animal Breeding and Biology

Documentation of the study and training program plan
Field: *Animal Science*
Speciality: *Bioengineering in Animal Science*
Mode of study: *state studies*
Level of education: *2nd cycle*

General characteristics of conducted studies

1. Field of study: ***Animal Science***
2. Speciality: ***Bioengineering in Animal Science***
3. Level of education: ***the second cycle (master course)***
4. Profile of education: ***general-academic***
5. Mode of study: ***state studies***
6. Name of qualification and title conferred by the graduate: ***magister inżynier (MSc.)***
7. Assignment to an area or areas of learning: ***Agriculture, Forestry and Veterinary***
8. Identification of areas of science and scientific disciplines the learning results from: ***Agricultural sciences – Animal Science***
9. Show the relationship with the mission of the university and its developmental strategy

Results of education

1. Table referring field effects of education to area effects and engineering competences

Explanations of used symbols:
R – results of education in the area of agricultural sciences
ZOO – results of education in the field of Animal Science
Inz – engineer results of education
2 – 2nd degree (cycle) studies
A – general academic profile
W – knowledge category
U – skills category
K – social competences category
01, 02, 03 and successive – numbers of education results

Symbol	Results of education for **ANIMAL SCIENCE** After graduation from the second degree studies in **ANIMAL SCIENCE,** speciality: **BIOENGINEERING IN ANIMAL SCIENCE** the graduate:	Reference to effects of education in areas of education in the field of agriculture, forestry and	Reference to the effects of education leading to the engineer competence obtaining

		veterinary sciences	
KNOWLEDGE			
Results common for **ANIMAL SCIENCE** field			
ZOO2_W01	chooses basic kinds and types of experiments, defines rules, methods and techniques of conducting research and preparing research papers	R2A_W01	InzA_W02
ZOO2_W02	selects methods for statistical test description, probability distribution evaluation, population parameters estimation, hypothesis verification, variation and regression assays	R2A_W01	InzA_W02
ZOO2_W03	describes methods and usage of breeding biotechniques and genetic diagnostics in animals raising and breeding	R2A_W01	InzA_W03 InzA_W05
ZOO2_W04	defines rules of planning and organisation of breeding work, describes methods and programmes of animals improving and economic effectiveness of breeding work	R2A_W05	
ZOO2_W05	points at economically effective systems of animals raising that favor their welfare, obtaining health-oriented products quality and also landscape and natural environment shaping, describes rules of agro-environmental programs functioning	R2A_W03 R2A_W04 R2A_W06 R2A_W07	InzA_W01 InzA_W04
ZOO2_W06	knows rules of animal origin products trade, characterises basic technologies of food processing as well as products storage, co-packing and labelling	R2A_W02 R2A_W05	InzA_W02 InzA_W05
ZOO2_W07	knows and understands basic ideas and rules from the range of industrial property protection and copyright as well as necessity of intellectual property resources management; is able to use patent information resources	R2A_W08	InzA_W04
ZOO2_W08	knows general rules of creating and development of individual enterprises forms that use knowledge from the range of science fields and disciplines proper for studied specialty	R2A_W09	InzA_W04
Results for **Bioengineering in Animal Science** specialty			
ZOO2_W12	has got knowledge that concerns environmental microfactors and their influencing animal organisms	R2A_W01 R2A_W03 R2A_W04 R2A_W05 R2A_W06	InzA_W01
ZOO2_W13	knows and understands basic concepts that concern genetic resources protection and need to act in that range	R2A_W01 R2A_W04 R2A_W05 R2A_W06	InzA_W05
ZOO2_W14	has got deepened knowledge that allows to plan production in an optima way with use of systems and methods which influence organization of effective reproduction in herds of particular animal species	R2A_W01 R2A_W04 R2A_W05 R2A_W07 R2A_W09	InzA_W01 InzA_W02
ZOO2_W15	defines problems connected with herd management, describes and selects numerical methods that serve to monitor herds and to support decision processes in farm animals usage as well as housekeeping of populations of animals living in the wild	R2A_W01 R2A_W02 R2A_W04 R2A_W05	InzA_W05
ZOO2_W16	has got expanded knowledge that concerns physiological processes course at molecular level	R2A_W01 R2A_W04	InzA_W03
ZOO2_W17	has got knowledge from the range of structure and functioning of vertebrate endocrine system; describes molecular mechanisms of hormone activity in target cells	R2A_W01 R2A_W04	InzA_W03
ZOO2_W18	characterizes adaptive and immunological mechanisms in particular classes of vertebrates	R2A_W01 R2A_W04	InzA_W03
ZOO2_W19	describes and defines basic biochemical, immunoenzymatic and radioisotopic methods used in diagnostics applied in animal breeding	R2A_W05	InzA_W02 InzA_W03
ZOO2_W20	has got knowledge concerning basic techniques of biological particles labeling	R2A_W05	InzA_W02
ZOO2_W24	has got knowledge from the range of aided breeding and control of estrous cycle in farm animals	R2A_W04 R2A_W05	InzA_W03
ZOO2_W25	has got knowledge from the range of physiology and pathology of male reproductive system	R2A_W01 R2A_W04	InzA_W03

ZOO2_W28	defines microclimatic and hygienic demands in animal houses for reproductive flocks, eggs stores and during incubation process	R2A_W03 R2A_W04 R2A_W05	InzA_W03 InzA_W04 InzA_W05
ZOO2_W30	has got knowledge that concerns farm animals breeding state	R2A_W04 R2A_W05	InzA_W03
ZOO2_W31	has got expert knowledge from the range of analytic techniques and methods used in determining of fodders alimentary value	R2A_W01 R2A_W03	InzA_W02, InzA_W04, InzA_W05
ZOO2_W32	has got detailed knowledge from the range of digestion, metabolism and absorption of alimentary components as well as metabolism of farm and accompanying animals	R2A_W04	InzA_W03
ZOO2_W34	is acquainted with consequences of feeding mistakes including metabolic diseases and results of deficiency and surpluses of alimentary components	R2A_W04	InzA_W03
SKILLS			
Results common for **Animal Science** field			
ZOO2_U01	plans and performs experiments, statistically elaborates and interprets obtained results using proper computer tools and literature resources	R2A_U01 R2A_U03 R2A_U04	InzA_U01 InzA_U02
ZOO2_U02	performs statistical description of a trial, evaluates probability distribution, uses statistical tests and different methods of features dependence estimation	R2A_U03	InzA_U01
ZOO2_U03	uses methods of gametes biotechnology, makes use of molecular genetics techniques to identify carrier-state of genes which determine genetic illnesses and animal usage features	R2A_U04 R2A_U05	InzA_U01 InzA_U02 InzA_U06
ZOO2_U04	can choose strategy of animals improvement, uses genetic information to evaluate breeding and selection values, estimates breeding work efficiency	R2A_U05 R2A_U06	InzA_U04 InzA_U05 InzA_U06 InzA_U07
ZOO2_U05	organizes economically effective animal raising with perseverance of welfare and environment protection rules, constructs agro-environmental programmes	R2A_U05 R2A_U06	InzA_U04 InzA_U05 InzA_U06 InzA_U08
ZOO2_U06	selects and uses methods to preserve animal origin materials and processed food as well as chooses food processing technology, products storage, co-packing and labelling	R2A_U05 R2A_U06	InzA_U06 InzA_U08
ZOO2_U07	is able to communicate precisely with different stakeholders in verbal, written and graphic ways, uses scientific literature with comprehension, prepares scientific papers in Polish and English languages; independently broadens his/her knowledge in the range of animal sciences	R2A_U02 R2A_U08 R2A_U09	InzA_U01 InzA_U05
ZOO2_U08	estimated advantages and disadvantages of taken up activities, including their originality in solving professional problems – for gathering experience and improving engineer competence	R2A_U07	InzA_U03 InzA_U07
ZOO2_U09	performs under guidance of scientific tutor research tasks that concern studied specialty, property interprets obtained results and draws conclusions	R2A_U01 R2A_U05	InzA_U01
ZOO2_U10	uses English language in the range of science fields and scientific disciplines proper for the studied specialty according to demands that are determined for B2 level + European System of Language Learning Description, reads with understanding and fluently uses scientific literature and also prepares and presents in Polish and English languages presentations from the range of animal husbandry sciences	R2A_U10	InzA_U01
Results for **Bioengineering in Animal Science** specialty			
ZOO2_U13	uses monitoring techniques, numeric and expert techniques as well as computer tools in order to support decisions in herd management, interprets and critically evaluates obtained results	R2A_U01 R2A_U03 R2A_U04 R2A_U05 R2A_U06	InzA_U02 InzA_U05 InzA_U06
ZOO2_U15	is able to plan animal production and choose optimal system of herd reproduction with consideration of current economical conditions	R2A_U01 R2A_U03 R2A_U04 R2A_U05 R2A_U06 R2A_U07	InzA_U04 InzA_U05 InzA_U06 InzA_U07

ZOO2_U16	can collect, preserve, store and analyze biological and genetic material in order to protect animals biodiversity and also interprets information from various sources that concern animal genetic resources protection	R2A_U01 R2A_U03 R2A_U05 R2A_U06	InzA_U03 InzA_U08
ZOO2_U17	estimates risk of particular research techniques usage for given type of research material	R2A_U04	InzA_U02 InzA_U06
ZOO2_U18	selects a proper animal model for physiological and pathological parameters evaluation in farm animals	R2A_U04 R2A_U05	InzA_U02 InzA_U06
ZOO2_U19	formulates the way and mode of treating animals during conducted experiments	R2A_U04 R2A_U05 R2A_U06	InzA_U03 InzA_U08
ZOO2_U20	determines concentration of hormones in blond and tissues with use of proper tests	R2A_U05	InzA_U01 InzA_U07
ZOO2_U21	uses analytical methods; interprets and verifies results as well as diagnoses physiological state of animals	R2A_U01 R2A_U04 R2A_U05	InzA_U01 InzA_U02 InzA_U05
ZOO2_U23	can regulate the term of estrus and ovulation as well as can prepare a female to embryos obtaining; can identify gametes and embryos and can manipulate them	R2A_U05 R2A_U06 R2A_U07	InzA_U02 InzA_U03
ZOO2_U24	can diagnose pregnancy (in advanced phase) with proper and pathological course in farm animals females	R2A_U05 R2A_U06 R2A_U07	InzA_U02 InzA_U03
ZOO2_U26	uses methods to evaluate male usefulness to reproduction	R2A_U04 R2A_U05	InzA_U02 InzA_U03
ZOO2_U31	recognizes physiological state of the animal; manages the herd of animals in the range of reproduction using obtained knowledge and elaborates new conceptions	R2A_U01 R2A_U05 R2A_U06	InzA_U04 InzA_U05 InzA_U08
ZOO2_U32	is able to use analytic methods and is acquainted with modern research equipment	R2A_U04 R2A_U06	InzA_U01 InzA_U02 InzA_U05
ZOO2_U33	is able to cooperate with animal breeders conducting professional consulting in the range of animal feeding and fodder production. Can prepare public performances (presentations, films, show, workshops) connected with practiced profession	R2A_U01 R2A_U02	InzA_U05 InzA_U07
ZOO2_U34	can propose and justify choice of essential analytic techniques as well as evaluation systems of quality and alimentary value of fodders for various species of farm animals	R2A_U01 R2A_U03	InzA_U05 InzA_U06 InzA_U07
SOCIAL COMPETENCES			
ZOO2_K01	knows the range of gained knowledge and skills, understands the need to learn and constant training, is able to organize learning process of the other people	R2A_K01 R2A_K07	InzA_K01
ZOO2_K02	is able to work in a team playing different roles, understands the need of methodical work over long-term projects and is aware of responsibility for team work effects	R2A_K02 R2A_K03	InzA_K01
ZOO2_K03	can make decisions independently, can organize team work, lead managerial role and also undertake running his/her own business	R2A_K02 R2A_K03 R2A_K04 R2A_K08	InzA_K01
ZOO2_K04	is focused on activities that lead to decrease risk and predict human activity results in the range of animal husbandry and animals life environment	R2A_K06	InzA_K01 InzA_K02
ZOO2_K05	understands complexity of problems connected with animals raising and is aware of necessity to estimate critically results of using different methods and techniques that support herd management decisions	R2A_K04 R2A_K05 R2A_K06	InzA_K02
ZOO2_K06	takes care of animals welfare as well as formation and state of natural environment	R2A_K05	InzA_K01
ZOO2_K07	demonstrates initiative in activities that lead to animal husbandry knowledge use in professional work	R2A_K08	InzA_K01 InzA_K02
ZOO2_K08	is conscious of necessity to act according to ethical rules in professional and social work	R2A_K04 R2A_K05	InzA_K01
ZOO2_K09	is responsible for professional matters transferred within the framework of consultative and popularizing activities	R2A_K05	InzA_K01

2. Table of areal effects of education covering by field effects of education

Symbol	Effects of education for territory of education in the range of sciences: **AGRICULTURE, FORESTRY AND VETERINARY**	Reference to effects of education for **ANIMAL SCIENCE** field **BIOENGINEERING IN ANIMAL SCIENCE** Specialty
KNOWLEDGE		
R2A_W01	has got broadened knowledge from the range of biology, chemistry, mathematics, physics and related sciences adapted to studied specialty	ZOO2_W01, ZOO2_W02, ZOO2_W03, ZOO2_W12, ZOO2_W13, ZOO2_W14, ZOO2_W15, ZOO2_W16, ZOO2_W17, ZOO2_W18, ZOO2_W25, ZOO2_W31
R2A_W02	has got advanced economic, law and social knowledge adapted to studied specialty	ZOO2_W06, ZOO2_W15
R2A_W03	has got deepened knowledge in the matter of biosphere, chemical and physical processes which occur there, basics of technique and formation of environment adapted to studied specialty	ZOO2_W05, ZOO2_W12, ZOO2_W28, ZOO2_W31
R2A_W04	has got deepened knowledge about functioning of living organisms on different levels of complexity, about inanimate nature and also technical engineer tasks adapted to studied specialty	ZOO2_W05, , ZOO2_W12, , ZOO2_W13, ZOO2_W14, , ZOO2_W15, ZOO2_W16, ZOO2_W17, ZOO2_W18, ZOO2_W24, ZOO2_W25, ZOO2_W28, ZOO2_W29, ZOO2_W30, ZOO2_W32, ZOO2_W34
R2A_W05	reveals knowledge of advanced methods, techniques, tools and materials that allow to use and shape nature potential in order to improve human life quality	ZOO2_W04, ZOO2_W06, , ZOO2_W12, ZOO2_W13, , ZOO2_W14, , ZOO2_W15, ZOO2_W19, ZOO2_W20, ZOO2_W24, ZOO2_W28, ZOO2_W30
R2A_W06	has got broadened knowledge about role and meaning of natural environment and balanced usage of biological diversity as well as its dangers	ZOO2_W05, ZOO2_W12, ZOO2_W13,
R2A_W07	has got broadened knowledge about state and complex activity of factors that determine functioning and development of rural areas	ZOO2_W05, ZOO2_W14
R2A_W08	knows and understands basic concepts and rules from the range of protection of industrial property and copyright and also necessity of intellectual property management; he/she can use patent information resources	ZOO2_W07
R2A_W09	knows general rules of creating and development of individual business forms that uses knowledge from science fields and branches proper for studied specialty	ZOO2_W08, , ZOO2_W14
SKILLS		
R2A_U01	has got ability to find, understand, analyse and creative use of needed information that come from various sources and are given in different forms proper for studied specialty	ZOO2_U01, ZOO2_U09, ZOO2_U13, ZOO2_U15, ZOO2_U16, ZOO2_U21, ZOO2_U31, ZOO2_U33, ZOO2_U34
R2A_U02	has got ability to communicate precisely with different stakeholders in verbal, written and graphic ways	ZOO2_U07, ZOO2_U33
R2A_U03	understands and uses proper computer technologies to gather and transform information from the range of agriculture and forestry production	ZOO2_U01, ZOO2_U02, ZOO2_U13, ZOO2_U15, ZOO2_U16, ZOO2_U34
R2A_U04	independently plans, performs, analyses and estimates correctness of performed task from the range of science fields and branches proper for studied specialty	ZOO2_U01, ZOO2_U03, ZOO2_U13, ZOO2_U15, ZOO2_U17, ZOO2_U18, ZOO2_U19, ZOO2_U21, ZOO2_U26, ZOO2-U32
R2A_U05	independently and comprehensively analyses problems that influence production and quality of food, human and animal health, state of natural environment and natural resources and is acquainted with usage of expert techniques and their optimalizations adapted to studied specialty	ZOO2_U03, ZOO2_U04, ZOO2_U05, ZOO2_U06, ZOO2_U09, ZOO2_U13, ZOO2_U15, ZOO2_U16, ZOO2_U18, ZOO2_U19, ZOO2_U20, ZOO2_U21, ZOO2_U23, ZOO2_U24, ZOO2_U26, ZOO2_U27, ZOO2_U31
R2A_U06	has got ability of choosing and modification of typical activities (including techniques and technologies) adapted to natural resources in order to improve human life quality and proper for studied specialty	ZOO2_U04, ZOO2_U05, ZOO2_U06, ZOO2_U13, ZOO2_U15, ZOO2_U16, ZOO2_U19, ZOO2_U23, ZOO2_U24, ZOO2_U31
R2A_U07	estimates advantages and disadvantages of taken up activities, including their originality in solving professional problems – for gathering experience and improving engineer competence	ZOO2_U13, ZOO2_U08, ZOO2_U23, ZOO2_U24
R2A_U08	has got deepened ability to prepare various written papers in Polish language and foreign one that is considered basic for science fields and branches proper for the studied specialty or in the area that lies between various scientific fields	ZOO2_U07

R2A_U09	has got deepened ability to prepare oral presentations in Polish and foreign languages in the range of science fields and branches proper for the studied specialty or in the area that lies between various scientific fields	ZOO2_U07
R2A_U10	has got language skills in the range of science fields and scientific disciplines proper for the studied specialty according to demands that are determined for B2 level + European System of Language Learning Description	ZOO2_U10
SOCIAL COMPETENCES		
R2A_K01	knows the range of learning and constant training, is able to inspire and organize learning process of the other people	ZOO2_K01
R2A_K02	is able to cooperate and work in a team playing different roles	ZOO2_K02, ZOO2_K03
R2A_K03	is able to define priorities to fulfill the task determined by oneself or by someone else	ZOO2_K02, ZOO2_K03
R2A_K04	properly identifies and solves dilemmas connected with his/her job	ZOO2_K03, ZOO2_K05, ZOO2_K08
R2A_K05	is aware of importance of social, professional and ethical responsibility for production of high quality food, animals welfare and shaping and state of natural environment	ZOO2_K05, ZOO2_K06, ZOO2_K08, ZOO2_K09
R2A_K06	has got knowledge of activities that lead to risk restriction and predicting the results of activities in the range of widely treated agriculture and environment	ZOO2_K04, ZOO2_K05
R2A_K07	is aware of need to constant learning and self-education in the range of his/her job	ZOO2_K01
R2A_K08	can think and act in enterprising way	ZOO2_K03, ZOO2_K07

3. Table of engineering competences of education by field learning outcomes

Symbol	Learning outcomes leading to engineering competences	Reference to effects of education for **ANIMAL SCIENCE** field **BIOENGINEERING IN ANIMAL SCIENCE** Specialty
KNOWLEDGE		
InzA_W01	has a basic knowledge about the life cycle of equipment, facilities, and technical systems	ZOO2_W05, ZOO2_W12, ZOO2_W14
InzA_W02	knows basic methods, techniques, tools and materials used in solving simple engineering problems in the studied field	ZOO2_W01, ZOO2_W02, ZOO2_W06, ZOO2_W14, ZOO2_W19, ZOO2_W20, ZOO2_W31
InzA_W03	has basic knowledge necessary to understand the social, economic, law and other non-technical aspects of engineering activities	ZOO2_W03, ZOO2_W16, ZOO2_W17, ZOO2_W18, ZOO2_W19, ZOO2_W24, ZOO2_W25, ZOO2_W28, ZOO2_W30, ZOO2_W32, ZOO2_W33
InzA_W04	has basic knowledge of management, including quality management, and business activity	ZOO2_W05, ZOO2_W07, ZOO2_W08, ZOO2_W28, ZOO2_W31
InzA_W05	knows the typical engineering technologies in the range of the studied field of study	ZOO2_W03, ZOO2_W06, ZOO2_W13, ZOO2_W15, ZOO2_W28, ZOO2_W31
SKILLS		
InzA_U01	Is able to plan and carry out experiments, including measurements and computer simulations, to interpret the results and draw conclusions	ZOO2_U01, ZOO2_U02, ZOO2_U03, ZOO2_U07, ZOO2_U09, ZOO2_U10
InzA_U02	is able to use to formulate and solve engineering tasks analytical simulation and experimental methods	ZOO2_U01, ZOO2_U03, ZOO2_U13, ZOO2_U17, ZOO2_U18, ZOO2_U21, ZOO2_U23, ZOO2_U24, ZOO2_U26, ZOO2_U32
InzA_U03	is able to — during formulization and solvation of engineering tasks — see their systemic and non-technical aspects	ZOO2_U08, ZOO2_U16, ZOO2_U19, ZOO2_U23, ZOO2_U24, ZOO2_U26
InzA_U04	is able to make a preliminary economic analysis of undertaken engineering activities	ZOO2_U04, ZOO2_U05, ZOO2_U15, ZOO2_U31
InzA_U05	is able to make a critical analysis of the way of function, and assess - especially in conjunction with the studied field - the existing technical solutions, in particular equipment, facilities,	ZOO2_U04, ZOO2_U05, ZOO2_U07, ZOO2_U13, ZOO2_U15, ZOO2_U21, ZOO2_U31, ZOO2_U32, ZOO2_U33, ZOO2_U34

	systems, processes, services	
InzA_U06	is able to identify and formulate a specification of simple engineering tasks of a practical nature, characteristic for studied field of study	ZOO2_U03, ZOO2_U13, ZOO2_U15, ZOO2_U17, ZOO2_U18, ZOO2_U34
InzA_U07	is able to evaluate the usefulness of routine methods and tools to solve simple tasks of practical engineering characteristic of the studied field, and to select and use the appropriate method and tools to solve these tasks	ZOO2_U04, ZOO2_U08, ZOO2_U15, ZOO2_U20, ZOO2_U33, ZOO2_U34
InzA_U08	able to - according to the predetermined specification - design and implement a simple device, object, system or process typical for the studied field of study, using appropriate methods, techniques and tools	ZOO2_U05, ZOO2_U16, ZOO2_U19, ZOO2_U31,
SOCIAL COMPETENCES		
InzA_K01	is aware of the importance, and understands the consequences of non-technical aspects and engineering activities, including its impact on the environment, and the associated responsibility for decisions ma świadomość ważności i rozumie pozatechniczne aspekty i skutki działalności inżynierskiej, w tym jej wpływu na środo-wisko, i związanej z tym odpowiedzialności za podejmowane decyzje	ZOO2_K01, ZOO2_K02, ZOO2_K03, ZOO2_K04, ZOO2_K06, ZOO2_K07, ZOO2_K08, ZOO2_K09,
InzA_K02	able to think and act in an entrepreneurial way. potrafi myśleć i działać w sposób przedsiębiorczy	ZOO2_K04, ZOO2_K05, ZOO2_K07,