DOCTORATE PROGRAM IN AGRICULTURAL AND VETERINARY SCIENCES

Reproductive and Regenerative Biotechnology in domestic and wild animals

I. COURSE IDENTIFICATION	
Code	AG108199
Semester	Summer
Days	Tuesday and Thursday
Schedule	09:00 a 12:00
Pre-requirements	
Weekly direct hours	6
Weekly indirect hours	6,5
Credits	2
General coordinator	Oscar Peralta DVM, MSc, PhD
Email address	operalta@uchile.cl
Assistants	Jahaira Cortez and Moises Segunda
Assistants Email addresses	jahazu86@gmail.com; segundamois@gmail.com

II. PROFESSORS

First-Last Name	Academic degree	Academic degree institution	Affiliation
Jennifer Cortez	MSc	University of Edinburgh	University of Edinburgh
Mónica De los Reyes	PhD	Universidad de Córdoba	Universidad de Chile
Xavier Donadeu	PhD	University of Wisconsin	University of Edinburgh
Charles Easley	PhD	Virginia Commonwealth University	University of Georgia
Nucharin Songsasen	PhD	University of Guelph	Smithsonian Conservation Biology Institute
Jane Morrell	PhD	Swedish University of Agricultural Sciences	Swedish University of Agricultural Sciences
Oscar Peralta	PhD	Virginia Tech	Universidad de Chile

III. MAIN PURPOSES

The main objective of this course is to contribute in the formation of skills, knowledge and understanding of the English language, through the analysis of lines of research in the area of Biotechnology applied to Reproduction and Regenerative Medicine in domestic and wild animals. In order to achieve this objective, this course seeks to facilitate and encourage the participation of visiting professors and students from English-speaking Universities, or from other Universities where Spanish is not the first language. Additionally, the course aims at supporting the formation of collaborative networks for PhD students and faculty from the South Campus, with foreign visiting professors and students who are participants of this activity.

IV. SPECIFIC COMPETENCES (SC)

SC: Critical thinking and skills development for the analysis and synthesis of information in the English language, with the aim to establish an opinion based on scientific evidence in the area of Reproductive and Regenerative Biotechnology in domestic and wild animals.

V. GENERIC COMPETENCES (GC)

GC1: Written communication in English language, using strategies of expression pertinent to the area of agricultural and veterinary sciences.

GC2: Oral communication in English language, using strategies of expression pertinent to the area of agricultural and veterinary sciences.

VI. TEACHING METHODOLOGY

The teaching methodology includes lectures and encourages participatory discussion in English. In addition, this course encourages, each session, critical discussions and analyzes of scientific articles. Students will be evaluated in terms of their participation in classes, and through the development of two proposals.

VII. EVALUATION

Type of Evaluation	Learning results (N°)	Date	Percentage
Proposal 1	LR1 y GC1	19-01-2021	35%
Proposal 2	LR2 y GC1	29-01-2021	35%
Participation in classes	GC2	All classes	30%

VIII. REFERENCES

N°	Title	Authors	Year	Source
1	Safety and efficacy of a mesenchymal stem cell intramammary therapy in dairy cows with experimentally induced Staphylococcus aureus clinical mastitis	O A Peralta, C Carrasco, C Vieytes, M J Tamayo, I Muñoz, S Sepulveda, T Tadich, M Duchens, P Melendez, A Mella, C G Torres	2020	Sci Rep; 10(1):2843
2	Sertoli cell-mediated differentiation of bovine fetal mesenchymal stem cells into germ cell lineage using an in vitro co-culture system	M N Segunda, J Bahamonde, I Muñoz, S Sepulveda, J Cortez, M De Los Reyes, J Palomino, C G Torres, O A Peralta	2019	Theriogenology; 130:8-18
3	Hepatogenic and neurogenic differentiation of bone marrow mesenchymal stem cells from abattoir-derived bovine fetuses	Fernando Dueñas, Víctor Becerra, Yennifer Cortes, Sonia Vidal, Leonardo Sáenz, Jaime Palomino, Mónica De Los Reyes, Oscar A Peralta	2014	BMC Vet Res; 10;10:154.
4	Associations between foetal size and ovarian development in the pig	Claire Stenhouse, Yennifer Cortes-Araya, Charis O.Hogg, Xavier Donadeu, Cheryl J.Ashworth	2020	Anim Reprod Sci; 221: 106589

5	Generation of Functional Myocytes from Equine Induced Pluripotent Stem Cells	Karin R. Amilon, Yennifer Cortes-Araya, Benjamin Moore, Seungmee Lee, Simon Lillico, Amandine Breton, Cristina L. Esteves, and F. Xavier Donadeu	2018	Cell Reprogram; 20 (5): 275-281
6	Comparison of Antibacterial and Immunological Properties of Mesenchymal Stem/Stromal Cells from Equine Bone Marrow, Endometrium, and Adipose Tissue	Yennifer Cortes-Araya, Karin Amilon, Burgunde Elisabeth Rink, Georgina Black, Zofia Lisowski, Francesc Xavier Donadeu and Cristina L. Esteves	2018	Stem Cell & Dev
7	Analyses of bovine luteal fractions obtained by FACS reveals enrichment of miR-183-96-182 cluster miRNAs in endothelial cells	Bushra T Mohammed, Cristina L Esteves, F Xavier Donadeu	2019	Reprod Biol Endocrinol; 6;17(1):41.
8	Pericytes in Veterinary Species: Prospective Isolation, Characterization and Tissue Regeneration Potential	Cristina L Esteves, F Xavier Donadeu	2018	Adv Exp Med Biol; 1109:67-77
9	The Fate of Autologous Endometrial Mesenchymal Stromal Cells After Application in the Healthy Equine Uterus	B Elisabeth Rink, Teresa Beyer, Hilari M French, Elaine Watson, Christine Aurich, F Xavier Donadeu	2018	Stem Cells Dev; 1;27(15):1046-1052
10	Effects of season and single layer centrifugation on bull sperm quality in Thailand	Thanapol Nongbua, Apirak Utta, Nutthee Am-in, Junpen Suwimonteerabutr, Anders Johannisson, Jane M Morrell	2020	Asian-Australas J Anim Sci. 33(9): 1411–1420.
11	Season does not have a deleterious effect on proportions of stallion seminal plasma proteins	Anders Johannisson, Essraa M. Al-essawe, Anas Kh. Al-saffar, Saeid Karkehabadi, Isabel Lima-verde, Manuela Wulf, Christine Aurich, Jane M. Morrell	2020	J Reprod Dev. 66(3): 215–221
12	Sperm quality in frozen beef and dairy bull semen	Jane Margaret Morrell, Andra Sabina Valeanu, Nils Lundeheim, Anders Johannisson	2018	Acta Vet Scand. 60: 41.
13	Pannexin channels are involved in freezing/thawing IP-permeability	Torres J, Palomino J, Moreno, RD, De los	2017	Reprod Fertil Dev; 29(11) 2269-2276.

	increase in dog spermatozoa.	Reyes, M.		
14	GDF-9 and BMP-15 mRNA levels in canine cumulus cells are	Ramirez G., Palomino J., Aspee K., De los Reyes	2020	Animals; 10(2): 462

X. PROGRAMACIÓN	
Knowledge area 1	Biotechnology applied to reproduction and regenerative medicine in horses and food animals.
Learning result 1	Analyze the fundamentals of Reproductive and Regenerative Biotechnology in the

15	connexins 37 and 43 in cumulus oocytes complexes throughout the canine oestrous cycle.	Espinoza R.,. Dettleff P, Peralta O.A., Parraguez V.H, Ramirez G	2020	Reprod Fertil Dev; 32(11) 976-987.
16	Reproductive technologies for the conservation of wildlife and endangered species	Gabriela F Mastromonaco, Nucharin Songsasen	2020	Reproductive Technologies in Animals, Academic Press
17	Oviductal Extracellular Vesicles Improve Post-Thaw Sperm Function in Red Wolves and Cheetahs	Marcia de Almeida Monteiro Melo Ferraz, Jennifer Beth Nagashima, Michael James Noonan, Adrienne E Crosier, Nucharin Songsasen	2020	Int J Mol Sci. 25;21(10):3733
18	Lessons from biodiversity--the value of nontraditional species to advance reproductive science, conservation, and human health	David E Wildt, Pierre Comizzoli, Budhan Pukazhenthi, Nucharin Songsasen	2010	Mol Reprod Dev; 77(5):397-409.
19	Induced Pluripotent Stem Cells (iPSCs) in Developmental Toxicology	Charles A Easley	2019	Methods Mol Biol;v1965:19-34.
20	Assessing reproductive toxicity of two environmental toxicants with a novel in vitro human spermatogenic model	Charles A Easley 4th, Joshua M Bradner, Amber Moser, Chelsea A Rickman, Zachary T McEachin, Megan M Merritt, Jason M Hansen, W Michael Caudle	2015	Stem Cell Res;14(3):347-55.
21	Gamete derivation from embryonic stem cells, induced pluripotent stem cells or somatic cell nuclear transfer-derived embryonic stem cells: state of the art	Charles A Easley, Calvin R Simerly, Gerald Schatten	2014	Reprod Fertil Dev; 27(1):89-92

	English language, considering particularities of each animal species, understanding its application in reproduction, genetic improvement and medicine.
Description of the evaluation	**Proposal No.1:** Biotechnologies associated with reproduction and regenerative medicine have potential applications in food animals through several strategies that include genetic improvement, production of transgenic animals, fetal programming and clinical therapies. In this regard, **it is requested** to carry out a proposal or scientific project based on scientific or technological research, aiming at generating new knowledge or applications through working hypotheses included in the project. The proposal must be written in English, it is individual and must not exceed 5 pages, letter size (references included) verdana 10 following the format of a Fondecyt project. https://www.conicyt.cl/fondecyt/2019/05/13/concurso-regular-fondecyt-2020/ The proposal should contain the following sections: a) Theoretical-conceptual and state-of-the-art developments that underpin the proposal b) Objectives and hypotheses or research questions c) Methodology d) Work Plan e) Background information to assess the capacity and experience of the team to implement the proposal **Recommended references:** 1-12

Date	Schedule	Topic	Methodology	References (N°)	Professor	Direct hrs	Ind. hrs
5-01	09:00 a 9:30	Program presentation	Lecture		Oscar Peralta		
5-01	09:30 a 10:30	Mesenchymal stem cells in livestock cattle: Potential applications for cell therapy and reproduction	Lecture	1-2-3	Oscar Peralta	2	4
5-01	10:30 a 12:00	Mesenchymal stem cells in livestock cattle: Potential applications for cell therapy and reproduction	Paper discussion	1-2-3	Oscar Peralta	2	4
7-01	09:00 a 10:30	Developmental programming of impaired muscle growth affected by foetal growth restriction.	Lecture	4-5-6	Yennifer Cortes	2	4
7-01	10:30 a 12:00	Developmental programming of impaired muscle growth affected by	Paper discussion	4-5-6	Yennifer Cortes	2	4

		foetal growth restriction.					
12-01	09:00 a 10:30	Perspectives of Mesenchymal and induced pluripotent stem in veterinary regenerative medicine	Lecture	7-8-9	Xavier Donadeu	2	4
12-01	10:30 a 12:00	Perspectives of Mesenchymal and induced pluripotent stem in veterinary regenerative medicine	Paper discussion	7-8-9	Xavier Donadeu	2	4
14-01	09:00 a 10:30	Practical applications of sperm selection for assisted reproduction to increase reproductive efficiency in livestock production	Lecture	10-11-12	Jane Morrell	2	4
14-01	10:30 a 12:00	Practical applications of sperm selection for assisted reproduction to increase reproductive efficiency in livestock production	Lecture	10-11-12	Jane Morrell	2	4

Knowledge area 2	Biotechnology applied to the reproduction of companion animals, conservation of wild animals and experimental models.
Learning Result 2	Analyze the fundamentals of Reproductive Biotechnology in the English language, considering particularities by each animal species, understanding its application in reproduction, conservation and scientific research.
Evaluation Description	**Proposal 2:** A fundamental discipline of knowledge in the area of veterinary medicine constitutes the study of reproductive biology and the development and application of biotechnologies for the reproduction of canine and feline species, as well as for the use of these technologies in wildlife conservation. Moreover, the use of animal models including primate allows to bring knowledge in the treatment of diseases that affect reproductive function to clinical application in humans. In this regard, **it is requested** to carry out a proposal or scientific project oriented to scientific or technological research, which will lead to generate new knowledge

	or applications through working hypotheses expressed in the project. The proposal must be written in English, it is individual and must not exceed 5 pages, letter size (references included) verdana 10 following the Fondecyt project format. https://www.conicyt.cl/fondecyt/2019/05/13/concurso-regular-fondecyt-2020/ The proposal should contain the following sections: a) Theoretical-conceptual and state-of-the-art developments that underpin the proposal b) Objectives and hypotheses or research questions c) Methodology d) Work Plan e) Background information to assess the capacity and experience of the team to implement the proposal Recommended references: 13-24

Date	Schedule	Topic	Methodology	References (N°)	Professor	Direct hrs.	Ind. Hrs.
19-01	09:00 a 13:00	New trends in Artificial Insemination in domestic carnivores	Lecture	13-14-15	Mónica De los Reyes	2	4
19-01	10:30 a 12:00	New trends in Artificial Insemination in domestic carnivores	Paper discussion	13-14-15	Mónica De los Reyes	2	4
21-01	09:00 a 13:00	Roles of Reproductive Sciences in Endangered Species Conservation	Lecture	16-17-18	Nucharin Songsasen	2	4
21-01	10:30 a 12:00	Roles of Reproductive Sciences in Endangered Species Conservation	Paper discussion	16-17-18	Nucharin Songsasen	2	4
26-01	09:00 a 13:00	Using an in vitro spermatogenesis platform to model male factor infertility and develop novel therapies	Lecture	19-20-21	Charles Easley	2	4
26-01	10:30 a 12:00	Using an in vitro spermatogenesis platform to model male factor infertility and develop novel therapies	Paper discussion	19-20-21	Charles Easley	2	4
28-01	09:00 a 13:00	Undefined	Lecture	22-23-24		2	4
29-	10:30 a	Undefined	Paper	22-23-24		2	4

01	12:00		discussion				