Artificial insemination and assisted reproductive technologies (2 CFU, 24 hrs; 18 hrs lectures and 6 hrs [x4] practical sessions)			
<u>Objectives of the course</u>: the student learns about the use of artificial insemination (AI) in farm animals, the estrous cycle and estrus synchronization and how to use semen for insemination; furthermore the student learns the more advanced assisted reproductive techniques (in vivo and in vitro embryo production, embryo sexing and freezing, embryo transfer, cloning) as an instrument for the genetic improvement, for the improvement of reproductive efficiency, for fertility recovery, and for the use in biotechnologies.			
Lectures			
Contents and learning outcomes	**Themes**	**Specific contents**	**Hours**
1.COURSE PRESENTATION: HOW TO FACE THE COURSE		Course presentation, program, teachers, teaching methods, readings/bibliography, final assessment.	0,5
2. ARTIFICIAL INSEMINATION IN THE BOVINE AND BUFFALO (Tot. 3 hrs) [*acquirement of: a) Reproductive parameters in dairy cow livestock and interpreation of available data b) Estrous cycle manipulation with different estrus synchronization protocols c) Artificial insemination, how and when make it*]	***Estrous cycle and fertility***	Estrous cycle, livestock fertility and reproductive parameters, estrus detection	1
	Estrous cycle manipulation	Synchronization of estrus and ovulation	0,5
	Artificial insemination	History, advantages and disadvantages, legislation, instruments and technique	1
	Artificial insemination in the buffalo	Estrous cycle, reproductive efficiency, deseasoning, estrous cycle manipulation	0,5
3. ARTIFICIAL INSEMINATION IN THE HORSE (Tot. 2,5 hrs) [*acquirement of: a) Estrous cycle manipulation with different estrus synchronization protocols b) Artificial insemination, how and when make it*]	***Estrous cycle***	Estrous cycle and estrus detection	0,5
	Estrous cycle manipulation	Seasonal anestrus removal, transition phase management, synchronization of estrus and ovulation	1
	Artificial insemination	Applications, advantages and disadvantages, insemination instruments and technique	1
4. ARTIFICIAL INSEMINATION IN THE PIG, SHEEP AND GOAT (Tot. 2 hrs) [*acquirement of: a) a) Estrous cycle manipulation with*	***Artificial insemination in the pig***	Estrous cycle, estrus detection, reproductive efficiency, estrous cycle manipulation and artificial insemination in the sow	1

different estrus synchronization protocols b) Artificial insemination, how and when make it]	***Artificial insemination in the sheep and goat***	Estrous cycle, estrus detection, estrous cycle manipulation and artificial insemination in the sheep and goat	1
5. IN VIVO EMBRYO PRODUCTION (Tot. 5 hrs) [*acquirement of: a) Superovulation induction for bovine in vivo embryo production b) Embryo selection for transfer and freezing c) Embryo freezing techniques d) Thawing and transfer of embryos in recipient animals*]	***In vivo embryo production in farm animals***	Donor selection, gynaecologic evaluation, drugs and treatments, insemination, uterine flushing for embryo collection	2
	Morphological evaluation of embryos	Embryo identification and classification using IETS standards. Identification of embryo developmental stage and quality	0,5
	Embryo sexing	Technique for embryo sex determination	0,5
	Embryo freezing	Action mechanism of cryoprotectants, using glycerol and ethilen glycol, equilibration, packaging. Instruments and freezing curve. Vitrification outlines	0,5
	Embryo transfer	Recipient selection and management. Selection of the optimal recipient for transfer. Embryo thawing, embryo transfer	1,5
6. IN VITRO EMBRYO PRODUCTION (Tot. 3 hrs) [*acquirement of: a) Protocols for bovine in vitro embryo production b) Protocols for equine in vitro embryo production*]	***Bovine in vitro embryo production***	Applications, advantages and disadvantages, occyte collection (in vivo tby Ovum Pick Up o at the slaughterhouse), oocyte quality, IVM, IVF, IVC	2
	Equine in vitro embryo production	Raccolta degli ovociti mediante tecnica di Ovum Pick Up per la maturazione in vitro o per l'oocyte transfer. Intracitoplasmic sperm injection (ICSI)	1
7. IN VITRO EMBRYO PRODUCTION (Tot. 2 hrs) [*acquirement of: a) Techniques of embryonic and somatic cloning b) Genetic engineering techniques and possible applications*]	***Animal cloning***	Concepts and applications, embryo bisection, blastomeres separation, nuclear transfer cloning, embryonic and somatic cloning, efficiency and troubles	1
	Genetic engineering	Definitions, animal species and techniques, phases for the generation of a genetic modified animal, applications in the biomedical field and potential applications in the zootechnical field	1

Practical sessions			
Contents and learning outcomes	**Themes**	**Specific contents**	**hours**
8. ARTIFICIAL INSEMINATION ***(Tot. 2 hrs)*** [*acquirement of: nozioni fondamentali per l'esecuzione di una inseminazione artificiale*]	***AI in the bovine and equine***	Instruments. Artficial insemination in a training simulator and in the animal	2
9. EMBRYO TRANSFER ***(Tot. 2 hrs)*** [*acquirement of: nozioni fondamentali per l'esecuzione di un flushing uterino*]	***Uterine flushing for bovine and equine embryo collection***	Instruments. Uterine flushing for bovine embryo collection in a training simulator	2
10. OVUM PICK-UP ***(Tot. 2 hrs)*** [*acquirement of: nozioni fondamentali per l'esecuzione di un prelievo di oociti in vivo*]	***Ovum pick up for bovine and equine oocyte recovery***	Instruments. Transvaginal ultrasound-guided follicular aspiration of ovaries	2