

<b>Coordination of modules</b>			
<b>Names of programme teachers /instructors:</b>	<b>Qualifications</b>	<b>Filiation/Position</b>	<b>Responsibilities/ Involvement</b>
Francisco José Vázquez Bringas	LV, PhD	University of Zaragoza (UZ), Spain. Associate Professor of Equine Surgery. Surgeon of Equine Service of Veterinary Teaching Hospital of UZ	Programme Director General coordination. Coordination of module 1: Professional key skills. Clinical management and communications
Verónica Salazar Nussio	LV, PhD, Dip ACVAA, Dip. ECVAA	Alfonso X University (UAX), Madrid, Spain. Chief Anesthesiology Service and Course Leader in Anesthesiology course, Veterinary Teaching Hospital, Veterinary Faculty, UAX	Coordination of module 2: Analgesia and anaesthesia
Manuel Novales Durán	LV, PhD	University of Córdoba (UCO) , Spain. Professor of Radiology Chief of Radiology Service of Veterinary Teaching Hospital of UCO. Director of the Diagnostic Center for Osteochondrosis in the Purebred Spanish Horse.	Coordination of module 3: Diagnostic imaging
David Argüelles Capilla	LV, PhD, Dip ECVS, ACVSMR Resident	Autonomous University of Barcelona (UAB), Spain. Associate Professor of Equine Surgery. Surgeon of Equine Unit of Veterinary Teaching Hospital of UAB	Coordination of module 4: Emergency, critical and supportive care
Carla Aguirre Pascasio	LV, MSc, PhD, CertAVP EM&ESST (Equine Medicine & Surgery Soft Tissue), ECEIM Resident	University of Murcia (UMU) , Spain. Veterinary Clinician. Equine Service of Veterinary Teaching Hospital.	Coordination of module 5: Internal Medicine
Francisco Javier López San Román	LV, PhD, Dip ECVS	Complutense University of Madrid (UCM), Spain. Professor of Large Animal Surgery, Veterinary Faculty, UCM. Head of Large Animal Section of The Veterinary Teaching Hospital, UCM	Coordination of module 6: General surgery
Antonio Cruz Madorrán	LV, MVM, MSc, PhD, Dip ACVS, Dip ECVS, Dip ACVSMR	Cardenal Herrera University (CEU-UCH), Valencia, Spain. Director of Equine Hospital Chief of Equine Surgery, Sports Medicine and Rehabilitation, CEU-UCH	Coordination of module 7: Lameness investigation, sport medicine and rehabilitation
Cristina Ortega Ferrusola	LV, PhD, ECAR Resident	University of Extremadura (UEX), Spain. Researcher and Technical director of Equine Reproduction Service of Veterinary Teaching Hospital of UEX.	Coordination of module 8: Reproduction, neonatology and stud farm medicine

## **APPENDIX I: Programme overview**

### **Aims and objectives**

The aim of this program is to provide structured specific knowledge, competences and skills in the field of equine veterinary practice in order to achieve an adequate professional status as an equine general practitioner inside the framework of Spanish equine industry and with mutual recognition with other Equine Vets (Veterinary Continuing Education in Europe) programs.

The course is addressed to postgraduate veterinarians working in this field who will be able to complete and complement specific education not covered at a graduate level and to put this knowledge into practice in their work.

### **Level**

The level of knowledges, skills and competencies are set at European Qualification Framework (EQF) Level 7, higher than the graduation level for an establishment of veterinary education accredited by the EAEVE (European Association of Establishments for Veterinary Education) but lower than European (or American) Diplomate Specialist Boards (EBVS, ABVS), following the standards and dossier of competences created by the VetCEE Board.

### **Quantity of education**

Total learning time for this program is 32 ECTS (European Credit Transfer System) units of learning, which is equivalent of 800 hours of blended learning, approximately 6.4 months full-time learning, including contact learning hours and autonomous work.

The program includes a variety of teaching methods in order to address the different learning styles: online teaching, practical teaching, self-directed learning, multimedia resources, case logs and assignments. Although each of these teaching methods has her own proportion of contact/non-contact learning, the approximate global proportion of the contact learning hours in this program is 50% and the practice proportion is around 25% (see table in page 5).

The program is structured to allow candidates to spread the learning over a period of 2 to 5 years (minimum and maximum). This large range of time and the important presence of online learning allow completing the programme when the postgraduates are starting their professional career and also facilitate longer periods necessary for careers breaks for family, health or professional reasons.

### **Scope**

This course is orientated to achieve high quality veterinary care as a first opinion equine practitioners for the benefit of equids health, welfare and also benefit of owners and society. This species-orientated -mainly horses and also donkeys- programme includes several modules of the different disciplines needed in equine veterinary practice.

## **Enrolment in programme pre-requisites**

This is a course oriented towards veterinary degrees with a minimum of professional experience. Before enrolling in the course, all candidates' CVs are assessed. To ensure a basic level of experience before beginning of the programme. The condition of being qualified for at least one year and, have worked at least for a time equivalent to one year in the field or in an equine veterinary practice is a prerequisite before enrolment of candidates. Participation in recognized equine internship programmes after veterinary graduation can be computed as this year of professional experience. During the previous professional activity period, candidates must be a member of the veterinary statutory body within the country where they have been worked as veterinarian. During the duration of the programme the veterinarian must be a member of a local statutory body of the CGCVE.

## **Modularisation**

The program is structured in 8 modules which can be combined individually and can be taken in the candidate convenience within two to five years. This structure is compatible with different personal situations of candidates, including a full time job with high work load (an average of 8 to 3 hours of dedication per week according to 2 or 5 years of duration). Accreditation is awarded to the candidate that completes entire programme and not separate modules.

Module 1 Professional key skills. Clinical management and communications (2.5 ECTS)

Module 2 Analgesia and anaesthesia (2.5 ECTS)

Module 3 Diagnostic imaging (2.5 ECTS)

Module 4 Emergency, critical and supportive care (2.5 ECTS)

Module 5 Internal Medicine (6.5 ECTS)

Module 6 General surgery (5 ECTS)

Module 7 Lameness investigation, sport medicine and rehabilitation (5 ECTS)

Module 8 Reproduction, neonatology and stud farm medicine (5.5 ECTS)

An important amount of the program contents is provided online. In order to optimize time and to facilitate attendance of candidates coming from different sites of Spanish geography, the rest of contact hours (mainly wet-lab sessions) are grouped in 5 two-days intensive sessions and offer in different places, several times each 5 years (according the demand).

Practical session I Wet-labs of module 3

Practical session II Wet-labs of modules 4 and 5

Practical session III Wet-labs of modules 2 and 6

Practical session IV Wet-labs of module 7

Practical session V Wet-labs of module 8

## **Quality assurance**

The Spanish veterinary statutory body (Consejo General de Colegios Veterinarios de España (CGCVE)) is the provider of this programme. The CGCVE is implementing a global policy and associated procedures for the assurance of the quality of their activities. Quality assurance systems of programmes and awards of the CGCV will be evaluated and approved by ACPUA (Agencia de Calidad y Prospectiva de Aragón) an agency approved by the European Association for Quality Assurance in Higher Education (ENQA). ACPUA will be responsible for overseeing that this programme has a strategy for the continuous enhancement of quality, including the programme design and delivery, assessment of candidates, quality of teachers and teaching, learning resources, information systems and communications. To do this, a formal audit will be carried out every five years, reviewing the theoretical and practical contents in situ as well as the facilities and laboratories where the programme will take place, and also including an examination of individual student assessments and student feedback about the programme.

Each module is coordinated by an expert in the field of the topic. This coordination team has appropriate professional skills and sufficient experience in high education and postgraduate teaching: (6 EBVS/ABVS diplomas, 2 RCVS advanced veterinary practice certificates, 8 PhD). The coordination team has relevant teaching experience and appropriate pedagogical knowledge.

The programme has an extensive initial list of potential teachers/instructors who have shown to CGCVE their interest in participating. This list of more than 70 teachers in total for different modules includes several Spanish speaking instructors come from Europe and USA. Most of teachers are internationally recognized.

The quality and relevance of the practice or work place experience is supervised. Support of students is ensured, so that students can achieve appropriate experience to acquire the desired learning outcomes of the programme. In cases where the students should necessitate, additional support, this would be compensate providing other places to complete the practice

The CGCVE (the competent authority which regulates the veterinary profession in Spain) has been confirmed the approval of the programme as a valid veterinary professional qualification, delivered at a national level.

## **Assessment**

All candidates are individually assessed. Each module is assessed, but CertEuCEq accreditation is awarded to the student that concludes the entire programme and not modules separately.

Candidates are assessed on the following:

### *Knowledge and understanding*

Each module is evaluated with an exam and/or by several tasks such as: case studies, preparation of reports, solving practical problems, presentation of selected cases, etc.

Students must successfully resolve a number of case studies proposed during the course. Cases are based on practical aspects of the topics covered during the different modules. For a successful achievement, students will have to take into consideration notes taken during classes but also specific bibliography.

In the last modules (4, 5, 6, 7 and 8) students must adequately present Case reports and Case logs related to the topics of these modules. These cases must be discussed by student considering notes taken during classes and specific bibliography. Knowledge of the first modules (1, 2, 3 and 4) must be included in clinical cases of last modules.

#### *Practical skills*

Modules that include practical skills include an individual assessment during the practical session. Assessment of practical skills is also done by means of a check-list from Case log, where minimum requirements are clearly defined.

#### *Communication skills*

Some modules include clinical reports, practical cases and/or exercises that participants must discuss in groups and present and defend in front of the other participants.

#### *Conditions for passing each module:*

To pass each module these required topics must be completed:

- 100% attendance of scheduled online (non live) theoretical classes and the scheduled practice sessions.
- Online (limited time) test questionnaire after each unit of theory.
- In some modules, students must adequately present a CASE REPORT with a series of well documented clinical cases related to the topics of these modules. These cases must be discussed by student taking into consideration notes taken during classes and specific bibliography.
- In some modules, students must adequately present a CASE LOG or portfolio with a series of clinical cases related to the topics of these modules.
- A final online assessment (limited time). Students must complete the other topics before this assessment and successfully answer some questions. For a successful achievement, student will have to take into consideration notes taken during class but also specific bibliography.

To pass each module, a minimum of 50% must be obtained. Participants are previously informed of the relative weight of each component used in the evaluation of each module:

- 10% Test questionnaire of each theory unit.
- 20% Case report.
- 20% Portfolio or Case log
- 50% Final module assessment.

#### *Conditions for passing the programme:*

To overcome the complete programme, the students must pass each module and pass a final assessment. This global final scrutiny is face-to-face (vivo) and may consist of different contents (test and development questions, oral discussion of cases, etc.) with a court of professors from several modules.

### **Appeals procedures for candidates**

An evaluation is conducted by teachers of the module and supervised by the module coordinator.

In case of a claim made against the evaluation given, the evaluation evidences will be revised by the coordinator of the programme and the coordinators of other modules who are not directly involved in the evaluation. All evaluation documents are kept for at least five years.

## APPENDIX II: Full programme syllabus

### Module 1: PROFESSIONAL KEY SKILLS. CLINICAL MANAGEMENT AND COMMUNICATIONS (2.5 ECTS)

#### **LEARNING OBJECTIVES:**

Acquire or consolidate general abilities for a qualified equine clinician that develop individual clinical activities or that work under professional team.

1. Practical understanding of established techniques of research and enquiry.
2. Acquire knowledges of behavior, principal technical aspects and rules in relation with animal welfare and equine welfare.
3. Ability to deal with complex animal welfare issues, using systematic approaches to make sound judgements.
4. Develop abilities to applicate equine signalment regulations.
5. Specific regulations regarding to biosecurity, health, transport, possession and breeding in the their more common use.
6. Medicines law and equine practice. Guidance on the use of cascade. Use of medicines in sport horses and horses that may be for human consumption.
7. To recognize national requirements to move and manage waste produced during equine clinical activity.
8. Understanding veterinary regulations of public and private services (international, national and autonomous) in relation with equine industry. Also understand the relations with breeding associations, sport federations, race associations, insurance companies and know how to fill out official documents that generally are used.
9. Practical welfare assessment of the Veterinary College. Understand veterinary responsibilities that originate from acts in relation with clinical activities, owners and in prepurchase examinations.
10. Learn how to apply rules of laboral security, especially those in relation with equine clinical activity.
11. Understand the culture of quality that is apply to the personal and professional development. Be aware about the importance of evidence based medicine and how to apply it.
12. Acquire and develop basic abilities for a correct communication skills with the team work and other veterinary colleagues and specially with the owners during complex situations. Learn how to manage situations as euthanasia or animal use loss. Acquire leadership abilities.
13. Be able to maintain accordance register of the history and client data, respecting the country regulation regarding to data protection. Be a warranty of the retrospective evaluation and report writing. Critical evaluation of current data management systems.
14. Systematic understanding of current business practice and personnel management.

## **SYLLABUS:**

***THEORETICAL SYLLABUS 2.32 ECTS (50% contact hours): 29 contact online hours and 29 non-contact hours (home self study); 58 total hours = 2.32 ECTS***

### **I SECTION. GENERAL KNOWLEDGES OF VETERINARY MEDICINE IN EQUINE PRACTICE. 17 online hours**

**Unit 1.- Equine signalment.** National, European and International regulatory framework. Signalment procedures: graphic and descriptive identification. Other signalment mechanisms. Coat heritage. Determination of age.

**Unit 2.- Equine welfare.** Equine ethology. Responsible possession. Comunitary and national welfare legislation. Equine and Donkey protocol evaluation. Training and equine welfare. Transport and equine welfare. The vets role in equine neglect. Equine industry welfare guidelines. Practical welfare assessment of animals and use of the “five freedoms”

**Unit 3.- Public health and biosecurity.** Preventative health. European and National legislation in public health, equine application. Endemic and notifiable diseases. Overview of infection control strategies for equine facilities. Zoosanitary ordination in equine facilities. Comunitary, National and other countries transportation.

**Unit 4.- Equine nutrition.** Regulation about commercialization of feed and row material. Carbohydrates, lipids, proteins, vitamins and minerals. Carrying out a well-balanced diet: animals in maintenance, exercise, growing and stallions and breeding mares.

**Unit 5.- Responsible use of medicines.** Authorised medicinal products that must never be used to treat horses that may be for human consumption. List of substances essential for the treatment of equidae. Products for which a specific withdrawal period has been authorized. Antimicrobial resistances.

**Unit 6.- Waste management.** National legislation in sanitary waste. SANDACH: elimination and/or cadaver processing. Ethical guidelines to cadaver transportation. Valuation of manures.

**Unit 7.- Equine industry in Spain.** Official veterinary services. Stud books, functioning and interaction with veterinarias. International federation for equestrian sports: veterinary participation in competitions. Regulatory societies of racing. Insurance companies, expertise evaluation and general rules.

**Unit 8.- Profesional conduct and ethical decisions.** Deontological code of the Veterinary College. Equine patient and limitations. Quality of veterinary care. Approach to everyday ethics and code of good practices.

**Unit 9.- Profesional responsibilities.** Current rules. Critical points of high conflict. Informed consent.

**Unit 10.- Job security.** Principal zoonoses. Protection protocols and system. Protection during pregnancy. Security during driving. Attitude to make easier the clinical activity (“dontbrakeyourvet”-BEVA)

### **II SECTION. CLINICAL MANAGEMENT AND COMMUNICATION SKILLS. 12 online**



## hours

**Unit 11.- Evidence based medicine.** Research in clinical reasoning. Clinical problem solving methods. Biomedical knowledge and paper presentation. Clinical audit in clinical practice.

**Unit 12.- Communication skills.** The effects of good and poor communication. Dealing professionally with second opinions and referrals. Practice communication policy development.

**Unit 14.- Records and reports.** Relevant data handling management. Security copy. Data protection. Report elaboration depending of addressee. Retrospective evaluation.

**Unit 15.- Business management.** Development of effective staff appraisal processes. CPD. Team building concepts and ideas. Dealing with difficult employee situation. Practical business and financial planning.

***PRACTICAL SYLLABUS: 0.18 ECTS : 4.5 non-contact hours (home self study and portfolio preparation); 4.5 total hours = 0.18 ECTS***

A total of 3 cases (real situations) must be collected (about welfare, biosecurity and professional conduct). Complete signalement including case number and diagnostic procedures performed must be described in the case log. It is essential that each case is numbered consecutively and that full case records can be identified and retrieved on the basis of information in the case log.

### **LEARNING OUTCOME:**

When the module is finished the student will be able to:

1. The candidates should have knowledges regarding ethic and welfare issues in relation with equine management in field and hospital conditions.
2. Demonstrate capacity to maintain exhaustive register of cases, retrospective evaluation and perform professional reports.
3. Communication skills with owners, team and colleagues are essential in high quality equine clinics. Regarding to clinical evaluation of cases, veterinary management as first opinion during the first attention or/and after referred to a specialist.
4. Communication skills with the client should be one of the primary objectives. These habilities should include the capacity to collect a relevant clinical history, to write a correct diagnostic plan, to evaluate results and treatment. Besides, the interaction and communication during difficult situations as euthanasia or loss of use.
5. Leadership during compromise situations in equestrian events in presence of public and medium. The equine clinician should be able to promote team work, delegate tasks and perform constructive critics.
6. Finally is necessary to show knowledges in business management of an own clinic or group of clinicians that are able to dispense a high level attention in private environment.

## Module 2: ANESTHESIA AND ANALGESIA (2.5 ECTS)

### LEARNING OBJECTIVES:

#### **General Objectives**

The mastery of essential anesthetic and analgesic skills is vital for the field equine practitioner. This module will provide the required knowledge and skills needed to perform a safe anesthetic procedure, both in elective and emergency diagnostic/therapeutic procedures. This module will provide as well essential practical skills for the adequate pain management of the equine patient.

#### **Specific objectives:**

1. Assessment and evaluation of the pre-anesthetic status of a patient and determination of its anesthetic risk.
2. Design and application of a safe sedation protocol for the most frequent diagnostic and therapeutic procedures.
3. Design of a safe premedication protocol for field and in-house equine anesthesia.
4. Design of a safe induction and maintenance protocol for field and in-house equine anesthesia.
5. Monitoring of anesthetic depth and vital constants in field and in-house equine anesthesia.
6. Prevention, identification and treatment of the most common anesthetic complications in field and in-house equine anesthesia.
7. Troubleshooting of most anesthetic equipment and monitor problems.

### SYLLABUS:

***THEORETICAL SYLLABUS 1.8 ECTS (50% contact hours): 23 contact online hours and 23 non-contact hours (home self study); 46 total hours = 1.8 ECTS***

#### **Unit 1. Pre-anesthetic assessment and preparation.**

Physical examination. Laboratory Test. Anesthetic risk and physical status. Morbidity and mortality associated with equine anesthesia. Pre-anesthetic considerations related to specific conditions and diseases. Preparation of the equine patient to anesthesia. Intravenous and arterial catheterization.

#### **Unit 2. Sedation.**

Phenothiazines. Benzodiazepines. Alpha-2 adrenoceptor agonists. Opioids. Combinations for sedation for standing procedures.

#### **Unit 3. Induction.**

Dissociative anesthetics (Ketamine). Barbiturates (Thiopental). Other injectable anesthetics (Propofol, Alfaxalone, Etomidate). Centrally acting muscle relaxants (Benzodiazepines, Guaifenesin). Induction techniques. Tracheal intubation. Nasal intubation. Tracheostomy.

#### **Unit 4. Positioning.**

Physiological consequences of different recumbencies. Padding. Positioning of limbs.

#### **Unit 5. Inhalant general anesthesia.**

General pharmacological considerations of inhalation agents. Halogenated agents (Isoflurane, Sevoflurane, Desflurane). Partial intravenous anesthesia as supplement to inhalant general anesthesia (Lidocaine, ketamine, alpha-2 adrenoceptor agonist and opioids CRI).

#### **Unit 6. Intra Venous general anesthesia.**

Total Intravenous anesthesia combinations. Field anesthesia.

#### **Unit 7. Recovery.**

Factors affecting quality and length of recovery. Assisted recovery (ropes, sling, pool, raft). Oxygen supplementation during recovery (nasotracheal intubation, oxygen demand valve).

#### **Unit 8. Monitoring.**

The anesthetic record. Monitoring of anesthetic depth. Monitoring of the cardiovascular and hemodynamic status (heart rate, cardiac auscultation of heart sounds, mucous membranes color, capillary refill time, electrocardiogram, blood pressure – invasive and non-invasive – central venous pressure, cardiac output). Monitoring of oxygenation status (respiratory rate, pulmonary auscultation of lung sounds, respiratory pattern, mucous membrane color, pulsioximetry, arterial blood gas). Monitoring of ventilation status (respiratory rate, pulmonary auscultation of lung sounds, respiratory pattern, end-tidal CO<sub>2</sub>, arterial blood gas). Other (lactate, temperature).

#### **Unit 9. Anesthetic equipment (vaporizer, anesthesia machine and ventilator).**

Systems for delivery of medical gases (oxygen, medical air, nitrous oxide). Anesthetic machine (main components). Vaporizers. Breathing systems. Ventilators. Scavenging methods. Most common equine anesthetic machines. Safety checklist.

#### **Unit 10. Anesthetic complications.**

Complications related to the premedications and induction phases. Complications related to the maintenance phase. Complications related to mechanical ventilation. Complications after extubation. Complications related to the recovery phase.

#### **Unit 11. Analgesia and pain management (systemic).**

Pathophysiology of pain. Opioids. NSAIDs. Other (alpha-2 adrenoceptor agonists, NMDA antagonists). Pain assessment tools (physiological indicators, behavioral indicators, pain scales).

#### **Unit 12. Analgesia and pain management (loco-regional).**

Local anesthetics pharmacology (Lidocaine, Bupivacaine, Mepivacaine, Ropivacaine, Procaine). Local anesthetics toxicity (cardiac and nervous toxicity). Potentiation and Inhibition of local anesthesia. Equipment necessary for delivery of loco-regional anesthesia.

### **Unit 13. Anesthesia and analgesia of donkey and mule.**

Anatomical, physiological and behavioral differences with horses. Premedication and sedation. Induction. Maintenance. Monitoring and instrumentation. Recovery. Analgesia.

### **Unit 14. Anesthesia for specific conditions and situations.**

Anesthesia in foals. Anesthesia in acute abdominal syndrome patients. Anesthesia for the neurological patient. Anesthesia in c-section patients. Anesthesia in arthroscopies. Anesthesia in laryngeal dysfunctions. Anesthesia in condylar fractures. Anesthesia in HYPP patient.

***PRACTICAL SYLLABUS: 0.7 ECTS (33.3% contact hours): 2 contact hours (problem or case based learning), 3.5 contact hours (case log compilation) and 11 non-contact hours (home self study and case log preparation); 16.5 total hours = 0.7 ECTS***

### **I PROBLEM OR CASE BASED LEARNING (2 contact hours and 4 non-contact hours)**

A total of 3 clinical cases will be provided for discussion. One of them consisting in a pre-anesthetic assessment case, one in a sedation protocol design for a standing procedure and one in a case of pain management.

### **II CASE LOG (3.5 contact hours and 7 non-contact hours)**

A total of 10 sedations and 10 general anesthesia procedures (5 inhalant and 5 intravenous) must be collected during the surgical wetlabs. Complete patient signalement, case number, diagnosis, procedure performed, elective or emergency anesthesia, ASA status, premedication drugs, induction drugs, maintenance agents, hemodynamic support drugs, maintenance support drugs, ventilation mode, method of recovery, complications and outcome. The case log form will be provided.

### **LEARNING OUTCOME:**

The successful student will demonstrate the ability:

- To successfully evaluate the pre-anesthetic status of a patient and determine its anesthetic risk.
- To safely restrain a patient physically and pharmacologically by the design and application of a safe sedation protocol in order to perform the most frequent diagnostic and therapeutic procedures in field equine practice.
- To design a safe premedication protocol for field and in-house anesthesia.
- To design a safe induction and maintenance protocol for field and in-house anesthesia.
- To effectively monitor anesthetic depth and vital constants in the anesthetized patient.
- To effectively troubleshoot anesthetic equipment problems.

## Module 3. DIAGNOSTIC IMAGING (2.5 ECTS)

### LEARNING OBJECTIVES:

- 1.- To understand the fundamentals of Radiation Safety while working with X-Rays.
- 2.- To understand how the bones and joints respond to injury, and how to interpret their images.
- 3.- To understand the anatomy of horses and foals through radiographic views of their locomotor system taken by a portable X-ray device, and how to process their corresponding digital images, including basic and complementary views.
- 4.- To understand the physical fundamentals of ultrasound including equipment used.
- 5.- To know how to take and interpret ultrasounds of the distal parts of limbs, especially the pastern, the fetlock and metacarpal and metatarsal regions.
- 6.- To have a basic knowledge of other regions (carpus, tarsus, stifle and shoulder).
- 7- To understand the fundamentals of advanced imaging diagnostic techniques
- 8.-To know in which specific cases it is advisable to recommend advanced imaging diagnostic techniques.

### SYLLABUS:

***THEORETICAL SYLLABUS: 1.52 ECTS (50% contact hours): 19 contact online hours and 19 non-contact hours (home self study); 38 total hours = 1.52 ECTS***

### **SECTION I. RADIOLOGY. 8 contact online hours**

#### **Ia. General principles of radiology and radiation safety (1 contact online hour)**

**Unit 1. General principles concerning ionizing radiation and x-rays.** Harmful effects of the ionizing radiation. ALARA principles. Measurement units. Stochastic and non-stochastic effects of radiation. Dosimetry. Safety radiation rules for equine radiology.

**Unit 2.- X-ray equipment and accesories.** Radiographic detectors and image processing. Computerized Radiology (CR), Direct Digital Radiology (DDR). Digital terminology: DICOM and PACS.

**Unit 3.- X-ray and quality identification.** Anatomical terminology. Radiographical terminology.

#### **Ib. General principles of radiographic interpretation (1 contact online hour).**

**Unit 4.- General principles of radiographic interpretation.** Radiographic quality. Terminology to describe radiographic signs. Estimating the minimum time to develop lesions.

**Unit 5.- How the bones respond to injury.** Types of demineralization of bone (general, local and focal demineralization). Increased bone production (cortical thickening, focal new bone formation), periosteal and endosteal reactions, sclerosis.

**Unit 6.- Specific osseous lesions:** Physitis, neoplasia, osteitis, osteomyelitis, hypertrophic osteopathy, enostosis-like lesions and fractures (types).

**Unit 7.- How the joints respond to injury.** Swelling (intra-articular, periarticular and generalized swelling), trauma, luxation and subluxations, intra-articular fractures, infectious arthritis (types), or osseous cyst-like lesion, osteochondrosis, degenerative joint disease, dystrophic and metastatic mineralization.

### **Ic. Basic and complementary views used in different regions (6 contact online hours)**

**Unit 8. – Radiology of the digit (foot, distal phalanx, navicular bone, proximal phalanx and interphalangeal joints) (forelimbs and hindlimbs).** Basic and complementary views. Radiographic anatomy in horses and foals. Significant findings.

**Unit 9.- Radiology of the fetlock (forelimbs and hindlimbs).** Basic and complementary views. Radiographic anatomy in horses and foals. Significant findings.

**Unit 10.- Radiology of the metacarpus and metatarsus.** Basic and complementary views. Radiographic anatomy in horses and foals. Significant findings.

**Unit 11.- Radiology of the carpus, elbow and shoulder.** Basic and complementary views. Radiographic anatomy in horses and foals. Significant findings.

**Unit 12.- Radiology of the tarsus and stifle.** Basic and complementary views. Radiographic anatomy in horses and foals. Significant findings.

**Unit 13.- Radiology of the head and the spine.** Basic views. Radiographic anatomy in horses and foals. Significant findings.

**Unit 14.- Radiology of the thorax.** Basic views. Radiographic anatomy.

**Unit 15. Radiology of the abdomen.** Basic view. Radiographic anatomy.

## **SECTION II: ULTRASOUND. 7 contact online hours.**

### **Ila.- general concepts of ultrasound (1 contact online hours).**

**Unit 16.- General principles of ultrasonography.** Physics and instrumentation. Terminology. Techniques and general interpretation of the ultrasound images. Main artefacts. Applications.

### **Ilb.- Ultrasound of the distal part of the limbs (4 contact online hours).**

**Unit 17.- Examination technique.** Patient preparation. Tendon and Ligaments. Tendon Sheaths and Bursae. Nerves. Muscle, Bone and Joints. Anatomy. Scanning Techniques

**Unit 18.- Ultrasonography of the pastern (forelimbs and hindlimbs).** Ultrasonographic findings. Normal and abnormal structures.

**Unit 19.- Ultrasonography of the fetlock (forelimbs and hindlimbs).** Ultrasonographic findings. Normal and abnormal structures.

**Unit 20.- Ultrasonography of the metacarpus.** Ultrasonographic findings. Normal and abnormal structures.

**Unit 21.- Ultrasonography of the metatarsus.** Ultrasonographic findings. Normal and abnormal structures.

**IIC.- Ultrasound of the other different anatomical regions. (2 contact online hours).**

**Unit 22.- Ultrasonography of the carpus elbow, shoulder, tarsus and stifle.** Ultrasonographic findings. Normal and abnormal structures.

**Unit 23.- Ultrasonography of the thorax, abdomen and other regions.** General principles.

**Unit 24.- Reports on radiography and ultrasonography.**

**SECTION III: ADVANCED IMAGEN DIAGNOSIS TECHNIQUES. 4 contact online hours.**

**Unit 25.- Computed Tomography (CT Scan):** Fundamentals. Uses and limitations. When to recommend a CT for a horse.

**Unit 26.- Magnetic Resonance Imaging (MRI):** Fundamentals. Uses and limitations. When to recommend a MRI for a horse.

**Unit 27.- Scintigraphy. Fundamentals:** Uses and limitations. When to recommend a scintigraphy for a horse.

***PRACTICAL SYLLABUS 0,98 ECTS (65% contact hours): 16 contact hours (wetlab) and 8.5 non-contact hours (home self study and image portfolio preparation); 24.5 total hours = 0.98 ECTS***

**I. DOING X-RAYS AND ULTRASOUND IN FIELD CONDITIONS (16 wetlab contact hours and 4 non-contact hours)-**

Practical sessions for 2 days, 8 hours each day.

**Wet lab day 1 (8 contact hours and 2 non-contact hours)**

**Group I. Radiology of all 4 distal limbs (fore and hind limbs).** Pastern, fetlock and metacarpus and metatarsus. Radiographic views. Taking X-rays. Examination of clinical cases.

**Group II. Ultrasound of all 4 distal limbs (fore and hind limbs).** Pastern, fetlock and metacarpus and metatarsus. Taking ultrasound images. Examination of clinical cases.

**Wet lab day 2 (8 contact hours and 2 non-contact hours))**

**Group I. Radiology of all 4 proximal limbs (fore and hind limbs).** Carpus, elbow, shoulder, stifle, head, spine and thorax. Radiographic views. Taking X-rays. Examination of clinical cases.

**Group 2. Ultrasound of all 4 proximal limbs (fore and hind limbs).** Taking ultrasound images. Examination of clinical cases.

**II. SELF PREPARATION OF A DIAGNOSTIC IMAGE PORTFOLIO (8.5 NON CONTACT HOURS)**

Students must adequately present a portfolio with four cases related to the topics of this module. These clinical cases must be well documented with multimedia files and a

radiological report, redacted taking into consideration notes taken during class and specific bibliography.

**LEARNING OUTCOME:**

Once having completed the module students should be able to:

- Protect themselves effectively against X-ray radiation in field conditions.
- Be able to do X-rays of the whole locomotor system, including basic and complementary views, while knowing the primary pathologies of each region.
- Be able to do X-rays at a basic level of other regions, such as the head, spine and thorax, while knowing the primary pathologies of each body part.
- Be able to do precision Ultrasounds of the distal limbs: digits, fetlock, and metacarpus and metatarsus, and also the proximal regions at a basic level, distinguishing the principal pathologies of each region.
- The know the uses and limitations of advanced imaging diagnosis techniques (CT Scan, MRI and Scintigraphy).



## Module 4: EMERGENCIES AND SUPPORTIVE CARE (2.5 ECTS)

### **LEARNING OBJECTIVES:**

Learn the different emergency protocols facing different emergency pathologies in equine medicine and surgery.

Learn how to use the different protocols of monitoring and pharmacological support of the critical patient.

### **SYLLABUS:**

***THEORETICAL SYLLABUS: 2.24 EvTS (50% contact hours): 28 online contact hour and 28 hours of non-contact hours (study and self -work); 56 total hours: 2.24 ECTS***

### **SECTION I: APPROACHING THE CRITICAL PATIENT: MONITORING/ BASIS OF THE FLUID-THERAPY AND EMERGENCY DRUGS PROTOCOLS. 7 hours on line**

#### **la Monitoring the critical patient ( 3 hours on line)**

**Unit 1.-** General approach to critical patient monitoring. Evaluation of the general condition of the emergency patient. Importance of the correct evaluation. General concepts of critical patient exploration: systematic evaluation.

**Unit 2.-** Main techniques of critical patient monitoring. Hematology. Biochemistry. Gasometry .Coagulation times. Blood pressure and central venous pressure. Cardiac output. Urine production and urinalysis.

**Unit 3.-** Interpretation of the techniques of monitoring the patient in critical condition. Bases for the interpretation of the different monitoring techniques. Discussion of clinical cases.

#### **lb.- Fluid therapy (4 hours online):**

**Unit 4.-** General principles of fluid therapy. Fundamentals of fluid therapy. Rational establishment of the fluid therapy plan. Calculation of the degree of dehydration. Maintenance requirements, fluid deficits and continuous losses.

**Unit 5.-** General procedures for the administration of fluids. Venous catheterization: types of catheter and placement. Catheter maintenance and care. Vascular access routes in the horse. Enteral fluid therapy Nasogastric intubation. Choice of the proper route of fluid administration.

**Unit 6.-** Types of fluids. Crystalloids Colloids Composition of enteral fluids. Considerations for choosing the right fluid. Resuscitation fluid therapy. Design of the appropriate fluid therapy plan. Monitoring

**Unit 7.-** Shock. Types of shock. Monitoring of the horse with shock. Emergency treatment. Endotoxemia. Multiorganism dysfunction syndrome.

## **SECTION II. DIGESTIVE SYSTEM. 4 hours online**

**Unit 8.-** General approach to the patient with digestive or peritoneal emergencies. General evaluation of the patient. Initial management of the horse with colic pain. Indications for your reference to the hospital. Differential Diagnoses.

**Unit 9.-** Procedures to be carried out in the patient with colic ( abdominal) pain. Nasogastric intubation. Rectal palpation Abdominocentesis and evaluation of peritoneal fluid. Abdominal ultrasound.

**Unit 10 .-** Main emergencies of the oral cavity, esophagus, stomach and liver. Etiology. Clinical signs. Differential diagnoses. Treatment. Discussion of clinical cases.

## **SECTION III RESPIRATORY SYSTEM. 4 hours online**

**Unit 11.-** General approach to the patient with respiratory emergencies. General considerations of management of patients with respiratory distress. Main signs present in horses with respiratory problems of upper and lower respiratory tract.

**Unit 12.-** General emergency procedures in horses with respiratory disease. Principles of oxygen therapy. Temporal tracheostomy. Thoracocentesis, placement of pleural drainage tubes.

## **SECTION IV.- CARDIOVASCULAR SYSTEM. 3 hours online.**

**Unit 13.-** General approach to the patient with cardiac emergencies. Main clinical signs present in horses with cardiac pathology. General considerations.

## **SECTION V MUSCULOSKELETAL SYSTEM. 3 hours online**

**Unit 14.-** General approach to musculoskeletal emergencies. Main clinical signs. Initial pain control in horses with musculoskeletal injuries. Fractures, myopathies, septic synovitis, laminitis.

**Unit 15.-** When and how to refer a musculoskeletal emergency. Initial management of the horse with musculoskeletal injuries. Indications for referral to the hospital. Immobilization techniques. Choice of the appropriate immobilization method.

**Unit 16.-** Interpretation of diagnostic tests and methods of treatment of musculoskeletal emergencies. Discussion of clinical cases.

## **SECTION VI SKIN AND EYES- 3 hours on line.**

**Unit 17.-** General approach to wound care. When to refer. When to do a first intention or second intention close.

**Unit 18.-** General approach to eye emergencies. When to refer. First aid treatments.

## **SECTION VII. UROGENITAL SYSTEM. 5 hours online.**

**Vla.- Emergencies of the urogenital tract of the mare (2 hours online):**

**Unit 19.-** General approach to emergencies of the urogenital tract of the mare. General considerations of handling the problems of the urogenital tract of the mare. Main urogenital pathologies in the emergency mare.

**Vlb.- Emergencies of the urogenital tract of the male (2 hours online):**

**Unit 20.-** General approach to emergencies of the urogenital tract of the stallion and gelding. General considerations of management of male urogenital tract problems. Main urogenital pathologies of urgency in the male.

**Vlc.- Emergencies of the urinary tract common to the female and the male (1 hour online):**

**Unit 21.-** Emergencies of the urinary tract. Critical care of the patient with acute renal failure.

***PRACTICAL SYLLABUS: 0.26 ECTS (62% contact hours): 2 wetlabs hours with live animals or contact work (self-study); 6.5 total hours = 0.98 ECTS***

These practices will be carried out together with module 5 in 2 sessions of 8 hours each day. The contents of module 3 are:

**I. PRACTICES WITH ANIMALS / BIOMODELS OF EMERGENCIES (2 contact hours and 1 study hours)**

Simultaneous work groups with different instructors. How to deal with emergency situations of high airways, synovial wounds and fractures.

**II. WORKSHOP OF FLUIDOTHERAPY and EMRGENCY DRUGS DOSAGE (2 contact hours and 1.5 hours of study)**

How to establish different fluid therapy plans depending on different clinical situations.

How to calculate different emergency drugs doses.

**LEARNING OUTCOMES:**

When the module is finished, the student should be able to:

1. Understand the physiology and pathophysiology of the main diseases of all organ systems in the horses.
2. Recognize, treat and stabilize the patient according to the different pathologies that affect equines.
3. Explain to the owner when necessary the need to develop more specific tests and when there is a need to submit to be examined by a specialist.

## Module 5. INTERNAL MEDICINE (6.5 ECTS)

### **LEARNING OBJECTIVES:**

- 1.- Basic knowledge of medicine regarding to infectious and parasitic diseases in equids
- 2.- Acquire knowledge of different drugs and their use in equids
- 3.- Learn legislation in drugs use and their application in cascade
- 4.- Understand mechanisms of antibiotics resistance and how to diminish the incidence of resistance.
- 5.- To understand physiology and physiopathology of the organic systems in equids.
- 6.- Recognize the main disorders, diagnostic methods and treatments of the different organic systems in equids.
- 7.- Acquire capacity to establish support therapies for different diseases and recognize when is necessary to refer.
8. Learn the differences in the physiology and main diseases in geriatric equids. Critical points in geriatric medicine.
9. Recognize the most important diseases in donkeys and differences in therapeutics in comparison with equids.
10. Recognize toxicological disorders, the etiology and how to treat it.

### **SYLLABUS:**

***THEORETICAL SYLLABUS 5.28 ECTS (50% contact hours): 66 contact online hours and 66 non-contact hours (home self study); 132 total hours = 5.28 ECTS***

### **I SECTION. CONCEPTS OF GENERAL MEDICINE. 10 online contact hours**

#### **1a. Prevention and diagnosis of the main infectious and parasitic diseases in equids (6 hours)**

**Unit 1.- Immunity system in horses.** Innate and adaptative immunity. Proinflammatory cytokines, acute phase proteins and complement. Immunoglobulins. Types of hypersensitivity reactions and main pathologies associated to hypersensitivity. Autoimmunity. Main immunodeficiencies in horses. Immunomodulators and immunostimulants. (1.5 hour)

**Unit 2.- Infectious diseases in equids and diagnostic methods.** Infectious diseases with respiratory, gastrointestinal, nervous and reproductive symptoms and, those that affect hematopoietic system. Most important diagnostic methods required for each of them (2 hours).

**Unit 3.-Control methods and management of infectious diseases.** Establishment of sanitary barriers. Quarantine. Compulsory statement. Spanish legislation. Places to check sanitary controls to enter in other countries. (1 hour)

**Unit 4.-Parasites in equids.** Gastrointestinal parasites. Lung parasites. Skin parasites. (1.5 hour)

**Ib. Principles of pharmacology and main drugs in equids (4 hours)**

**Unit 5.- Pharmacologic principles.** Pharmacokinetics. Types of drugs. Distribution and elimination of drugs in the organism. Therapeutic drug monitoring. (1 hour).

**Unit 6.- Antibiotics in equids.**Rationale use of antibiotics. Minimum inhibitory concentration. Bactericidal versus bacteriostatic antimicrobials. Prophylactic use of antibiotics.Antibiotic families, mechanism of action and indications depending on pathologies. Resistance mechanisms. (2 hours).

**Unit 7.-Antiinflammatory drugs.** Mechanism of action. Drug interactions. Types of nonsteroidal and steroidal antiinflammatories. Adverse effects of antiinflammatories. (1 hour).

**II SECTION: ORGANIC SYSTEMS. 49 online contact hours**

**Ila.- Gastrointestinal system (12 hours)**

**Unit 8.-Oral cavity.**Teeth. Examination of the oral cavity.Biomechanic of the mouth. Physiopathology and dental diseases. Congenital and developmental abnormalities. Preventive and routine treatments. (3h)

**Unit 9.- Diagnostic methods in gastrointestinal pathologies.** Peritoneal fluid. Fecal examination. Radiography. Ultrasonography. Nuclear scintigraphy. Computed tomography. Endoscopy. Oral glucose and xylose tolerance test. (2h)

**Unit 10.-Esophagus and stomach.** Anatomy and physiopathology. Esophageal obstruction, esophagitis, motility disorders, stricture, diverticula and congenital disorders. Gastroduodenal ulcer syndrome. Dysphagia. Neoplasia. (2h)

**Unit 11.-Diseases of the small intestine.** Physiopathology of diseases that affect small intestine. Small intestinal obstruction. Malabsorption syndromes. Epiploic foramen, mesenteric and inguinal hernia. Intussusception. Volvulus. Pedunculated lipoma.Ileal impaction. Duodenitis proximal enteritis. Inflammatory bowel diseases. (2h)

**Unit 12.- Diseases of the cecum and colon.** Physiopathology of diseases that affect large intestine. Cecal tympany, impaction and torsion. Typhlitis and tapeworm infection. Cecocecal and cecocolic intussusception. Colonic impaction and torsion. Enteroliths, fecaliths and bezoars. Right and left dorsal displacements. Right dorsal colitis. Salmonellosis and Clostridiosis. Parasites. Antibiotic associated diarrhea. (2h)

**Unit 13.- Diseases of the peritoneum and mesentery.** Hemoperitoneum. Peritonitis. Ascitis. Abdominal adhesions. Verminous mesenteric arteritis. Neoplasia. (1 hour)

**Ilb.- Respiratory system (7 hours)**

**Unit 14.- Clinical examination and diagnostic methods of upper and lower respiratory tract.** Endoscopy. Radiography. Ultrasonography. Tracheobronchial aspiration. Bronchoalveolar lavage. Thoracocentesis. Thoracic radiography. Lung biopsy. Thoracoscopy. (2h)

**Unit 15.-Diseases of the upper respiratory tract.** Sinusitis.Progressive ethmoidal hematoma. Guttural pouch diseases (tympany, mycosis and empyema). Pharyngeal lymphoid hyperplasia. Dorsal displacement of the soft palate. Recurrent laryngeal

neuropathy. Epiglottic entrapment. Arytenoid chondritis. *Streptococcus equi equi* (strangles). Influenza virus. Herpesvirus infection. Arteritis virus infection. African horse sickness. (3h)

**Unit 16.- Diseases of the lower respiratory track.** Physiopathology of respiratory system. Bacterial pneumonia and pleuropneumonia. Interstitial pulmonary disease. Moderate and severe equine asthma. Exercise induced pulmonary hemorrhage. Tumors of the respiratory system. (2 hour)

### **Ilc.- Cardiovascular system. (4 hours)**

**Unit 17.- Cardiovascular system.** Auscultation. Heart sounds. Heart rate and rhythm. Cardiac murmurs. Cardiac arrhythmias. Electrocardiography. Ecocardiography indications. (2h)

**Unit 18.- Cardiac disorders.** Pulmonary hypertension and cor pulmonale. Congestive heart failure. Congenital heart diseases. Valvular heart diseases. Infective endocarditis. Pericardial disease. Miocardial disease. Vascular diseases. Cardiac arrhythmias. (2h)

### **Ild.- Musculoskeletal system (3 hours)**

**Unit 19.- Clinical examination and diagnostic methods in muscular pathologies.** Physical examination. Classification of muscle disorders. Pathophysiology of rhabdomyolysis. Muscular enzymes. Serum CK exercise response test. Electrolytes. Urinalysis. Selenium and vitamin E. Genetic testing. Muscle biopsy. (1h)

**Unit 20.- Disorders of musculoskeletal system.** Exertional myopathies. Non exertional myopathies. Inflammatory myopathies. Electrolyte imbalance. (2h)

### **Ilf.-Neurologic system (5 hours)**

**Unit 21.- Neurologic examination.** Examination. Evaluation of gait. Localization of lesion. (1h)

**Unit 22.- Diagnostic methods in neurological pathologies.** Cerebrospinal fluid evaluation. Electromyography. Magnetic resonance imaging. (1h)

**Unit 23.- Disorders of neurologic system.** Seizures. Central nervous system trauma. Vestibular disease. Diseases of the cerebellum. Shivers. Cervical vertebral compressive myelopathy. Equine degenerative myeloencephalopathy. Equine protozoal myeloencephalitis. Equine herpesvirus-1 myeloencephalopathy. Polyneuritis equi. Viral encephalitis. Rabies. Equine motor neuron disease. Tetanus. Botulism. Equine grass sickness. Lyme disease. Trigeminal mediated headshaking. (3h)

### **Ilg.- Hematopoietic system and liver (4 hours)**

**Unit 24.- Disorders of hematopoietic system.** Disorders associated with hemolysis. Disorders of hemostasis. Disorders of hematopoiesis. (1h)

**Unit 25.- Evaluation, clinical signs and diagnostic methods in liver pathologies.** Normal liver and hepatic physiopathology. Clinical signs of liver disease. Clinical pathology specific and nonspecific indicators of liver diseases. Liver enzymes. Serum bile acids. Liver biopsy. (1h)

**Unit 26.- Disorders of the liver.** Acute hepatic diseases. Chronic hepatic diseases. Hepatic encephalopathy. Biliary obstruction and cholelithiasis. Hyperlipemia and hepatic lipidosis. Hepatic neoplasia. (2h)

### **Ilh.-Endocrine system (4 hours)**

**Unit 27.-Endocrine system disorders.** Disorders of calcium and phosphorus. Thyroid gland. Endocrine Pancreas. (1.5h)

**Unit 28.- Pituitary pars intermedia dysfunction and equine Metabolic syndrome.** Definitions. Etiology. Clinical signs. Diagnostic testing. Treatment. Management. (2.5h)

### **Ili.-Urinary system (3 hours)**

**Unit 29.-Examination and diagnostic methods of urinary system.** Physical examination. Hematology and biochemistry. Urinalysis. Ultrasonography. Nuclear scintigraphy. Endoscopy. Water deprivation test. Quantitative measures of renal function. Renal biopsy. (1.5h)

**Unit 30.- Disorders of urinary system.** Physiopathology urinary system. Acute renal failure. Chronic renal failure. Uremic syndrome. Cystitis. Pyelonephritis. Obstructive diseases in urinary tract. Polyuria-Polydipsia. Urinary incontinence and bladder dysfunction.( 1.5h)

### **Ili.-Integumentary system (3,5 hours)**

**Unit 31.- Skin evaluation and diagnostic methods.** Physical examination. Cytology. Cultures. Fine needle aspiration. Biopsy. (1h)

**Unit 32.- Skin disorders.** Disorders of pigmentation. Disorders of hair. Disorders of keratinization. Infectious disease of skin. Nutritional and toxic skin disorders. Immune mediated skin disorders. Necrotizing and neoplastic skin disorders. (2.5h)

### **Ili.- The eye (3.5 hours)**

**Unit 33.- Eye examination and diagnostic methods.** Cranial nerves examination. Reflexes. Schirmer tear test. Intraocular pressure. Ophthalmoscopic evaluation. Ocular nerve blocks. (1h)

**Unit 34.- Disorders of the eye and annexes.** Eyelids. Nasolacrimal system. Cornea. Uvea. Lens. Retina. Orbit. (2.5h)

## **III SECTION: OTHER ESSENTIAL SUBJECTS IN INTERNAL MEDICINE. 7 online contact hours**

### **Ili.a. Geriatric medicine (2 hours)**

**Unit 35.-Diseases of the aged horse.** Normal aging changes.How to recognize and how to treat.

### **Ili.b. Donkey`s Medicine (3 hours)**

**Unit 36.-Diseases in donkeys.** How to recognize and how to treat. Differences respect to horses in therapeutics.

### **Ili.c. Toxicologic problems (2 hours)**

**Unit 37.-Toxicologic problems.** Toxicosis related to gastrointestinal tract, neurology signs, cardiovascular and hemolymphatic systems and signs relating to liver disease or dysfunction.

***PRACTICAL SYLLABUS 1.22 ECTS (51% contact hours): 12 contact hours (wetlab), 3.5 contact hours (clinical cases discussion) and 15 non-contact hours (home self study and case report /case log preparation); 30.5 total hours = 1.22 ECTS***

## **I. WETLAB OF INTERNAL MEDICINE (12 contact hours and 3 non-contact hours)**

It will be provided together with the module 3 workshop in face-to-face sessions of 2 days / 8 hours including the following contents.

**Wet lab day 1 (4 contact hours and 1 non-contact hours)** *(The remaining hours of this practical session correspond to the contents of module 3):*

**Group III. Urogenital system (1,5h)** Urogenital examination. Cystoscopy. Other diagnostic test: water deprivation test...

**Group IV. Musculo skeletal system (0,5h)** Muscle biopsy. Other diagnostic test: CK test, effort tests...

**Group V Neurology and ophthalmology systems (2h)** Cranial nerves examination. Complete neurological examination. Complete ocular examination. Main diagnostic tests in eyes: reflexes, dyes tests, ultrasonography

**Wet lab day 2 (8 contact hours and 2 non-contact hours)**

**Group I. Gastrointestinal system (5h)** Oral cavity evaluation. Teeth. Preventive and routine treatments. Rectal palpation. Abdominal ultrasound. Peritoneal fluid extraction and analysis. Other diagnostic tests: Glucose absorption test, liver biopsy, fine needle aspiration....

**Group II. Respiratory and cardiovascular systems (3h)** Thoracic and cardiac complete auscultation. Endoscopy and different methods to take samples (tracheal aspiration, thoracocentesis). Thoracic Ultrasound

## **II EQUINE MEDICINE PORTFOLIO AND CASE REPORT (3.5 contact hours and 12 non-contact hours)**

A total of 25 cases must be collected (see Appendix). Complete signalement including case number and diagnostic procedures performed must be described in the case log. It is essential that each case is numbered consecutively and that full case records can be identified and retrieved on the basis of information in the case log.

Students must adequately present a complete case from this case log. This clinical case must be well documented with multimedia files and redacted taking into consideration notes taken during class and specific bibliography. The case is presented and discussed (during an interactive session of 3 hours) with teachers and other students in a specific online session. Knowledge of the first modules (professional key skills, clinical management and communications, analgesia and sedation, emergency, critical and supportive care and diagnostic imaging) must be included in these clinical cases.

### **LEARNING OUTCOME:**

When the module is finished the student will be able to:

1. Understand the physiology and pathophysiology of the main disorders of all organic systems
2. Recognize, treat and stabilize the main diseases that affect equids.
3. Explain to the owner when is necessary to perform more specific tests and refer to a reference hospital to be evaluated by a specialist.



## Module 6. SURGERY (5 ECTS)

### **LEARNING OBJECTIVES:**

#### **General Objectives**

First opinion equine practice may involve general surgical work that can be performed in field condition and/or equine practices and theaters. A range of surgical techniques that are commonly undertaken on first opinion practice are listed in List 1.

A correct diagnosis and pre-operative evaluation of surgical disorders together with thorough knowledge of aseptic principles, tissue handling, and basic surgical techniques is mandatory. Familiarity with postoperative care and management of surgical complications is also required. The program should include adequate knowledge of surgical conditions that require referral to a specialist, including skills to recognize and stabilize these conditions prior to referral.

#### **Specific objectives:**

1. Recognition and decision making of surgical disease.
2. Preoperative evaluation, principles of asepsis and antisepsis, preparation of the surgical patient and facility and surgical site infection.
3. Tissue handling (incision, hemostasis and suture materials and patterns) and basic surgical techniques including surgical instruments and bandage techniques.
4. Familiarity and practical competence in a range of surgical techniques (List 1).
5. Basic knowledge of advanced surgical techniques (List 2).

### **SYLLABUS:**

***THEORETICAL SYLLABUS 3.2 ECTS (50% contact hours): 40 contact online hours and 40 non-contact hours (home self study); 80 total hours = 3.2 ECTS***

**SECTION I. SURGICAL BIOLOGY AND SURGICAL METHODS. 10 online contact hours.**

#### **Ia. Surgical biology (2 hours).**

**Unit 1. Wound healing** Classification of wounds. Phases of wound healing. Wound healing differences. Factors that influence wound healing.

**Unit 2. Surgical site infection (SSI) and use of antimicrobials.** SSI classification. Risk factors for SSI. Nosocomial infections. Prevention and management of SSIs. Prophylactic antibiotics used in horses.

#### **Ib. Surgical methods (8 hours).**

**Unit 3. Instrument preparation, Sterilization, and Antiseptics.** Instrument preparation and packing. Physical Sterilization. Chemical Sterilization. Disinfectants. Antiseptics.

**Unit 4. Preoperative evaluation. Preparation of the Surgical Patient, Facility and Personnel.** Operative Risk. Preparation of the Surgical Patient. Preparation of the Surgical Facility. Preparation of the Surgical Personnel.

**Unit 5. Surgical Instruments.** Materials. Instruments for general surgery. Orthopaedic Instruments. Special Instruments. Maintenance and identification. Packing and Storage.

**Unit 6. Surgical techniques.** Manipulation of surgical instruments. Incision and excision. Dissection. Hemostasis. Tissue handling. Irrigation and suction

**Unit 7. Minimally Invasive Surgical Techniques** Endoscopic equipment. Arthroscopy. Laparoscopy and thoracoscopy.

**Unit 8. Cryosurgery and lasers.** Cryobiology. Cryosurgery Instrumentation. Cryosurgery Techniques. Cryosurgery Indications. Function of lasers. Lasers commonly used.

**Unit 10. Suture material and patterns.** Suture classification. Suture characteristics. Selection of suture material. Surgical needles. Suture configurations. Suture patterns. Surgical staplers.

**Unit 11. Drains, bandages and external coaptation.** Drains purposes, material and placement. Types of drains. Bandages. External coaptation.

**Unit 12. Anaesthesia of the equine head.** Proyecciones básicas y complementarias. Anatomía radiográfica en adultos y potros. Hallazgos significativos.

## **SECTION II: SPECIAL SURGERY. 30 online contact hours.**

### **Ila. Integumentary system (3 hours)**

**Unit 13. Principles of reconstructive surgery. Skin grafting.**

**Unit 14. Management of superficial wounds.**

**Unit 15. Management of deep and chronic wounds. Fistulas and sinus tracts.**

**Unit 16. Surgically treated skin conditions**

### **Ilb. Alimentary system (6 hours)**

**Unit 17. Oral cavity, salivary glands, esophagus, stomach and spleen.**

**Unit 18. Surgical decision in surgical colic. Surgical approaches.**

**Unit 19. Surgery of the small intestine.**

**Unit 20. Surgery of the large intestine, rectum and anus.**

**Unit 21. Abdominal hernias.**

**Unit 22. Postoperative care and complications of colic surgery.**

### **Ilc. Respiratory system (4 hours)**

**Unit 23. Surgery of the nasal cavity and sinuses.**

**Unit 24. Surgery of the equine pharynx.**

**Unit 25. Surgery of the equine larynx.**

**Unit 26. Surgery of the guttural pouches.**

**Unit 27. Surgery of the trachea and thorax.**

**IId. Nervous system (1 hour)**

Unit 28. Surgical treatment of diseases of the spinal column.

Unit 29. Peripheral Nerve Injury.

**Ile. Eye and Adnexa (2 hours)**

Unit 30. Basic ophtalmic surgery.

Unit 31. Adnexal surgery.

**IIf. Reproductive and urinary systems (5 hours)**

Unit 32. Surgery of the testis.

Unit 33. Surgery of the penis and prepuce.

Unit 34. Surgery of the vulva, vestibule, vagina and cervix.

Unit 35. Surgery of the uterus and ovaries.

Unit 36. Surgery of the kidney and ureters.

Unit 37. Surgery of the bladder, umbilical remnants and urethra.

**Ilg. Orthopaedic surgery (10 hours)**

Unit 38. Bone healing and bone implants and instruments.

Unit 39. Principles of fracture treatment. Bone grafts and replacements.

Unit 40. Principles of joint surgery.

Unit 41. Management of bursitis.

Unit 42. Principles of tendon and ligament surgery.

Unit 43. Management of muscle disorders and diseases.

Unit 44. Surgical treatment of synovial and osseous infections.

Unit 45. Surgical treatment of flexural and angular deformities.

Unit 46. Surgical treatment of osteochondrosis and subchondral bone cysts.

Unit 47. Craniomaxillofacial surgery.

***PRACTICAL SYLLABUS 1.8 ECTS (58% contact hours): 16 contact hours (wetlab), 7 contact hours (discussed surgical videos), 3 contact hours (clinical cases discussion) and 19 non-contact hours (home self study and case report /case log preparation); 45 total hours = 1.8 ECTS***

**I SURGICAL WETLABS (16 contact hours and 4 non-contact hours).**

Practical sessions for 2 days, 8 hours each day.

**Wetlab day 1 (8 contact hours and 2 non-contact hours)**

- 1- Skin biopsy and punch/pinch grafting techniques (to be performed in cadaver heads).
- 2- Performance of regional blocks of the rostral area and its indication (to be performed in cadaver heads).

- 3- Placement and performance of site for sinucentesis and anatomy of the paranasal sinus (to be performed in cadaver heads).
- 4- Wiring of simple fracture of incisive and interdental space of the mandible and the maxilla (to be performed in cadaver heads).
- 5- Tracheostomy tubes demonstration. Location of incision in the alive horse. Video of performance of procedure.

### **Wetlab day 1 (8 contact hours and 2 non-contact hours)**

- 1- Type of drains and its placement rational
- 2- Different types of wound pads and its indication for each stage of the wound healing. Demonstration of difference between occlusive and semioclusive pads.
- 3- Periosteal transection and elevation (to be performed in cadaver limbs).
- 4- Distal metacarpal and metatarsal II/IV resection (to be performed in cadaver limbs).
- 5- Digital neurectomy (to be performed in cadaver limbs).
- 6- Tenotomy of the deep digital flexor at mid cannon area (to be performed in cadaver limbs).
- 7- Castration techniques (video), types of emasculators and inguinal cryptorchid castration (video)

### **II CASE LOG AND CASE REPORT (3 contact hours and 12 non-contact hours)**

A total of 25 surgical cases, balanced in orthopaedic and soft tissue surgery, must be collected. Complete signalement including case number, diagnosis, surgical procedure performed as first or assistant surgeon must be thoroughly described in the case log. It is essential that each case is numbered consecutively and that full case records can be identified and retrieved on the basis of information in the case log.

Students must adequately present a complex case from this case log. This clinical case must be well documented with multimedia files and redacted taking into consideration notes taken during class and specific bibliography. The case is presented and discussed (during an interactive session of 3 hours) with teachers and other students in a specific online session. Knowledge of the first modules (professional key skills, clinical management and communications, analgesia and anaesthesia, emergency, critical and supportive care and diagnostic imaging) must be included in these clinical cases.

### **III. SURGICAL VIDEOS (7 contact online hours and 3 non-contact hours)**

#### **LIST 1.**

- 1- Drain placement.
- 2- Regional blocks of the rostral head area.
- 3- Sinucentesis and anatomy of the paranasal sinuses.
- 4- Wiring of simple fractures of incisive and interdental space of the mandible and maxilla.
- 5- Tracheotomy/tracheostomy.
- 6- Skin biopsy and punch/pinch grafting techniques
- 7- Castration techniques

- 8- Periosteal transection and elevation
- 9- Distal metacarpal and metatarsal II/IV resection
- 10- Digital neurectomy
- 11- Tenotomy of the deep digital flexor at mid cannon area

**LIST 2.**

*a. Integumentary system*

- Advanced wound reconstruction

*b. Alimentary system*

- Diseases of the oral cavity
- Indications for exploratory and surgical laparotomy.
- Surgical disorders of the gastrointestinal tract.
- Hernia repair techniques. Neonatal inguinal and umbilical herniorrhaphy
- Rectal tears.

*c. Respiratory system*

- Approaches to the equine sinuses.
- Laryngotomy and ventriculectomy.
- Laryngoplasty
- Treatment of DDSP
- Approaches to the guttural pouches
- Placement of thoracic drains. Rib resection.

*d. Nervous system*

- Peripheral Nerve Injury

*e. Eye and Adnexa*

- Third Eyelid Excision
- Placement of a subpalpebral lavage tube
- Enucleation

*f. Reproductive and urinary systems*

- Cryptorchidectomy
- Penile amputation Urethral extension
- Third degree perineal lacerations and rectovestibular fistula repair
- Ovariectomy.
- Cesarean section
- Surgery of umbilical remnants
- Uroperitoneum

*g. Orthopaedic surgery*

- Tenotomies and desmotomies. Tendon suture
- Transphyseal fixation for angular limb deformities.
- Fracture repair decision making and principles of internal fixation.
- Common joint surgery e.g. arthroscopy and arthrodesis.

**LEARNING OUTCOME:**

At the end of this module students should be able to demonstrate:

- . Good surgical knowledge and practical skills consistent with good first opinion general practice.
- . Knowledge of general surgical principles and skills applicable to all general surgical techniques.
- . Deep knowledge of indications and for certain basic surgical techniques.
- . For procedures requiring referral to specialist, general knowledge as opposed to practical experience is required.

## **Module 7: LAMENESS INVESTIGATION AND SPORTS MEDICINE (5 ECTS)**

### **LEARNING OBJECTIVES:**

- Acquire the necessary knowledge to perform a complete and advanced lameness exam.
- Learn the diagnostic methods used in the lameness exam.
- Know the main pathologies of the locomotor system and learn to diagnose and treat them.
- Learn the basics of equine rehabilitation and design rehabilitation programs according to the horse's injuries.

### **SYLLABUS:**

***THEORETICAL SYLLABUS: 3.6 ECTS (50% contact hours): 45 online contact hours and 45 hours of non-contact (study and autonomous work); 90 total hours = 3.6 ECTS***

### **SECTION I.- PREPARATION OF THE PATIENT, MANAGEMENT AND SAFETY OF THE LAMENESS DIAGNOSIS AND TREATMENT. (1 online hour)**

**Unit 1.-** The lameness exam: a general vision.

### **SECTION II.- EVALUATION OF LAMENESS AND GRADING SYSTEMS. EVALUATION OF THE ANOMALIES FOUND IN THE CLINICAL EXAMINATION. INTERPRETATION OF THE EFFECT OF DIAGNOSTIC ANESTHESIA OF THE DISTAL EXTREMITY. (5 online hours)**

**Unit 2.-** Clinical investigation of lameness: History and clinical examination.

**Unit 3.-** Diagnostic analgesia of the distal extremity: techniques and interpretation of results.

**Unit 4.-** The use of gait analysis technology.

### **SECTION III.- INDICATIONS FOR INTRASYNOVIAL DIAGNOSIS, INCLUDING SYNOVIOCENTESIS FOR CASES OF SUSPECTED SEPSIS, AND INTERPRETATION OF THE RESULTS. (1 online hour)**

**Unit 5.-** Intrasynovial anesthesia of the lower limb: techniques, complications and interpretation of results.

### **SECTION IV.- USE AND INTERPRETATION OF BASIC RADIOGRAPHIC AND SONOGRAPHIC STUDIES OF THE LOCOMOTOR SYSTEM: IMPORTANCE OF THE**

**DIAGNOSIS OF LAMENESS AND IN THE PRE-PURCHASE EXAMINATION. (5 online hours):**

**Unit 6.-** Radiology in practice: equipment, techniques, special techniques

**Unit 7.-** Ultrasonography in practice: equipment, techniques, special techniques

**Unit 8.-** The pre-purchase exam: how to interpret and assess the findings

**SECTION V. DIAGNOSIS AND TREATMENT OF THE MAIN PATHOLOGIES BY ANATOMICAL REGIONS (13 online hours)**

**Unit 9.-** Pathologies of the fore limb

**Unit 10.-** Pathologies of the hind limb

**Unit 11.-** Articular biology and osteoarthritis

**Unit 12.-** Tendinous / ligamentous biology and tendinitis / desmitis

**Unit 13.-** Approach to back problems and axial skeleton

**Unit 14.-** Approach to the horse with problems of movement without defining: neurological or lame

**SECTION VI. KNOWLEDGE OF MEDICAL AND SURGICAL TREATMENTS AVAILABLE FOR LAMENESS USUALLY RECOGNIZED IN HORSES. (6 online hours)**

**Unit 15.-** Surgical therapies in the sports horse

**Unit 16.-** Orthobiological therapies: stem cells, PRP and IRAP

**Unit 17.-** Other advanced treatments

**Unit 18.-** Doping in the sport horse: Legislation and management

**SECTION VII.- Limb immobilization and transportation of the injured horse. (1 online hour).**

**Unit 19.-** The emergency situation: what to do?

**SECTION VIII.- BASIC KNOWLEDGE AND INDICATIONS OF ADVANCED CLINICAL RESEARCH AND IMAGING TECHNIQUES AVAILABLE IN REFERRAL PRACTICES FOR MUSCULOSKELETAL CONDITIONS, LAMENESS AND POOR PERFORMANCE. (2 hours online):**

**Unit 20.-** Diagnosis by advanced imaging methods: what and why?

**Unit 21.-** Investigation of the poorly performing horse

**SECTION IX.- BASIC UNDERSTANDING OF THE TRAINING, REINTRODUCTION TO TRAINING AND PHYSICAL MAINTENANCE OF THE EQUINE ATHLETE. (5 hours online)**



**Unit 22.-** Appropriate conditioning for athletes

**Unit 23.-** Training for success in different disciplines: Dressage, Jumping, Complete, Hippodrome and Raid. Injury prevention.

**Unit 24.-** Nutrition of the equine athlete.

**SECTION X.- GENERAL KNOWLEDGE OF REHABILITATION AND PHYSIOTHERAPY OF ORTHOPEDIC PROBLEMS FOUND IN GENERAL EQUINE PRACTICE. (3 online hours)**

**Unit 25.-** Equestrian rehabilitation: how to minimize the chances of re-injury

**Unit 26.-** Principles of physiotherapy: technology and when and how to use it

**SECTION XI.- KNOWLEDGE OF THE PRINCIPLES OF HORSESHOE, HORSESHOE AND CORRECTIVE AND NORMAL COMMUNICATION WITH FARRIERS. (3 online hours)**

**Unit 27.-** Interaction of the surface with the horseshoe

**Unit 28.-** Biomechanics of the hardware

**Unit 29.-** How to choose the right hardware for each job

***PRACTICAL SYLLABUS: 1.4 ECTS (54% face to face): 16 laboratory hours of practice with animals and biomodels, 3 hours of direct online contact for discussion of clinical cases and 16 non-contact hours (student's own study, portfolio preparation and clinical cases); 35 total hours = 1.4 ECTS***

**I. EXERCISES WITH ANIMALS AND BIOMODELS (16 contact hours and 4 non-contact hours)**

These practical sessions will be carried out through 2 sessions of 8 hours each, including the following contents:

**Practical session 1** (8 contact hours and 2 non-contact hours):

**Laboratory 1.** The lameness exam. Use of kinematic technology with inertial sensors (4 hours)

**Laboratory 2.** Anatomical dissection, regional and synovial blocks (4 hours).

**Practical session 2** (8 contact hours and 2 non-contact hours):

**Laboratory 3.** Technologies used in physiotherapy: equipment and management. (2 hours)

**Laboratory 4.** Hardware (4 hours)

**Laboratory 5.** Demonstrations in biomodels and practice horses of some ultrasound-guided injection techniques in unusual places

## **II. LAMENESS PORTFOLIO AND CLINICAL CASE (3 hours of online contact and 12 hours of non-contact)**

A minimum total of 20 cases of lameness of different diagnoses or profiles must be collected (for example, it is not useful to present 5 practically identical solar abscesses or 5 equal suspensory ligament injuries) in whose diagnosis and treatment the student has actively participated in professional activity.

A form will be completed, including the number of cases and diagnostic procedures developed. It is essential that each case is numbered consecutively and that all cases have a marked history, which is well defined to be identified if necessary.

Students must properly submit 1 full case of this caselog. This clinical case must be better documented with multimedia files and written taking into account the concepts given during the other modules (professional skills, clinical management and communication, analgesia and sedation, emergencies, intensive care and image). The cases will be presented and discussed (during the 3 hour interactive session) with teachers and other students in an online session. Clinical case format according to Equine Veterinary Journal requirements.

### **LEARNING OUTCOMES:**

When the module is finished, the student should be able to:

1. Understand the physiology and physiopathology of the main diseases of the musculoskeletal system in equidae.
2. Recognize, treat and stabilize the patient according to the different pathologies that affect equines.
3. Explain to the owner when necessary the need to develop more specific tests and when there is a need to submit to be examined by a specialist.

## **Module 8: REPRODUCTION, NEONATOLOGY AND STUD FARM MANAGEMENT (5.5 ECTS)**

### **LEARNING OBJECTIVES:**

- 1.- Cover existing techniques for an adequate reproductive examination of the mare. Acquire skills on how to use them.
- 2.- Become familiarized with the endocrinology of the mare and learn about the drugs available for reproductive control.
- 3.- Be able of undertaking a clinical examination, diagnosis and treatment of the principle reproductive problems in the mare in the field. Identify pathologies which should be referred to a specialist centre.
- 4.- Obtain sufficient knowledge to diagnose a pregnancy and perform early diagnosis of twin pregnancies.
- 5.- Acquire basic knowledge about monitoring the pregnant mare in the last trimester of the pregnancy. Monitor the foetus and the placenta.
- 6.- Understand how to manage a high-risk pregnancy and perform obstetric manoeuvres to correct dystocia in the field. Know how to diagnose and treat the most common pathologies occurring in the last trimester of pregnancy and post-partum and understand which cases should be referred to a referral centre.
- 9.- Examination and management of the neonatal foal in field conditions, paying particular importance to the diagnosis and fast stabilisation prior to referral.
- 10.- Acquire knowledge about congenital diseases in the neonate. Neonatal resuscitation.
- 11.- Know how to recognise, treat and stabilise foals suffering from the most common neonatal conditions.
- 12.- Knowledge of the main orthopaedic conditions during development.
- 13.- Know of the different techniques for semen collection and artificial insemination.
- 14.- Know how to perform a basic spermogram in field conditions, as well as prepare a dose of semen.
- 15.- Know of the different techniques for advanced semen evaluation (CASA system, Flow cytometry, redox potential) and in which cases samples should be sent for analysis.
- 16.- Know of and be familiar with existing diagnostic techniques to undertake a reproductive examination of the stallion.
- 17.- Know how to diagnose and treat the main behavioural problems and reproductive tract pathologies affecting the stallion.
- 18.- Reproductive management of the fertile, sub-fertile and geriatric stallion and of the donkey.
- 19.- Be familiar with the principle techniques used in assisted reproduction. Know in which cases it is appropriate to recommend them and know how samples should be correctly prepared and transported to the reference laboratory.
- 20.- Be familiar with preventative and prophylactic stud medicine.

21.- Knowledge of stud management and current legislation.

22.- Understand current techniques for genetic selection and improvement of the most common breeds.

### **SYLLABUS:**

**THEORETICAL SYLLABUS 4 ECTS (50% contact hours): 50 online contact hours and 50 hours self-directed study; 100 hours total = 4 ECTS**

#### **SECTION I. THE MARE. 19 hours online**

##### **1a.- Examination and reproductive control in the mare. The sub-fertile mare. (9 online hours)**

###### ***Anatomy, physiology and endocrinology of the mare (1 h):***

**Unit 1:** Anatomy and physiology of the reproductive tract of the unpregnant mare. Reproductive endocrinology: hypothalamic-pituitary-gonadal axis. Oestrus cycle: follicular and luteal phases.

###### ***Reproductive examination of the mare (2 h):***

**Unit 2:** Ultrasound of the reproductive tract of the mare. Uterine endoscopy.

**Unit 3:** Endometrial cytology and uterine culture. Endometrial biopsy. Hormone profile.

###### ***Control and synchronisation of the oestrus cycle and ovulation (1 h):***

**Unit 4:** Management of seasonal anoestrus and the transition period (artificial lights, dopamine antagonists). Synchronisation and induction of the oestrus and ovulation (PGF<sub>2</sub>, GnRH, hCG, progesterone, eFSH). Suppression of oestrus.

###### ***The sub-fertile mare (5 h):***

**Unit 5:** Diagnosis and treatment of pathologies of the ovaries and oviducts. Failure to ovulate, ovarian anomalies and ovarian tumours. Oviduct blockages.

**Unit 6:** Diagnostics and treatments of uterine pathologies: developmental uterine abnormalities, endometritis complex (post mating endometritis, acute, subclinical, chronic and fungal endometritis). Uterine cysts.

**Unit 7:** Diagnosis and treatment of cervical and vulval pathologies.

**Unit 8:** Management of the geriatric mare.

**Unit 9:** Examination and reproductive management in donkeys.

##### **1b. Examination of the pregnant mare. Pathologies during pregnancy and postpartum. (10 online hours)**

###### ***The pregnant mare and birth (4 h):***

**Unit 10:** Endocrinology of the pregnant mare. Pregnancy diagnosis. Foetal sex determination.

**Unit 11:** Management of twin pregnancies. The natural birth. Indications and methods for induction.

**Unit 12:** Dystocia. Obstetric management of dystocia. When should dystocia be referred?

***Problems during pregnancy and birth (6 h):***

**Unit 13:** Monitoring the mare and the foetus in the last trimester of gestation. Evaluation of the placenta and the foetus.

**Unit 14:** Diagnosis and treatment of the most common pathologies during the last trimester of gestation: placentitis, prepubic tendon and abdominal wall rupture, uterine torsion...

**Unit 15:** Postpartum pathologies: uterine prolapse, placental retention, postpartum metritis...

**Unit 16:** Mammary gland pathologies. Agalaxia.

**Unit 17:** Early embryonic death. Abortions and still births. Prevention and diagnosis of abortions.

**Unit 18:** Management of the high-risk pregnancy. Abortion induction. When should a pregnant mare be referred?

**SECTION II. THE NEONATE. 8 online hours**

**Ia Examination of the neonatal foal (1.5 h)**

**Unit 19:** Evaluation of endocrine, cardiovascular, respiratory, gastro-intestinal, and metabolic changes and thermo regulatory references in the neonate.

**Unit 20:** Congenital pathologies. Basic concepts of prematurity, dysmaturity and delayed intra uterine development. Resuscitation of the neonatal foal.

**Ib Common neonatal pathologies (3.5 h)**

**Unit 21:** Neurological, respiratory, gastro-intestinal, urogenital, endocrine, immune, hepatic and muscular pathologies.

**Ic Neonatal medicine in the foal (1.5h)**

**Unit 22:** Antibiotic therapy in foals. Fluid therapy, ionotropes and vasopressors. Anti-inflammatory and analgesic therapy. Nutritional support.

**IId Developmental orthopaedic pathologies (1.5h)**

**Unit 23:** Prevention, diagnosis and corrective measures in the field of the principal orthopaedic pathologies in the neonate.

**SECTION III. THE STALLION. 14 online hours**

**Illa Reproductive examination in the stallion (8 online hours)**

***Anatomy, physiology and endocrinology of the stallion (1 h)***

**Unit 24:** Anatomy and physiology of the reproductive tract of the stallion. The seminiferous tubule cycle. Hypothalamic-hypophyseal-gonadal axis. Reproductive behaviour in the stallion.

***Reproductive examination of the stallion (4 h)***

**Unit 25:** Management of the stallion. Semen extraction: techniques, types of artificial vagina, preparation of the stallion and the dummy mare.

**Unit 26:** Ultrasound of the reproductive tract of the stallion: accessory glands, testicles, and penis. Calculation of the DSOe and spermatic efficiency.

**Unit 27:** Advanced diagnostic techniques: Doppler ultrasound, reproductive tract endoscopy, new advances in ultrasound.

**Unit 28:** Taking samples for cytology and culture. Notifiable venereal diseases.

***Semen evaluation and processing for artificial insemination in field conditions (3 h)***

**Unit 29:** Basic spermogram: volume, concentration, motility, morphological anomalies, Ph.

**Unit 30:** Preparation of seminal doses: fresh and refrigerated semen. Types of artificial insemination: conventional, deep intrauterine, endoscopic. Low dose artificial AI.

**Unit 31:** Advanced spermogram. Referral of samples for complementary tests: CASA motility and velocities, DNA fragmentation, DNA oxidation test, viability, acrosomes, mitochondria, redox potential.

**IIIb The sub-fertile stallion (6 online hours)**

***Abnormal sexual behaviour (1 h)***

**Unit 32:** Abnormal sexual behaviour: reproductive and pharmacological management. Stallions with low libido. Ejaculatory and erection dysfunction.

***Reproductive tract pathologies (2 h)***

**Unit 33:** Testicular abnormalities: cryptorchids, tumours. Abnormalities of the penis. Accessory gland pathologies.

**Unit 34:** Examination and reproductive management in the donkey.

***The sub-fertile stallion (3 h)***

**Unit 35:** Techniques to improve semen quality: sperm filter, conventional centrifugation, gradient centrifugation.

**Unit 36:** The geriatric stallion. Management of the sub-fertile stallion.

**SECTION IV. REPRODUCTIVE BIOTECHNOLOGIES. 4 online hours**

***Embryo transfer (2 h)***

**Unit 37:** Selection and management of donors and receptor mares. Synchronisation of donors and receptor mares. Uterine flushing for embryo recovery. Handling and evaluation of embryos. Transfer of the embryo.

**Unit 38:** Vitrification of embryos. Freezing semen.

***In vitro production of embryos (2h)***

**Unit 39:** Transvaginal and flank aspiration of oocytes. Oocyte aspiration post mortem. Oocyte transfer.

**Unit 40:** Recovery of semen post-mortem.

**Unit 41:** Vitrification of oocytes. ICSI.

**SECTION V. MANAGEMENT AND PREVENTATIVE MEDICINE OF STUDS. 5 online hours**

**Unit 42:** Preventative medicine in the stud: vaccinations, worming, health tests.

**Unit 43:** Stallion, mare and foal nutrition.

**Unit 44:** Legislation for breeding operations. Diseases which prevent sale of semen and embryos.

**Unit 45:** Basic knowledge of selection and improvement systems of the main Spanish breeds. Parental testing.

**Unit 46:** Stud management.

***PRACTICAL CONTENT 1.5 ECTS (49.3% face to face): 10.5 of et-lab hours with animals and/or models, 8 hours of clinical cases, journal club and viewing and discussion of videos and 18.5 hours of self-directed study (self-study, preparation of clinical cases, journal club and preparation of a portfolio of reproduction and neonatology cases); 37.5 hours total = 1.5 ECTS***

**I. WORKSHOP SESSIONS (16 wet lab hours and 7 hours of self-directed study)**

2 days of practical sessions / 8 hours per day which will include the following content:

**Practical Session Day 1. (8 hours in-person attendance)**

**Practical workshop covering reproductive examination of the mare. 5 hours: 2 to 4 groups working simultaneously with various instructors:**

- Ultrasound of the reproductive tract of the non-pregnant mare.
- Taking samples for cytology and culture. Cytological diagnosis.
- Endometrial biopsy.
- Uterine endoscopy: uses.
- Therapeutic uterine flushing.
- Artificial insemination: conventional and deep (dummies)

**Screening and discussion of the Foaling Mare DVD. 1 hour in-person attendance.**

**Journal club. 2 hours in-person attendance and 4 hours for preparation and self-directed study).**

**Practical Session Day 2 (8 hours in-person attendance)**

**Practical workshop covering reproductive examination of the stallion. 5.5 hours: 2 to 4 groups working simultaneously with various instructors:**

- Techniques for semen extraction: artificial vaginas and pharmacological manipulation of ejaculation.
- Ultrasound of the reproductive tract of the stallion: accessory glands, testicles and penis. DSOe. B-mode and Doppler ultrasound of the testicles.
- Endoscopy of the reproductive tract.
- Basic spermogram: concentration, morphology and spermatic viability
- Semen processing: fresh, refrigerated and frozen.

- Advanced spermogram: spermatic motility (CASA), flow cytometry.
- Methods to improve seminal quality: cushion, centrifugation, filter and gradient or single layer centrifugation.

**II. CLINICAL CASES SESSION - 2.5 hours: Clinical cases prepared by tutors for students to solve and discuss.**

**III. PREPARATION OF THE PORTFOLIO OF CLINICAL CASES AND PRESENTATION/DISCUSSION OF REPRODUCTION CASES (3 hours in-person attendance for presentation/discussion and 12 hours of self-directed study and preparation)**

Participants should submit a portfolio of clinical cases which they have seen while using the knowledge acquired during the module. One of these should be used as a focus and appropriately documented with accompanying media (images or videos), laboratory results etc and presented in an online session where it will be discussed with tutors and other participants.

**LEARNING OUTCOMES**

After finishing the module on reproduction, neonatology and mare management the student should be able to:

1. Understand the physiology and endocrinology of reproductive processes which occur in the stallion and the mare: gamete formation, onset of puberty, reproductive cycles, sexual behaviours, copulation and fertilisation.
2. Understand the physiology and endocrinology of gestation, birth, postpartum, lactation as well as that of the foetus and neonate.
3. Understand and apply different procedures to control the reproductive cycle and ovulation in the mare and diagnose pregnancy.
4. Understand different techniques for artificial insemination, embryo transfer, in vitro fertilisation and new technologies used in equine reproduction as well as when to recommend them.
5. Be familiar with the different causes, both congenital and acquired which cause reproductive conditions, causes of infertility and sterility, in the mare and the stallion, their diagnosis and possible methods for prevention and treatment.
7. Understand diseases which can affect the mare during gestation, postpartum and lactation, as well as their diagnosis, prevention and treatment.
8. Understand the diseases which can affect the foetus and new-born, as well as their diagnosis, prevention and treatment.
9. Recognise when birth is likely to occur and evaluate possible complications and how to resolve them.



# Veterinary Continuous Education in Europe VetCEE

## Hours distribution in different modules

MODULE	THEORY			PRACTICAL CONTENTS					THEORY vs PRACTICAL		CONTACT vs NON CONTACT		TOTAL	
	CONTACT HOURS	NON CONTACT WORK	THEORY CONTACT PROPORTION	WET-LAB SESSIONS		OTHERS		MEAN PRACTICAL CONTACT PROPORTION	MODULE THEORY	MODULE PRACTICE	MODULE CONTACT HOURS	MODULE NON-CONTACT HOURS	MODULE TOTAL HOURS	MODULE TOTAL ECTS
				WET-LABS (CONTACT)	NON CONTACT WORK	CONTACT CLINICAL SESSIONS / JOURNAL CLUB / VIDEOS	NON CONTACT WORK (PREPARATION OF CASE LOG, CLINICAL CASES, STUDY...)							
<b>1. General</b>	29,0	29,0	50%	0,0	0,0	0,0	4,5	0%	93%	7%	46%	54%	62,5	<b>2,5</b>
<b>2. Anesthesia</b>	23,0	23,0	50%	0,0	0,0	5,5	11,0	33%	74%	26%	46%	54%	62,5	<b>2,5</b>
<b>3. Image</b>	19,0	19,0	50%	16,0	4,0	0,0	4,5	65%	61%	39%	56%	44%	62,5	<b>2,5</b>
<b>4. Emergencies</b>	28,0	28,0	50%	2,0	1,0	2,0	1,5	62%	90%	10%	51%	49%	62,5	<b>2,5</b>
<b>5. Medicine</b>	66,0	66,0	50%	12,0	3,0	3,5	12,0	51%	81%	19%	50%	50%	162,5	<b>6,5</b>
<b>6. Surgery</b>	40,0	40,0	50%	16,0	4,0	10,0	15,0	58%	64%	36%	53%	47%	125,0	<b>5,0</b>
<b>7. Locomotor</b>	45,0	45,0	50%	16,0	4,0	3,0	12,0	54%	72%	28%	51%	49%	125,0	<b>5,0</b>
<b>8. Stud</b>	50,0	50,0	50%	10,5	2,5	8,0	16,5	49%	73%	27%	50%	50%	137,5	<b>5,5</b>
<b>TOTAL PROGRAMME</b>	<b>300,0</b>	<b>300,0</b>	<b>50%</b>	<b>72,5</b>	<b>18,5</b>	<b>32,0</b>	<b>77,0</b>	<b>52%</b>	<b>75%</b>	<b>25%</b>	<b>51%</b>	<b>49%</b>	<b>800,0</b>	<b>32,0</b>
	<b>600,0</b>			<b>200,0</b>										