Standard 3

Curriculum

3.1. Factual information

3.1.1. Description of the educational aims and strategy in order to propose a cohesive framework and to achieve the learning outcome.

The curriculum of **FVETUM** was designed according to European Directive 2005/36/EC. It was formerly verified by ANECA (ENQA member) in 10/06/2009, approved by the Spanish Ministry in 12/11/2010 (BOE, 16/12/2010) and officially published in BOE 11/03/2011. Recently (08/05/2017), renewed its accreditation by ANECA.

The curriculum is built upon a list of **Competences**, which are divided into 3 categories:

- **Transversal**, formulated by the University. The same for all the Degrees of **UM**.
- **General,** taken from the "White Book of the Veterinary Degree" of ANECA (http://www.aneca.es/var/media/150400/libroblanco_jun05_veterinaria.pdf), and aimed at harmonizing the educational curriculum among the Spanish Establishments of Veterinary Education. This was relevant in a moment –around 2010- when all the Spanish Degrees were re-defined according to the European Higher Education Area.
- **Specific.** A total of 40 specific competences (**Appendix 2**), which correspond to the list of Day One Competences defined by the EAEVE.

Upon these **Competences**, the main educational purpose of the curriculum is to assure the students the achievement of competent level of knowledge and skills in all the fields of the veterinary profession. This is implemented through a progressive and comprehensive **competences-based learning-process** with the following educational aims and workload (**Table 3.1.1.**).

Table 3.1.1.- List of competences-based learning-process with the following educational aims and workload (ECTS).

	ECTS
• Achievement of knowledge and related skills in **Veterinary Basic Sciences**	88
• Achievement of knowledge and **Clinical and Sanitary** skills	113
• Achievement of knowledge and skills in **Animal Production and Welfare**	39
• Achievement of knowledge and skills in **Food Technology, Hygiene and Safety**	24
• Deeper, on-site development of the previous knowledge and skills by bringing the students into the reality of the **professional practice**, including	
o ***Indoor practical training***	21
o ***Outdoor practical training***	3
• Through **Electives**, achievement of knowledge and skills in other fields of the veterinary profession, such as *Ecophatology, Veterinary History, Taurology* and *Clinical Pathology* (6 out of 12 ECTS per student).	6
• Progressive achievement of basic Reviewing, Researching and Communication skills which culminate in the **Graduation Thesis**.	6
TOTAL	**300**

The mentioned aims pursue a series of **learning outcomes (Appendix 2 A)** associated to each specific subject of the curriculum. The relationship between the competences, the learning outcomes and how they are achieved is defined at subject level, and described in detail in the **Teaching Guide (TG)** of each individual subject (http://www.um.es/web/veterinaria/contenido/estudios/grados/veterinaria/2017-18/guias). On an annual basis, **TG** are reviewed, discussed and finally approved by the Department Councils and lately by the Faculty Board. In fact, **TG** can be considered as "formal contracts" between both academics and students which serve as a reference for the implementation and monitoring of the learning process. As a matter of fact, the whole learning process is run and assessed under a **coordination framework**, which involves interactions among representative, executive and surveying agents of the whole educational community (detailed in **3.1.3 section**).

Veterinary Degree at **FVETUM** curriculum (**Table 3.1.2**) is organized in a series of subjects with a minimum of 3 and a maximum of 24 ECTS as presented in the following Table ("Core subjects" are the conceptual entities which build the curriculum framework. "Subjects" refers to the individual educational units which are taught and assessed independently).

Table 3.1.2.- Organisation of core subjects and subjects by semester and ECTS of the Veterinary Degree at **FVETUM**.

Core subjects	Subjects	Semester	ECTS
Statistics and business	Statistics and business (management & marketing)	1	6
Physics & Chemistry	Physics & Chemistry	1	6
Biology	General and Molecular Biology	1	6
Biochemistry	Biochemistry	1	6
Animal Anatomy	Anatomy I	1	6
	Anatomy II	2	6
	Microscopic Anatomy & Histology	2	6
	Anatomy & Histology Central Nervous System (CNS) & Embryology	3	6
Physiology	Veterinary Physiology I	2	6

	Veterinary Physiology II	3	6
Genetics	Genetics	2	6
Identification, Animal Welfare, Ethics & Professional Legislation	Deontology, Legal Medicine & Veterinary Legislation	2	3
	Ethnology and Animal Handling	3	4,5
	Ethology, Animal Welfare and Animal Protection	4	4,5
Biological Agents of Disease and Structural & Functional Disorders	Microbiology I	3	4,5
	Microbiology II & Immunology	4	6
	Parasitology	3	4,5
	Nosology & Physiopathology	4	6
	General Pathological Anatomy	4	3
Basics of Diagnosis & Therapeutics	Propaedeutics	5	6
	Pharmacy and pharmacology	5 & 6	6
	Special Pathological Anatomy	5 & 6	9
	Diagnostic Imaging	6	4,5
	Pharmacotherapy	7	4,5
Clinical Sciences	Veterinary Anaesthesia	6	4,5
	General Surgical Pathology & Surgery	7	4,5
	Internal Medicine	7 & 8	12
	Reproduction & Obstetrics	7 & 8	12
	Farm Animal Clinics	9	3
	Special Surgical Pathology & Surgery	9	6
Animal Heath	Epidemiology, Zoonosis & Public Health	4	6
	Infectious Diseases I	5	4,5
	Infectious Diseases II	6	4,5
	Parasitic Diseases	5 & 6	9
	Toxicology	6	6
	Preventive Medicine & Heath Policy	9	6
Animal Husbandry	Agronomy	2	3
	Animal Nutrition	3 & 4	9
	Animal Husbandry, Farm Facilities & Welfare	7 & 8	9
	Agrarian Economy	8	3
	Animal breeding & Welfare	9	6
Hygiene, Security & Food Technology	Food Technology	7 & 8	9
	Food Hygiene, Ipection & Control I	8	6
	Food Hygiene, Inspection & Control II	9	6
	Food Security	9	3
PRACTICUM & Veterinary Degree Final Thesis	**PRACTICUM** (*Prácticas Tuteladas*)	10	24
	Veterinary Degree Final Thesis	10	6
Electives (6 ECTS out of 12)	Veterinary History	5	3
	Taurology	5	3
	Wild Fauna Ecophatology	5	3
	Veterinary Clinical Pathology	5	3

Through a total of 5 academic years - 10 semesters - subjects are annual or restricted to a semester. The first 9 semesters cover the most substantial part of the curriculum, while the 10th semester (30 ECTS) is aimed at further developing and verifying the achievement of the professional competences and skills – Day One Competences- on realistic scenarios. The list of subjects does not completely fit into structure defined by the ECCVT on the 26th March 2015, but it does include all its content, as showed in detail in **Tables 3.1.3** and **3.1.4**.

Table 3.1.3.- Curriculum hours in each academic year taken by each student.

Academic year	A*	B	C	D	E	F	G	H
1st	363	71	109	153	86		40	**822**
2nd	353	40	58	213	70		42	**776**
3rd	339	62	91	49	3	232	27	**803**
4th	341	76	117	78	31	195	30	**868**
5th	175	38	128	90	184	326	108	**1.049**

*A= Lectures; B= Seminars; C= Supervised self-learning, D= Laboratory and desk based work; E= Non-clinical animal work; F= Clinical animal work; G= Others: tutorial and evaluation; H= Total.

The teaching strategy includes a broad variety of modalities including theory lectures, seminars, problem based learning, evidence based medicine, laboratory and desk based work, non-clinical animal work and clinical animal work. For a better clarification, the next **Figure 3.1.** summarizes which are the subjects where the latest two modalities of teaching are used.

Table 3.1.4.- Curriculum hours in EU-listed subjects taken by each student.

Module	Subject	A	B	C	D	E	F	G	H
BASIC SUBJECTS	Medical physic	26	5	5	5			2	**43**
	Chemistry (inorganic and organic sections)	25	4	4	4			1	**38**
	Animal biology, zoology and cell biology	43	4	6	21			4	**78**
	Feed plant biology and toxic plants	24	6	15	10	8		2	**65**
	Biomedical statistics	18	8	20	14			2	**62**
BASIC SCIENCES	Anatomy, histology and embryology	116	16	34	36	108		12	**322**
	Physiology	58	11	16	48	16		11	**160**
	Biochemistry	43	6	6	15			8	**78**
	General and molecular genetics	43	10	16	14			4	**87**
	Pharmacology, pharmacy and pharmacotherapy	50	1	1	12	3		3	**70**
	Pathology	54	6		43			5	**108**
	Toxicology	30	5	12	18	3	12	3	**83**
	Parasitology	27	2	4	16	6		3	**58**
	Microbiology	42	5	7	32			5	**91**
	Immunology	18	4	4	15			4	**45**
	Epidemiology	36			40	3		3	**82**
	Professional communication	2	3	10	2			1	**18**
	Professional ethics	4	2						**6**
	Animal ethology	16	8	10	5	6		3	**48**
	Animal welfare	16	4	5	2	3		1	**31**
	Animal Nutrition	43		2	3	7		5	**60**
CLINICAL SCIENCES	Obstetrics, reproduction and reproductive disorders	58	17	11			82	6	**174**
	Diagnostic Pathology	54	13	14			43	2	**126**
	Medicine and surgery including anaesthesiology	253	53	82	16		290	23	**717**
	Clinical practical training in all common domestic animal species						264	44	**308**
	Preventive Medicine	12	2	4	11			1	**30**
	Diagnostic Imaging	29	6	14			24	2	**75**
	Veterinary legislation, forensic medicine and certification	8			5			3	**16**
	Therapy in all common domestic animal species	29	6	32	22			2	**91**
	Propaedeutic of all common domestic animal species	38	7	10			30	3	**88**
ANIMAL PRODUCTION	Animal Production and breeding	89	16	52	33			9	**199**
	Economics	22	4	6	9			1	**42**
	Animal husbandry	27	5	21	10	8		2	**73**
	Herd health management	12	4	4	11	78		11	**120**
FOOD SAFETY AND QUALITY	Inspection and control of food and feed	55	13	36	47	6		5	**162**
	Food hygiene and food microbiology	22	6	10	15			3	**56**
	Practical work in places for slaughtering and food processing plants					106		16	**122**
	Food technology including analytical chemistry	59	9	11	29	5		5	**118**
PROFESSIONAL KNOWLEDGE	Professional ethics & behaviour	4	5				8	5	**22**
	Veterinary legislation, forensic medicine and certification	53	5	7	8	1		1	**75**
	Veterinary certification and report writing		2	2	1			3	**8**
	Communication skills							8	**8**
	Practice management & business	8	2	10	5	7		2	**34**
	Information literacy & data management	4	3		6			10	**23**

A= Lectures; B= Seminars; C= Supervised self-learning, D= Laboratory and desk based work; E= Non-clinical animal work; F= Clinical animal work; G= Others: tutorial and evaluation; H= Total.

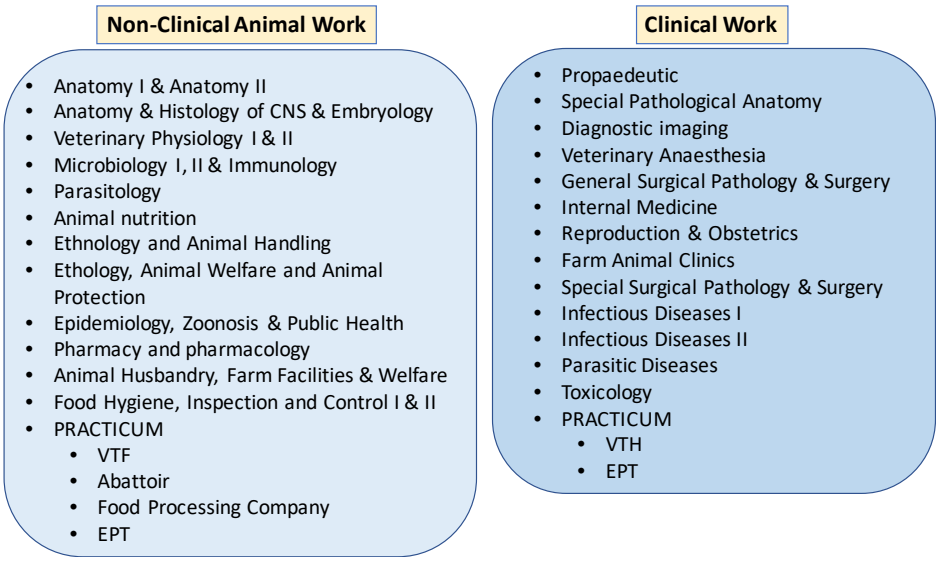

Figure 3.1.- Main subjects involved in non-clinical and clinical animal work.

In theory lectures, all the students of the same year (around 100) are taught in a single group. In the other modalities, teaching is organized in reduced groups of 4 to 20 students. Students of the 1st and 2nd years normally have 3 h of lectures and 3 h of other compulsory activities per day (seminars, laboratory work, non-clinical animal work, etc). Students of the 3rd, 4th and 5th years have a different teaching strategy. Seminars, laboratory work, non-clinical animal work and clinical work is in based on **rotations**, which means moving the students among the subjects of the same semester on a two-weeks basis. Students in the 10th semester have 15 weeks of **PRACTICUM** which is also organized in rotations among clinical and non-clinical activities. During the **PRACTICUM** students are split in groups of 4-5 people and expend 6 weeks in the **VTH**, 2 weeks in the **VTF**, 2 weeks in an abattoir, 1 week in a Food Processing Plant and 4 weeks in an external professional placement (**EPT**). During the 10th semester students are also devoted to their Veterinary Degree Final Thesis. A detailed description of the teaching timetable is available in the web site. Besides, the schedule can be checked on line at http://www.um.es/web/veterinaria/contenido/estudios/grados/veterinaria/2017-18#horarios.

3.1.2. Description of the legal constraints imposed on curriculum by national/regional legislations and the degree of autonomy that the Establishment has to change the curriculum.

The Veterinary Degree at **UM** accomplishes de requirements of **the European Directive 2005/36**, transposed to Spanish regulations in the **Royal Decree 1837/2008**. The curriculum conditions are regulated by the Resolution 17th December 2007 (BOE 21st December), and the **ECI/333/2008**, of 13th February, (BOE 15th February, 2008) which establish the conditions leading to qualification for the exercise of the Veterinary Profession. Under this legal frame, the current curriculum was verified by the National Agency for Evaluation, Quality and Accreditation (ANECA) and finally published by the Spanish Ministry and Regional Government on the 25th February 2011 (BOE 11th March and BORM of 8th of March 2011). The whole curriculum, including a Quality Assessment, was recently evaluated by ANECA and renewed accreditation (8/05/2017). All the factual information regarding the legal status and conditions of the Degree are included in the Registry of Universities, Establishments and Titles (RUCT) of the Ministry of Education, Culture and Sport, with code No.2500988(https://www.educacion.gob.es/ruct/estudio.action?codigoCiclo=SC&codigoTipo=G&CodigoEstudio=2500988&actual=estudios).

The current **Curriculum** begun in the academic year 2010/2011, and since then no major changes have been made to. During this period, implementation has been monitored by the **Committee of Quality Assurance and System of Guarantee of Internal Quality (SGIC**) which involve representatives of academics, technical staff and students as well as external stakeholders. As established by the working protocol surveys about the learning process (teaching methods, student's assessment and success, curriculum integration), the learning environment, the professional insertion, etc, are collected on a regular basis. Based upon the inputs collected in recent years, a period of potential curriculum review involving all the mentioned bodies is now in discussion (exploratory stage). No conclusions and/or recommendations are available yet, but some core guidelines are the level of integration of contents within the curriculum, and the relationship between assessment methods, learning outcomes and professional competences. This exploratory process of curriculum review is expected to serve as a basis for a broader discussion at Faculty level regarding the procedure, extent and content of any future change in the curriculum.

It is important to highlight at this site that the accurate implementation of the SGIC at the **FVETUM** has been awarded by ANECA with the stamp **AUDIT** (2th December 2013). **FVETUM** is the unique Spanish Veterinary Establishment holding this award, which is valid up to December 2017.

3.1.3.- Description of how curricular overlaps, redundancies, omissions and lack of consistency, transversality and/or integration of the curriculum are identified and corrected.

The teaching strategy in terms of coordination pursues a cohesive achievement of the competences and learning outcomes. On an annual basis, several meetings involving a total of 8 agents are responsible for assessing coordination of teaching: Dean and Vice-Deans, Semester Coordinators, Subject Coordinators, Students Representatives (one student per academic year, 5 in total), Academic Departments, Committee of Academic Affairs, Committee for Quality Assurance (SGIC), Faculty Board (Figure 2). Additionally, during the academic year 2016-17 a **Work-group for Coordination (WGC)** has been specifically set up with the main goal of improving the horizontal and vertical integration of the curriculum. This group involves the Dean, the Vice-Dean of Academic Organization, Internationalization and Students of the Veterinary Degree, the Heads of Academic Departments, the Director of the Veterinary Farm, and other representatives from different subjects who volunteered for this purpose. Refining the learning outcomes, pursuing integration, detecting overlaps, redundancies, omissions and lacks of consistency among the subjects have been assessed on a regular basis.

The **coordination strategy** of the curriculum involves 3 levels (**Figure 3.2.**): definition of coordination milestones, implementation and assessment.

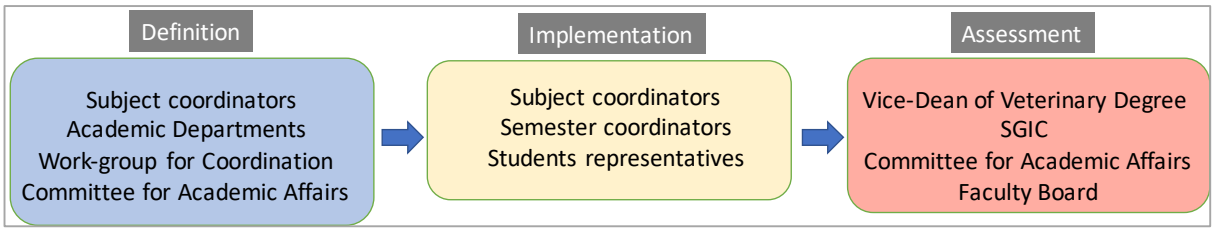

Figure 3.2.- Levels of coordination strategy.

- Definition of coordination milestones: establishing the relationship between the competences and the learning outcomes.
  - Subject coordinators are responsible for defining a competence-based list of learning outcomes, teaching and evaluation methods at subject level (Teaching Guides, TG).
  - Academic Departments approve the TG at Department level.
  - Work-group for Coordination defines horizontal and vertical coordination milestones among Academic Departments.
  - Committee for Academic Affairs defines recommendations or potential changes which are reported to the Faculty Board.
- Implementation: supervision of how the learning process and the coordination milestones are achieved during the academic year.
  - Subject coordinator supervises the process and reports to the Semester coordinator.
  - Semester coordinators supervise the learning process in those subjects included in the same semester of the academic year. Potential incidences, deviations, redundancies are reported to the Vice-Dean.
  - Student representatives collect the student's opinion on the learning process and report to the Vice-Dean.
- Assessment: evaluation of the congruence of the whole learning process.
  - Vice-Dean:
    - Chairs semester meetings between Student's Representatives and Subject Coordinators.
    - Reports to SGIC, Committee for Academic Affairs and Faculty Board.
  - SGIC: assessment of semester reports and advice about how to correct deviations from the teaching quality parameters and coordination milestones. Reports to Faculty Board.
  - Committee for Academic Affairs: assessment of semester reports and definition of recommendations to be approved by the Faculty Board
  - Faculty Board: discussion and final approval of any recommendation or change affecting the learning process or the curriculum.

3.1.4.- Description of the core clinical exercises/practical classes/seminars prior to the start of the clinical rotations.

During the 1st and 2nd years of the Degree, clinical topics and activities are considered in many subjects either with or without direct animal work. Afterwards, to allow a deep and optimum approach to clinical scenarios, from the 5th to the 10th semester, the teaching strategy is based on rotations. This situation is further illustrated in the next **Figure 3.3**.

In the **pre-clinical subjects (with or without animal work)**, in addition to a deep basic knowledge in each discipline, seminars, problem based learning activities, exercises and laboratory practices are used with a clinical orientation.

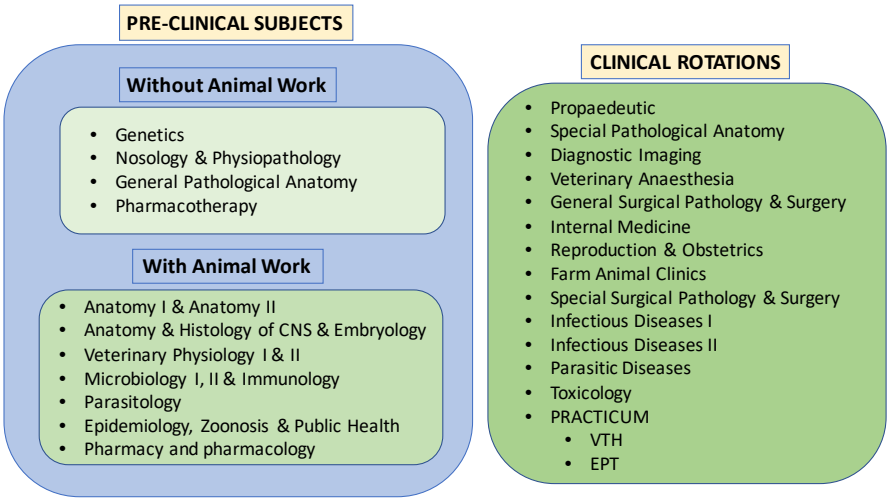

Figure 3.3.- Distribution of animal and non-animal work in pre-clinical and clinical subjects.

The clinical relevance of gross **Anatomy** is highlighted in theory lectures, seminars and practices. For instance, problem based learning is used to introduce the student in clinical pathologies affecting the locomotor apparatus. Practices on anatomical specimens and live animals are always carried out in a reduced group (4-5) for a better understanding of the normal anatomy and strategical comparison with abnormal anatomical specimens. In **Genetics** and **Embryology,** the basis of key inherited pathologies is considered.

In **Physiology** seminars and practices are complemented with discussions, exercises, simulations or presentations focused on key physiopathological processes affecting the domestic animals. Complementarily, underpinning knowledge on **Nosology** and **Physiopathology** is acquired through lectures and problem based learning seminars comprising key pathological disorders affecting different organs and systems.

In **General Pathological Anatomy**, the main pathogenic mechanisms are related with their correspondent lesions at cellular, tissue and organic levels. As an advance for future clinical knowledge, teaching is aimed at understanding how general etiological agents are linked to typical clinical signs from a macro and microscopical point of view.

Clinical thinking in **Bacteriology, Virology, Mycology, Parasitology and Immunology** is boosted by problem based learning activities and practices carried out in groups of 2-4 students. Routine and specialized diagnostic techniques are learnt in the context of clinical cases. For instance, the pathological effect of *Chlamydia abortus* is studied on infected cell cultures and by inoculation of chicken embryos, or protozoan diseases are diagnosed by working on samples from infested animals.

In **Pharmacy and pharmacology** students carry out an animal phase of a pharmacokinetic study, in which they administrate a drug and collect plasma samples at different predetermined times. This contributes to understand the importance of the proper disposition of drugs in the animal body, how to prescribe drugs and its legal implications, and to notify adverse effects of drugs to the National Pharmacovigilance Services. The clinical aspects of **Pharmacotherapy** are fully developed in seminars and practical activities where cases based learning is used to study different pathological situations, discussing the best treatment as well as alternative ones if subjacent illness or chronical diseases are present. Also, the students should discuss about the potential adverse effects of treatments or secondary effects that can appear, and consider an alternative therapy.

Clinical problems in **Epidemiology** are introduced by using the rabbit and goat breeding units from the Teaching Farm. Theoretical concepts of the statistical variables are related with the reality of animal health and production. This way, students become familiar with these variables before performing epidemiological data analyses, and also learn some of the recommended routines to safely explore animals, elaborating a basic questionnaire including productive and sanitary data such as, absence or presence of clinical sings (dermatitis, mastitis, diarrhoea and others; productive records of rabbit does or goats).

3.1.5.- Description of the core clinical rotations and emergency services and the direct involvement of undergraduate students in it.

3.1.5.1 Organization of the clinical rotations.

As mentioned above a rotation model is followed by the subjects of the 3rd, 4th and 5th years (5th-10th semesters) to enhance the student's immersion in real professional scenarios (**Table 3.1.5**).

- **5th-9th semesters. Clinical rotation modules.**
  - Students within the same semester are assigned into modules (5 rotation groups) of approximately 20 students to rotate among subjects on a 2 weeks' basis. In each rotation, students are additionally split into subgroups of 2-10 students depending on the modality of teaching: seminars, case studies to develop evidence based medicine, specialized laboratory diagnosis, clinical visits to farms (ruminants and pigs, mainly) and clinical practices in the **VTH** (small animal and equine).
  - A number of hours of direct hands-on work with individual patients and herds, making use of relevant diagnostic data are compulsory in any rotation.
- **10th semester. PRACTICUM.**
  - During **PRACTICUM** students are assigned into rotation groups for a period of 15 weeks.
  - Each group expend **6 weeks in the VTH** (2-4 students per group), **4 weeks in a selected placement (EPT)** (one student per EPT), **2 weeks in abattoir** (1-2 students per abattoir), **2 weeks in the VTF** (4-5 students per group), and **1 week in a Food Pilot-Plant/Food Industry** (**FPP,** 10 students per group). Rotations in the **VTH** and **EPT** -10 weeks in total- involve different clinical services of direct clinical animal work.
  - At **VTH** students are allocated among different clinical services, which also involve two 12 hours shifts.
    - For 2 weeks, they are focused in medicine and surgery of companion animals: *Anaesthesia, Diagnostic Imaging, Surgery, Dermatology, Cardiorespiratory, Internal Medicine, Ophthalmology, Clinical pathology and Reproduction*.
    - For 4 weeks, students rotate among the following services:
      - *Emergency and Critical Care Service and Animal Ethology* (1 week),
      - *Pathological Anatomy* (1 week),
      - *Equine Medicine, Surgery and Reproduction* (1 week),
      - *Ambulatory Cattle Clinics* and *Emergency* (1 week).
  - During the placements (**EPT**, 4 weeks) students are supervised by veterinary practitioners who allow them to deal with all aspects of routine clinics. See 3.1.8 for further information.
  - During the rotations in the **VTF** (2 weeks) students are devoted to livestock units of porcine, bovine (dairy and beef cattle), equine, caprine, ovine, rabbit and poultry. During this period, students are also involved in any clinical problem affecting those animals.
  - Abattoir Practical Training (**APT**, 2 weeks). During **APT** one or a pair of students are involved as an Official Veterinarian Inspector (OVS) in the day-by-day activities of the abattoir under direct supervision of an official vet. All abattoirs are selected and agreed with the Regional Zoonosis and Food Safety Services of the Regional Authority for Public Health. Students follow the timetable of the abattoir and perform all activities as an OVS: documents review, hygienic infrastructure and performance by abattoir workers, ante, in-limite and post-mortem inspection, laboratory analyses (trichina and microbiological contamination and others) and sampling (official residue program), offal and SRM (Specified Risk Material control). Most of the abattoirs slaughter swine, cattle and small ruminants, and other are specialized in poultry or swine. **See 3.1.6** for further information.
  - Food Pilot Plant-Food Industry (**FPP**, 1 week). During FPP a ten-students group is assigned to visit and evaluate regional food industries in order to check, at real conditions, the development of the food production chain in a company. Also, to highlight the role played by a vet professional in this area of expertise. Students know, in situ, routine working day in food industries where different products (fresh, cured and cooked meat products, dairy, winery, brewery, bakery…) are elaborated. These visits (3-4 h) are in food companies located in Murcia Region or its surroundings. All of them are provided with high hygienic and technological standards. The students go by public or private transport. Each visit is supervised by the lecturer and the manager of the company or any other technical staff from the enterprise. Prior to and after the visit, students meet twice with the academic in charge (3-4 h, mandatory), who guides them to fulfil a report with different tasks and questions related with a practising hazard analysis and critical control point (HACCP) design.

3.1.5.2. Activities carried out by students in the clinical rotations:

- **Propaedeutic.**
  - Systematic clinical examinations of all the organic systems are carried out in small groups (4-5 students).
  - Dog is the main live model but also work sessions are devoted to equine, cow and exotic animals (one day each). Besides, students work with real clinical cases in which they must use results obtained from clinical examination, haematology and biochemistry (including endocrine data), fluid analysis, etc. Students have to interpret correctly the information, make a differential diagnosis and choose the most appropriate diagnostic tests for a confirmatory diagnosis.
- **Special Pathological Anatomy.**
  - This is an annual subject where students take a 2 weeks' rotation in each semester.
  - Modules are subdivided into two groups of 10 students, which expend 7 days of work in the necropsy room in each semester.

- In the first semester rotations involve 20 hours of practical work, 9 h seminars: students expend 1 day in biosecurity topics and learning how to collect and process tissue samples from abattoir organs; 2 days in oral and written description of lesions from abattoir organs; 3 days in a necropsy of domestic mammals and writing the necropsy report; 1 day in a bird necropsy and writing the necropsy report.
- In the second semester rotations involve 27 hours of practical work and 9 h seminars: student expend 4 days performing necropsies or working with selected histopathological images, and 3 days describing and diagnosing clinical diseases affecting organs obtained from the abattoir. Additionally, all students participate in two seminars about macroscopic and microscopic lesions.

- **Diagnostic Imaging.**
  - Before starting the clinical rotations, the students of each module attend two sessions of radiographic interpretations (4 h for small animals and 2 h large animals), one session of CT and MRI interpretations (2 h) and one session about ultrasonography interpretation (3 h for small animals and 1 h for horses).
  - During clinical rotations, the module is divided in several groups of 3-6 students (depending on the number of students of each module). They spend six days (4 h/every day) at the hospital and under supervision of teachers the students are involved in the different imaging techniques (radiology, ultrasonography, computed tomography). They participate in the positioning of the animals to take radiographs, preparing the animal to perform ultrasound exam and CT study.
- **Veterinary Anaesthesia.**
  - Students are divided into 2 submodules ranging from 7 to 10 students each. Both submodules change their position in alternant days, and while one submodule is involved in the clinical rotation (5 days) the other one is developing supervised teamwork (5 days).
  - The submodule involved in the clinical rotation is divided in smaller groups of 2-5 students, depending on the daily clinical cases attending at the **VTH**. Always under staff supervision, students are directly involved in the design and discussion of anaesthetic protocols, calculation of doses and the administration of anaesthetic and analgesic drugs. They also perform venoclysis, anaesthetic inductions, orotracheal intubations and monitoring. Fulfilling the anaesthetic records and supervising patients' recovery are also among their duties.
  - On their off-clinic days, students are exposed to evidence medicine based critical discussions on a relevant topic in anaesthesia including biosecurity, anaesthetic equipment, anaesthetic monitoring and rational design of sedative and anaesthetic protocols for different domestic species. Within these days, the students are instructed in anaesthetic procedures such as venoclysis, anaesthetic induction, orotracheal intubation, etc, by e-learning with video tutorials.
  - Complementarily, all the students are called to participate in the study and discussion of a series of selected clinical cases, to boost his clinical reasoning in veterinary anaesthesia.
- **General Surgical Pathology & Surgery.**
  - The rotation in this subject includes a total of 8 sessions of direct work with surgical equipment, biomodels and cadavers.
  - Activities and topics include on-site practice about the operating theatres, surgical equipment, asepsis (patient, surgeon and equipment), dressing, sutures and cures.
  - Diverse techniques associated to skin surgery are practiced in depth.
  - Also, in small groups (4-5) students must prepare and present a selected topic on general surgery in domestic animals.
- **Internal Medicine (Medical Pathology)**.
  - All students of each module are distributed among the different Clinical Services of the **VTH** in groups of approximately 5 students.
  - As this is an annual subject, in each semester students expend 2 days in the *Internal Medicine Service*, 2 days in *Cardiology*, 2 days in *Ophthalmology* and 1 day in the *Equine Medicine*. Under direct supervision students are responsible for managing the clinical cases which attended the consultations each day. Students are directly involved in carrying out a correct anamnesis and physical examination, establishing a series of differential diagnoses, justifying the prescription of complementary clinical tests, figuring out a diagnosis, prescribing a treatment, giving a prognosis and informing the owner. They also complete the medical records of the patient and collect all the information in relation to the complementary examinations. Direct clinical work with patients is complemented with 1 session of clinical cases on *Dermatology* and 2-3 days of scientific review and evidence based medicine work on a selected clinical case.
  - Additionally, every student must take a 24h shift per semester in the *Emergency and Hospitalization Service* of the **VTH**, either in small animal or equine. During the shifts students join the staff and take part in the supervision of the hospitalized patients, included those in intensive care, or in surgery.
- **Reproduction & Obstetrics.**
  - Students' tasks are scheduled in different scenarios. In the *Reproduction Service* of the **VTH** students (groups of 5) expend a total of 3 days. During 2 days, they are involved in the clinical examination, diagnosis and treatment (surgery included) of those patients attending the service on that day. In addition, the students take care of a hospital stay (12 hours) during which they participate in the emergency care, as well as in the administration of the necessary care to hospitalized patients. Complementarily, evidence based medicine is

boosted by working on a real clinical case study of pathology of reproduction (1 day). Students are expected to make oral presentations on the potential diagnosis and treatment.

- In the **VTF** (2 days) students perform sessions of reproductive management of porcine (1 day) and caprine (1 day) species. In both situations, students are involved in the reproductive management of the male (semen obtaining and preparation of artificial insemination doses) and of the female (oestrus detection, potential hormonal treatments needed for oestrus synchronization and/or induction; insemination procedure and pregnancy diagnosis). Students are provided with a script with the tasks to be performed. Video tutorials are also used to introduce the students in their tasks.
- Finally, in groups of approximately 20 students, they participate in seminar sessions (18 hours) during which a set of activities are carried out under direct academic instruction. The purpose is to guide the students throw literature review of some key topics in animal reproduction**.** Topics are chosen according to the students' concerns or may be provided by the teacher. In any case, students are provided with a working script and bibliography for them to prepare a report and make an oral presentation of the seminar. Subsequently, a colloquium among classmates is established.

- **Farm Animal Clinics.**
  - Rotations involve a total of 21 hours of clinical work with cattle, small ruminants and pig.
  - In small groups, students visit 3 cattle farms and are directly involved in clinical herd health activities (ambulatory clinics).
  - Clinical work with small ruminants and pigs is complemented in the VTF, where students are involved in the clinical management and treatment of pathologies affecting these species.
  - Complementarily, seminars are also held to boost clinical thinking and evidence based medicine discussions.
  - The rotation also includes a training in disease prevention systems in farms.
- **Special Surgical Pathology & Surgery.**
  - During the rotations students are exposed to 3 days in the small animal surgery (including traumatology) at the **VTH**.
  - Prior to surgery students are directly involved in the anamnesis, physical examination and evidence based medicine discussion of the most appropriate diagnostic and therapeutic techniques for each patient. Once in the surgical theatre, 2-3 students of the module directly participate in the surgical scenario assisting the surgeon, while the remaining students follow the surgery by high definition video projection in a separate room and under direct supervision of another surgeon (surgery lecturer). The selected students participating in the surgery among surgeries.
  - Students also expend 3 days in surgical practice with dog cadavers. The most common surgeries in thorax (thoracotomy, thoracoscopy, tracheostomies), abdomen (gastrotomies, splenectomies, cholecystotomies) and eyes (entropion, evisceration and enucleation) are performed.
  - A whole session devoted to diagnosis and treatment of equine lameness is also included in the rotation.
  - Finally, in groups of 2-3 people all the students must work on a selected clinical case according to the methodology of evidence based medicine.
- **Infectious Diseases I & Infectious Diseases II.**
  - In small groups (7-8 students) students participate in clinical visits to farms (cows, small ruminants, exotics are the most common) presumptively suffering from infectious processes. If required, students participate in sampling of fluids or tissue for further processing in the laboratory. This is complemented by some journeys of laboratory work.
  - In the laboratory, students either work with samples taken from patients during the visit to the farms or with those submitted to the Department of Animal Health. They are aimed at getting a diagnosis (bacteriological isolation, PCR reading…) as well as at discussing the prognosis and potential treatments for the clinical cases.
  - Topics (2-3 students/each) on herd health or infectious diseases of small animals are also reviewed in depth, presented and discussed with classmates
  - Finally, during the rotations students are also involved in problem solving of 4-5 selected clinical cases.
- **Parasitic Diseases:**
  - Rotations include 9 sessions of laboratory work, divided by the different host species, where students work at the bench with samples obtained from animals affected by parasitic diseases. During these sessions students conduct etiological diagnosis and discuss prognosis and potential treatments.
  - Additionally, clinical visits to farms of different production species are organized in groups of 8 students for *in situ* management and discussion of parasitic diseases. If necessary, samples are taken for further processing and analysis in the lab.
  - Also, 2 sessions are devoted to seminars where students work cooperatively to solve virtual clinical cases with debate and discussion.
  - Finally, in groups of 2-3 students, a published research paper on a topic of parasitic diseases is presented and discussed with classmates at the end of the rotation.
- **Toxicology.**
  - Rotations involve laboratory work in the *Service of Diagnostic Toxicology* of the **UM**, as well as field work and clinical sessions. Students are instructed in analytical techniques for toxicological diagnosis and then

directly involved in the processing and diagnosis of at least one clinical and one alimentary case of toxicology selected from those submitted to the service during the rotation.

- Additionally, students expend a whole journey in the Wild Animal Recovery Centre of Alicante where they learn not only clinical management of intoxicated patients but also management and knowledge about wild species. A gastric lavage of a wild bird is routinely done and also a discussion on clinical cases related with wild animals.
- Finally, students are also involved in a session of evidence based medicine about forensic toxicology with real cases obtained by the Council Zoonosis Service of Murcia.

- **PRACTICUM**.
  - Groups of 1-5 students are incorporated into the current working protocols of intra and extramural clinical scenarios. They are always supervised by academic staff who are also responsible for evaluating the level of achievement of the Day 1 competences.
  - At the **VTH** students join the hospital staff responsible for each medical consultation, surgery or obstetrics. Students do not only do things but also are requested to keep a record of activities which allows them to produce a final clinical report that is assessed by the assigned clinical tutor. Reports must describe the clinical cases in a comprehensive, realistic and professionally way, and include a discussion based on the literature.
  - During the rotation in *Pathological Anatomy* students actively participate in the following activities: review of clinical cases, necropsies, taking and processing samples for microscopical study, staining techniques (regular and special) and pathology diagnosis.
  - In *cattle ambulatory clinics* students join the academics for diagnostic work in farms where clinical cases and emergencies have been notified. Students are responsible for assisting the clinical practice and also reporting all the clinical cases.
  - In the *Hospitalization Service* rotation students actively participate (1 week) in the treatment and care of hospitalized small animals for surgery or intensive care. In addition, in small groups (1-2), the students participate with the VTH Ethology specialist in one or two Ethology Ambulatory small animals home visits.
  - In the *Equine Medicine, Surgery and Reproduction Service*, students actively participate (1 week) in all clinical horse cases. Students are involved in the physical examination and management of the horses and they directly participate in the medical and/or surgical treatment of the pathologies diagnosed. During the stay in the Equine Service, students also take care of the hospitalized horses.
  - During 3 work days, students are involved in the clinical management and treatment of the patients attending the **VTH** in evening schedule.
  - The student take care of a hospital stay (12 hours on weekend or holiday and 12 hours- night schedule) during which they participate in the emergency care, as well as in the administration of the necessary care to hospitalized small animal patients.
  - Additionally, every student must perform an ovariohysterectomy and/or an orchiectomy on a dog or a cat.
  - Complementarily, all the **PRACTICUM** students are invited to participate in the Weekly Clinical Sessions in which participate all the **VTH** faculty members. The first session is held on Monday and the goal is to expose and discuss about the weekend patient cases. The second session is on Wednesday and consists of a patient case presented by a **VTH** faculty member.

Table 3.1.5. Clinical Rotations under academic staff supervision (excluding **EPT**).

	List of clinical rotations (Discipline/Species)	DURATION (days)	YEAR OF PROGRAMME
Intra-mural (VTH)	Propaedeutic/Dog, Cat, Equine, Cow, Wild and Exotics	11	3
	Special Pathological Anatomy/Dog, Small Rum, Equine, Cow, Pig, Birds	21	3
	Imaging Diagnosis/Dog, Cat, Equine,	10	3
	Veterinary Anesthetics/Dog, Cat, Equine,	10	3
	Internal Medicine/Dog, Cat, Equine	21	4
	Reproduction & Obstetrics/Dog, Cat, Pig, Cow, Equine, Small Rum	21	4
	General Surgical Pathology & Surgery /Dog, Cat	11	4
	Special Surgical Pathology & Surgery/ Dog, Cat, Equine	11	5
	PRACTICUM: Medicine and Surgery of Companion Animals: Anaesthesia, Diagnostic Imaging, Surgery, Dermatology, Cardiorespiratory, Internal Medicine, Ophthalmology, Clinical Pathology and Reproduction	10	5
	PRACTICUM: Equine	5	5
	PRACTICUM: Special Pathological Anatomy	5	5
	PRACTICUM: Anaesthetics	7	5
Ambulatory clinics	Farm Animal Clinics		
	PRACTICUM: Ambulatory	5	
Depart Animal Health	Infectious Diseases I & II/Dog, Cat, Pig, Cow, Equine, Small Rum, Birds	21	
	Parasitical Diseases/Dog, Cat, Pig, Cow, Equine, Small Rum, Birds	21	
Toxicology Service	Toxicology/Dog, Cat, Small Rum, Wild & Exotics		

FSQ & VPH	Food Hygiene I and Food Hygiene II/Cow, Small Rum/Pig/Rabbits	22	
	PRACTICUM: Visits to abattoirs and food industries	10	See Tables 3.1.6 and 3.1.7
	PRACTICUM: HACPP	5	
ELECTIVES	Veterinary Clinical Pathology		
	Ecopathology of Wild Animals		

3.1.6.- Description of the teaching in abattoirs and in premises for the production, processing, distribution/sale or consumption of food of animal origin.

Teaching of **Animal Production** involves both basic subject as Animal Nutrition, Ethnology and Animal Handling, Ethology, Animal Welfare and Animal Protection, and other more specific subjects such as Animal Production, Animal Breeding & Welfare, and Agrarian Economy. The production of cattle (milk and meat cows), sheep (milk, meat and woo), goat (milk and meat), pig, birds (chicken and eggs), rabbits and fish are studied in detail. Equines are also considered regarding its husbandry.

- In **Animal Nutrition**, students are taught about the basics of animal nutrition and feeding. Also, their impact on animal health and production rates, the environment and the food security for humans is considered in theory and practical activities. Practical work in the **VTF** involves definition of different rations for all species as well as evaluation of the nutritional status of animals.
- A broad knowledge about the different breeds and their associated productive aptitudes is considered in **Ethnology and Animal Handling**. Direct work with productive species is carried out in the **VTF** to learn core tips regarding animal husbandry.
- Students are broadly taught on animal behaviour and welfare in **Ethology, Animal Welfare and Animal Protection**. The typical ethograms of all domestic species (pets included) are studied in detail. A few hours of direct animal work is devoted to this purpose in the **VTF**. Abnormal ethograms are also considered and discussed to evaluate their impact on the herd and the production.
- The whole reality of animal production of ruminants, pigs, rabbits, birds and fish is considered **Animal Husbandry, Farm Facilities & Welfare, Agrarian Economy, and Animal breeding & Welfare**. The genetic, nutritional, environmental, health, economy and welfare aspects are considered for each animal species and production (milk, meat, wool, etc). In the **VTF** students are devoted to evaluate how all those aspects influence on the yield. Animal welfare is particularly considered on site with regards to the dimension and conditions of the stables and cages. Students are also requested to produce a full productive project for a selected animal species. The projects must be reasonably feasible and accomplish all the legal requirements imposed by welfare.

Teaching in abattoirs, food processing plants, markets and food consumption premises. It is carried out in **Food Hygiene, Inspection and Food Control (I) and (II)**, in **Food Security,** in **Food Technology** and for 2 weeks during the **PRACTICUM**.

- **Food Hygiene, Inspection and Food Control (I).**
  - *Laboratory and desk based work*: each student (group size 20 per teacher) spends 20h in the laboratory to learn the following analytical procedures to determine food quality and food microbiology, and food authenticity:
    - Proximate composition of food and nutritional labelling. Analysis of protein, total fat, ash, carbohydrates and moisture, calculation of caloric value.
    - Food microbiology. Determination of total aerobic mesophylls, clostridium, coliforms, enterobacteria, streptococci group D of Lancefield and molds and yeast using classical methods and biochemical identification of enterobacteria. Also, the determination of coliforms and fecal enterococci in water.
    - Control quality of water. Determination of conductivity and different forms of chlorine in tap water for use in the food industries.
    - Control quality of honey. Analysis of moisture, acidity, total insoluble solids, identification of granules of pollen.
    - Control quality of eggs. Evaluation of the external and internal parameters of eggs.
  - *Seminar work*: each student (group size 20 per lecturer) spends 6h in the lecture room to learn the importance of foodborne diseases as communicable disease and the role for the maintenance of public health. In addition, learn about the surveillance organisms and the procedure to investigate a foodborne disease. The student prepares a practical work based on the real cases of the outbreak of foodborne disease.
  - *Visits to the Catering Services of the Murcia University*. The objective of these visits is that the students know *in situ* the day-to-day working activities in two catering facilities of Murcia University (Social Center and Faculty of Economy), and receive training about the hygiene and quality control of the whole process. They are trained on the manipulation of food and raw material, dish preparation, maintenance and serving. Besides, they receive information about hygiene and sanitary control of installations, staff and activities,

HACCP, etc. This training is taught in collaboration with the Manager of the Service of Ambient Quality, Food Safety and Nutrition of the Murcia University.

- **Food Hygiene, Inspection and Food Control (II).** Practical training is divided into 4 laboratory work sessions (total 12h), 1 visit to abattoir (6h, mandatory), 1 l visit to the Fish Central Market (4h, mandatory) and 1 visit to the Milking Goat Room of the VTF.
    - *Laboratory activities* are divided by animal origin foods: *meat and meat products, raw and processed milk and dairy products, and fishery products*. During these sessions students (group size <20) receive training about the main analytical methods to apply in the quality control of foods from animal origin intended for human consumption. That includes, among others, effects of stress on meat quality (pH to control PSE and DFD meats), meat products frauds, quality of raw milk (fat and protein composition), antibiotics, validation of heat treatments (inactivation of food enzymes), grade of freshness in fishery products (sensory analyses according to EU scales and QIM method content, total volatile nitrogen, trimethylamine, ammonia), etc.
    - *Abattoir*. Students, in small groups (<5), visit a general abattoir (all species abattoir: swine, cattle, equine and small ruminants) "Matadero Cabezo de la Plata" (25.5 km from Campus de Espinardo, 35 min drive) for 6 hours), where an Associate Lecturer, who acts as on-site OVS, explains the daily work. The main objective of this visit is to learn *in situ* how to proceed at the reception of the animals, with ante-mortem and post-mortem inspection, welfare protocols, at the stunning and the slaughter process, at the official sampling, in the management of the specified risk materials and other animal by-products, health marking, controlling meat storage temperature, HACCP, etc.

Table 3.1.6.- Abattoir visited for practical training in Food Hygiene, Inspection and Food Control (II) subject in the last three academic years indicating animal species and number of visitations, and students and hours per visitation.

Academic year	Abattoir	Animal species	Visits (v)/ Students (s)/ Hours (h)*
			Food Hygiene, Inspection and Food Control (II)
2016/2017	[1]"Cabezo de la Plata" (Murcia)	Swine, cattle, equine and small ruminants	25v /4s /6h
2015/2016	[1]"Cabezo de la Plata" (Murcia)	Swine, cattle, equine and small ruminants	28v /4s /6h
2014/2015	[1]"Cabezo de la Plata" (Murcia)	Swine, cattle, equine and small ruminants	30/5s/6 h

*V=Number of visitations to the abattoir in the academic year; S= number of students per visitation; H= hours of the visitation/training.

- *Central fish market*. Students are aimed at learning the Official Controls with respect to fishery products and live bivalve molluscs. They are joined by two academics (one of them on-site Official Veterinarian). The main Fish Market is in Alcantarilla (10 Km from the Faculty). It is one of the most important central markets of fish and marine products in Spain, where a wide range of Mediterranean and Atlantic species are classified and distributed all around the country. Students must identify fish species, control the minimal fish size, the labelling, perform sensory categorization and use official sampling methods for laboratory analyses.

Table 3.1.7.- Central fish markets visited for practical training in Food Hygiene, Inspection and Food Control (II) subject in the last three academic years indicating animal species and number of visitations, and students and hours per visitation.

Academic year	Central fish market	Visits (v)/ Students (s)/ Hours (h)*
		Food Hygiene, Inspection and Food Control (II)
2016/2017	"Alcantarilla" (Murcia)	10v /10s /4h
2015/2016	"Alcantarilla" (Murcia)	10v /11s /4h
2014/2015	"Alcantarilla" (Murcia)	10v /15s /4h

*V=Number of visitations to the abattoir in the academic year; S= number of students per visitation; H= hours of the visitation/training.

- *Dairy milking hygiene*. In the milking area students learn about the hygienic conditions to minimize microbial contamination of raw milk. Also, they perform the basic analytical methods to determine the aptitude of raw milk for heating treatment (alcohol test, reductasimetry). They also take surface samples to control the cleaning and disinfection plan of the milking system.

- **Food Security.**
    - *Laboratory and desk based work*, where each student (group size 20, per lecturer) spends 10 h in the laboratory carrying the following practical work:

- Determine how different intrinsic factors of food products (pH, acidity and salinity) and extrinsic parameters of food manipulation (Tª and time of storage) can affect to the survival and growth of pathogenic food bacteria using microbiological analysis.
- Use the ComBase program https://www.combase.cc/index.php/en/ to analyse the growth curve of the pathogens in food, discussing individually the results.
- Evaluate the cleaning procedures and the ambient hygiene in the food microbiology, as prerequisite of the HACCP plan.
- Analyse of food labels and prepare a check list related to the presence of food allergens.

- *Seminar work*. Students (group size 20, per lecturer) spend 5h practicing Hazard Analysis and Critical Control Point (HACCP) design, implementation and validation with practical cases in different foodstuff.

- **Food Technology.** Practical Training is divided into 7 laboratory work sessions, 3 located at the laboratory and the other at Food Pilot Plant (**FPP**). Total 21h plus 1 seminar (3 h).
  - *Laboratory work*. Students (group size around 20) receive training about technology treatment of food as well as the influence of the different technologies in the final food properties (emulsion properties, drying, influence of thermal treatment in food properties). At **FPP** the students carry out the elaboration of different products such as: fresh cheese, jam, sausage and canned food; and identify the main parameters of production involved as well as the equipment necessary.
  - *Seminar*. A set of activities are carried out under direct academic instruction. The purpose is to guide the students throw literature review of some key topic in food technology. Topics are chosen according to the students' interests or may be provided by the teacher. In any case, bibliography is given for them to prepare a report, presentation and discussion. For this purpose, students are split into groups (3-4) which represent different sectors of the food chain (industry, consumer and inspector).

- During the **PRACTICUM** students expend 2 weeks in a selected abattoir, either of general use or specialized by species (pig, cows, small ruminants, poultry, rabbit). A maximum of 2 students are allowed at the same time in each premise. During this period, the students must deal with the usual tasks performed by the Official Veterinarians of Public Health, who act as supervisors. Students keep a daily record of activities and must produce a report that is assessed by the assigned academic tutor.

Table 3.1.8.- Abattoir visited for practical training in PRACTICUM subject in the last three academic years indicating animal species and number of visitations, and students and hours per visitation.

Academic year	Animal species	Abattoir name and location (all within the Region of Murcia). Distance range 25 to 60 km)	Visits (v)/ Students (s)/ Hours (h)*
2016/2017	**Pork**	"ElPozo Alimentación S.A" (Alhama de Murcia)	11v/2s/40h
	Pork	"Hermanos Escámez Sánchez S.L." (Bullas)	7v/2s/40h
	Rabbit	"Carnesana" (Fuente Álamo)	7v/2s/20h
	Small ruminants	"Matadero Jumilla" (Jumilla)	1v/1s/50h
	Small ruminants	"Matosa Matadero Industrial" (Totana)	8v/2s/40h
	Ungulates (pork. cattle. small ruminants)	"Matadero Industrial TorrePacheco" (Torre Pacheco)	5v/2s/50h
	Ungulates (pork. cattle. equines. small ruminants)	"Cabezo de la Plata S.L." (Murcia)	12v/2s/50h
	Ungulates (pork. cattle)	"La Comarca" (Lorca)	6v/2s/50h
2015/2016	**Pork**	"ElPozo Alimentación S.A" (Alhama de Murcia)	8v/2s/50h
	Pork	"Hermanos Escámez Sánchez S.L." (Bullas)	7v/1-2s/40h
	Pork	"Joaquín Escámez S.L." (Totana)	8v/1-2s/40h
	Pork	"Cárnicas Ciezanas S.A." (Cieza)	8v/1-2s/50h
	Poultry	"Matadero Pujante" (Beniel)	4v/1-2s/40h
	Rabbits	"Carnesana" (Fuente Álamo)	8v/1-2s/20h
	Small ruminants	"Matadero Jumilla" (Jumilla)	7v/1-2s/50h
	Small ruminants	"Matosa Matadero Industrial" (Totana)	8v/1-2s/50h
	Ungulates (pork. cattle. equines. small ruminants)	"Cabezo de la Plata S.L" (Murcia)	7v/2s/50h
	Ungulates (pork. cattle. equines. small ruminants)	"Mercamurcia" (Murcia)	4v/2s/50h
	Ungulates (pork. cattle. small ruminants)	"Matadero Industrial TorrePacheco" (Torre Pacheco)	9v/1-2s/40h
	Ungulates (pork. cattle)	"La Comarca" (Lorca)	9v/1-2s/50h
2014/2015	**Pork**	"ElPozo Alimentación S.A" (Alhama de Murcia)	11v/2s/50h
	Pork	"Joaquín Escámez S.L." (Totana)	4v/1-2s/40h
	Pork	"Cárnicas Ciezanas S.A." (Cieza)	4v/1-2s/50h
	Pork	"Hermanos Escámez Sánchez S.L." (Bullas)	3v/1-2s/40h
	Poultry	"Matadero Pujante" (Beniel)	4v/1-2s/40h
	Rabbits	"Carnesana" (Fuente Álamo)	3v/1s/20h
	Small ruminants	"Matadero Jumilla" (Jumilla)	4v/1-2s/50h
	Small ruminants	"Matosa Matadero Industrial" (Totana)	5v/1-2s/50h

	Ungulates (pork. cattle. equines. small ruminants)	"Cabezo de la Plata S.L" (Murcia)	11v/2s/50h
	Ungulates (pork. cattle. equines. small ruminants)	"Mercamurcia" (Murcia	12v/2s/50h
	Ungulates (pork. cattle. small ruminants)	"Matadero Industrial TorrePacheco" (Torre Pacheco)	10v/1-2s/40h
	Ungulates (pork. cattle)	"La Comarca" (Lorca)	4v/1-2s/50h

*V=Number of visitations to the abattoir in the academic year; S= number of students per visitation; H= hours of the visitation/training.

Table 3.1.9.- Food industry visited for practical training in PRACTICUM subject in the last three academic years indicating animal species and number of visitations, and students and hours per visitation.

Academic year	Food sector	Food industry name and location	Visits (v)/ Students (s)/ Hours (h)*
2016/2017	**Bakery products**	"La Niña del Sur" (Alquerías)	1v/4s/4h
	Brewery products	Estrella de Levante (Espinardo)	2v/17-18s/4h
	Cured meat products	Aromais Serrana (Balsapintada)	1v/17s/4h
	Cured meat products	Los Quijales (Lorca)	1v/7s/4h
	Dairy products	AMECO Quesería artesanal (Fortuna)	3v/7-18s/4h
	Wine products	Carchelo Bodegas	1v/15s/4h
2015/2016	**Bakery products**	"La Niña del Sur" (Alquerías)	3v/15s each/4h
	Candy products	Jake Golosinas (Molina de Segura)	1v/15s/4h
	Dairy products	AMECO Quesería artesanal (Fortuna)	2v/12-14s/4h
	Vegetables products	Caprichos del Paladar (Alquerías)	1v/18s/4h
	Wine products	Bodegas Finca Luzón	3v/6-7s each/4h
2014/2015	**Bakery products**	"La Niña del Sur" (Alquerías)	2v/14-16s/4h
	Dairy products	El Barranquillo (Fuente Álamo)	1v/15s/4h
	Dairy products	AMECO Quesería artesanal (Fortuna)	2v/6s each/4h
	Dairy products	Palancares Alimentación (Bullas)	1v/5s/4h
	Juices and drinks	AMC Zumos (Espinardo)	1v/6s/4h
	Pickled products	Abriliva (Lorca)	1v/14s/4h
	Vegetables products	Tropicana Alvalle (Puente Tocinos)	1v/5s/4h
	Wine products	Bodegas Finca Luzón	3v/6-7s each/4h

*V=Number of visitations to the abattoir in the academic year; S= number of students per visitation; H= hours of the visitation/training.

3.1.7.- Description of the selection procedures of the Electives by the students and the degree of freedom in their choice.

The 4 Electives of the curriculum are in the 5th semester (3rd year) and Curriculum hours (**Table 3.1.10**) taken as electives for each student is summarized in **Table 3.1.11.** Students are expected to take 6 Elective ECTS out of the 24 in offer by 2 of the Electives (3 ECTS each). A maximum number of students 32-36 are admitted per subject. Thus, the total number of potential seats for Electives is around 136-140, which guarantees admission for all of them. When the number of applications to an Elective overtakes the number of available seats in offer, a grading mechanism based on the following criteria approved at University level is applied:

- Students who failed to enrol in a previous year have preference.
- Students are listed according to the average mark obtained in subjects of the 2nd year of the Veterinary Degree.
- In case of a tie, available seats are assigned by draw.

Table 3.1.10.- Curriculum hours taken as electives for each student.

SUBJECTS	A	B	C	D	E	F	G	H
Veterinary History	18	16	36				2	**72**
Taurology	22	7	11	5			2	**47**
Ecopathology Wild Animals	12	6			12		6	**36**
Veterinary Clinical Pathology	14	7	9	13			2	**45**

A= Lectures; B= Seminars; C= Supervised self-learning, D= Laboratory and desk based work; E= Non-clinical animal work; F= Clinical animal work; G= Others: tutorial and evaluation; H= Total.

Table 3.1.11.- Number of students enrolled into the electives in the last three years are displayed in Table.

	2016/17	2015/16	2014/15	Mean
Veterinary History	36	27	20	**27.6**
Taurology	27	12	17	**18.6**
Wild Fauna Ecopathology	32	31	32	**31.6**
Veterinary Clinical Pathology	27	15	14	**18.6**

Alternatively, instead of Electives, students can accomplish the 6 optional ECTS by enrolling into different types of University Activities, which are officially approved by the **UM** (Credits Recognized for University Activities, Spanish abbreviated **CRAU** http://www.um.es/web/veterinaria/contenido/centro/secretaria/creditos-en-actividades-universitarias-crau-).

- **CRAU activities** include collaboration with Departments ("collaborator students"), placements for extra-curricular practices (clinics, abattoirs, farms or herd health management units), sport and cultural activities,

active cooperation in professional or social charities, scientific congresses and representation tasks. Placements for extra-curricular practices are regulated by the Centre of Orientation and Information of Employment (COIE). Thus, any potential destination (company) must sign a formal agreement with the **UM** to be eligible as a placement. On the other hand, the learning aims and outcomes of each placement are directly supervised by the Vice-Dean of the Veterinary Degree. Most of these placements are taken in summer months, once the academic years is up (**Table 3.1.14**).

- The most common ways of obtaining Elective Credits by University Activities (CRAU) in **FVETUM** are by applying for a seat as collaborator student within a Department or the **VTH**, and through placements for extra-curricular practices. Students can only choose placements for extracurricular practices after having passed 50% of the total ECTS (150). Among the elected destinations for placements, almost 90% of them are in small animal clinics. 150 hours of direct work accounts for 1 **CRAU.**

Table 3.1.14.-Figures illustrating the use of extra-curricular placements by Veterinary Students (data supplied by COIE).

	2013-14	2014-15	2015-16	2016-17
Students involved in placements*	41% (169/411)	39% (148/377)	41% (149/361)	Not available
Average hours per placement/student	296,5	326	260	Not available

*Percentage (%)= factual/potential).

3.1.8.- Description of the organization, selection procedures and supervision of the EPT.

External Practical Training (**EPT**) is a part of the **PRACTICUM** (4 weeks). The students must accomplish a minimum of 160 h of practices in external entities (e.g., veterinary clinics, veterinary hospitals, companies, academic institutions, scientific centers, administration institutes, etc.) in any of the areas linked to the veterinary profession. The organization of **EPT** depends on the Vice-Dean responsible for the **EPT**, with the support of two administrative staff and the institutional environment given by the COIE. Among other functions, COIE performs the administrative management of the practices and deals the legal binds (agreements) with the companies. Any student has access to the full list of available placements on the COIE website (https://www.um.es/web/coie/). Currently, more than 200 companies related to the Veterinary profession are listed. New placements can easily be added through signature of the official agreement (**Table 3.1.15**).

At different moments of the Degree, and particularly during the 8th semester, orientation meetings with students are carried out to explain the organization of **EPT** and how to apply through the COIE website. At the beginning of the 10th semester, students communicate the chosen company to the Vice-Dean. In most cases students carry out their **EPT** at their first choice. During the **EPT** students are supervised by two tutors, one academic (**UM**) and one veterinary practitioner from the company. The practitioner in charge of tuition is the one responsible for certifying the achievement of professional skills on-site, while the academic tutor evaluates a detailed report delivered by the student. As mentioned above, around 40% of students also choose placements for practical training during holidays of the 3rd to 5th years the Degree.

Table 3.1.15. Curriculum days of External Practical Training (**EPT**) for each student.

Subjects	Minimum duration (weeks)	Year of programme	Student distributions in the last three year (%)
Production animals (pre-clinical)*	4 (160 h)	5	-
Companion animals (pre-clinical)*			-
Production animals (clinical)*			**15,2**
Companion animals (clinical)*			**71,1**
FSQ & VPH*			**7,8**
Others * (wildlife animals)			**5,8**

The student can select the subject of External Practical Training among all the possible subjects related to the studies.

3.1.9.- Description of the procedure (e.g. logbooks) used to ascertain the achievement of each core practical/clinical activity (pre-clinical, clinical, ambulatory clinics, EPT) by each student.

The achievement of the competences of the curriculum is assessed through evaluation of learning outcomes. Thus, independently of its assignation -basic, pre-clinical, clinical, animal husbandry, animal health or food hygiene- each subject has a competence-based evaluation system, which pursues to guarantee that each graduated student has attained the competences of the curriculum. Thus, in most subject's evaluation not only includes the traditional theoretical exam but also a series of practical trials and verifications, which altogether guarantee that students not only know but also demonstrate competence in diverse professional fields. The most common way to verify this is through evaluation of hands-on work (continuous evaluation in some cases), demonstration of critical thinking and correct identification of problems related with diverse professional scenarios. Every modality of evaluation is pondered and students get a mark accordingly. All the information regarding the evaluation is described in detail in the teaching guides (TG).

Assessment of the Day One competences in **PRACTICUM** is carried out by both internal academic tutors (**VTH**, **VTF**) and external tutors (**EPT** and **APT**). After each rotation, students must write a specific report for each rotary: clinical cases

studied using evidence-based medicine from **VTH**, OVS activities at **APT**, **VTF** report activities, HACCP in **FPP** or agro-food company and the **EPT** report of activities. All those reports build (logbook) are assessed by the assigned internal tutors. Through logbook's evaluation and by the direct assessment of Day One Competences, both the internal and external tutors issue an assessment statement for each rotation. To illustrate this, in the case of the Clinical Rotations, the students receive a schedule with the activity to be carried out in each Rotation. The Clinical Teacher/Specialist from each Rotation must sign a weekly questionnaire evaluating the knowledge and technical skills demonstrated on-site. This includes attitude and behaviour. 60% of the grading comes from the results of those questionnaires. The remaining 40% comes from the report assessment produced by the student. The report must include the clinical cases which the student was directly involved with and discussion based on the scientific literature. A minimum mark of 5 out of 10 is compulsory for each rotation to be passed, and all rotations must be successfully passed to pass the **PRACTICUM**. The final mark of **PRACTICUM** comes from the pondered average mark obtained in each rotation.

During the 2016-2017 course, the academic tutors of **PRACTICUM** have participated in an *Innovation Educational Project* aimed at developing an **on-line logbook**, based upon the model of the Veterinary Faculty of the University of Las Palmas de Gran Canaria. This new logbook is in use at FVETUM during the present year (2017-18). Access is through the Virtual Campus (https://aulavirtual.um.es/portal) so that each rotation of the **PRACTICUM** has its own site. All the necessary resources for the student (description of activity, links to search legislation, articles research, etc.) and the folders where students have to upload reports and activities are available on-site. The tutors assess the logbook and also annotate the marks obtained during the on-site evaluation of hands-on work.

3.1.10.- Description of extension courses or non-curricular as a complementary source of students education.

Beside the curricular education and training of the students, FVETUM host several non-curricular but educational activities that in most of the cases are initiatives of individual AS, students or professional associations. FVETUM generally supervise the program and activities and provide the lecture halls and on request and if possible some additional support with financial aid (travel or accommodation of speaker…) or small gifts (pins, University books…). Some examples and student's attendance are presented in **Table 3.1.16**.

Table 3.1.16.- Optional courses proposed to students (not compulsory).

Courses:	2016/2017	2015/2016	2014/2015	Mean
Seminar Companion Animal Nutrition (15 h)	107	110	114	110
Conference on Science and Food Technology (15 h)	150	193	106	149
Course of Breeding, Maintenance and Pathology of Exotic Animals (40 h)	-	50	50	50
Course of Aquarius (25 h)	-	-	30	30
AVAFES-VEDEMA Course: Exotic Species (10h)	25	25	25	25

3.1.11.- Description of how and by who the core curriculum is decided, communicated to staff, students and stakeholders, implemented, assessed and revised.

As previously mentioned (**section 3.1.2**), **FVETUM** curriculum complies with the European and National regulations that define the curriculum frame, with the requirements of an Official Verification by ANECA. All Veterinary Establishments in Spain are under the same regulations and all issues are thoroughly debated and agreed within the Spanish Conference of Veterinary Faculties (http://www.cdve.es/), to provide homogeneity and coherence to Veterinary education and to favour exchange and mobility of students.

To **modify the FVETUM curriculum**, it can be motivated by a major change based on legislation, or after a review and accumulated experience of the application. Minor changes can be carried out by the MONITOR program (http://www.aneca.es/Programas-de-evaluacion/MONITOR) and major should follow a VERIFICA program (http://www.aneca.es/Programas-de-evaluacion/VERIFICA). In any case the decision is made following a process that has to be approved by the Faculty Board and the University Council. The initiation can be taken "**top-down**" (from the Dean Team) or "**bottom-up**" (from the Departments, staff or students). In any case, it has to be justified and proposed to the Academic Management Committee and the Quality Assurance Commission, that will submit to the Faculty Board. For the current curriculum, the FB designated the Veterinary Curriculum Degree to generate a debate and proposal with the staff (throw the Departments), students representatives and stakeholders. After the proper debate and once consensued, it is proposed to the FB, that once approved will submit to the Academic and Planification Committee of the **UM** previously to be approved by the University Council. Finally, it will be sent to ANECA. **Implementation** follow a pathway under the supervision of the Academic Management Committee and the Quality Assurance Commission (SGIC) and under the direction of the Vice-Dean with competences in the Veterinary Degree and Dean. **Assessment and revision** of the curriculum follow an internal and external process. Internally the mentioned Committees and FB will track both processes. Externally will follow the MONITOR or ACREDITA programs. All procedures are under the frame and internal support of the Quality Unit of the **UM**.

The procedures for the QA of the Degree are fully described in Chapter 11. Since the approval of the Degree, no major changes have been introduced in the annual planning. The minor modifications and improvements are communicated to all parties through meetings and publication on the website, Virtual Campus, informative displays and social networks.

3.2.- Comments.

To present the comments of **FVETUM** Veterinary Degree we have structures as a SWOT analysis:

- Strengths:
  - The current curriculum includes a distribution of contents suitable for the acquisition of all the competences of the veterinary profession with an integration of the acknowledge for the one health concept.
  - Curriculum has a high level of direct teaching (30, 40 and 85% of ECTS), with an additional self-directed learning by the students.
  - There are a broad number of teaching modalities implemented. Many academics are involved in innovative teaching activities which are implemented in both theory and hands-on work.
  - There is a high degree of transference of research to taught content. For instance, animal reproduction, nutrition, anaesthesia, diagnostic imaging, animal medicine, etc.
  - Practical training has had a significant increase on Clinical Sciences, Animal Heath-Animal Husbandry and Hygiene, Security & Food Technology. There a system of rotations from the 3rd year of the Degree which establishes a factual period of hands-on work in professional scenarios. This is especially enhanced during the Practicum, when students take a period of 15 weeks of direct practical training (intra and extra-mural) which strengthens the achievement of the professional competences.
  - Other significant improvement is the establishment of rotation periods in which the student's complete hands-on practical's during time periods without theoretical teaching.
  - Internal and external premises have been consolidating for both, intra and extra-mural, where our students can develop extra-mural practical training (4 weeks).
  - Also, the inclusion of the Veterinary Degree Final Thesis in the current curriculum has improved the acquisition of different specific professional and scientific skills by the students.
- Weaknesses:
  - Due to national accreditation model, any potential change in the curriculum takes time and any improvement is delayed.
  - Horizontal and vertical integration is a reiterated issue after academic year analyses that need to be addressed.
  - Some clinics can be improved or implemented to cover a broader range of species, and more time for some clinics training. However, the curriculum may need and extension one semester for room for an adequate timeframe to carry out the broader training.
- Opportunities:
  - The ESVET visitation is an opportunity of revision and analyses of the current situation for improvement that together with the visitation recommendation will help to rank the issues to be address and the order to follow.
  - There is a clear protocol to modify and update curriculum (ANECA) and after the visitation the opportunity for improvement of the curriculum.
  - AUDIT must be renewed soon, which is another opportunity to further implement QA.
- Threats:
  - The increasing requirements to achieve the standard quality of the Veterinary Degree, also requests from the University a higher investment on infrastructures, maintenance and consumables, so in some issues may be difficult to be reached and fully cover all standards if there is a shortage of resources.
  - For clinical services, cases referral is essential to maintain and increase the cases for students training. The economic crisis had a negative impact in the last 5 to 6 years and the recovery is slow. Additionally, clinics and hospitals in the area of influence of **FVETUM** has improved also their services, and it is needed a renovation and improve the infrastructure for competitiveness and keep client's fidelity. This is especially important in equine for the special environment of the owner.
  - There is an observed trend in the students to reject the practical training on abattoir or other subjects dealing with dead animal, based on ethical issues on animal protection and rights. Even though students are informed and clarified about the holistic education to became veterinarian, mainly at the Welcome Week the 1st academic year and along Degree at the different related issues, some students refuse to attend to the rotation on abattoir as well as in the subjects related with. Fortunately, and so far, finally the dialog with the students made that all students did attend and acquire the competences and skills, but it has been considered a potential threat.
  - Although Veterinary Degree is based on a common European legislation there is some differences on the common view on some issues of the Veterinary Curriculum that can be further harmonised.

3.3.- Suggestions for improvement.

- As mentioned, Curriculum is always under review to fulfil the IQAS. Some issues have been raised such as the already mentioned horizontal and vertical coordination, and also the length in ECTS of some issues or the placement of some subjects at the curriculum.
- The innovation project to define the Logbook to verify and track the Day One Competences for **PRACTICUM** subject will also help to identify potential gaps not fully covered or properly addressed.

- Rotations within **PRACTICUM** is under review to ensure that all students achieve all clinics and other areas of training. Considering the positive experience related to the implementation of practical rotational periods, a proposal has been made by the Spanish Conference of Veterinary Faculties (after an analysis of the Veterinary education programs in Spain) to government decision- makers in the field of education (Ministry of Education, Culture and Sport) in order to extend to one additional semester, the duration of the Veterinary Degree in our county, which would allow a better redistribution of the overall on-site teaching.
- Strategies for maintaining and improving clients to clinics is a continuous need based on the strategic plan of **VTH**.
- Vocational selection of students with the acknowledge of the whole professional capacities of veterinarian (including food safety at abattoir) is already put in practice, but it is needed to advice students also at high school to be aware.