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PVS Pathway

Veterinary Education Core Curriculum

OIE Guidelines





The OIE acknowledges the important contribution of the *ad hoc* Group on Veterinary Education, comprising:

Chair: Dr Ron DeHaven (American Veterinary Medical Association)
Dr Saeb Nazmi El-Sukhon (Veterinary academician, Jordan)
Prof. Pierre Lekeux (Veterinary academician, Belgium)
Dr Louis Joseph Pangui (Veterinary Dean, Senegal)
Prof. Aaron S. Mweene (Veterinary Dean, Zambia)
Dr Froilán Enrique Peralta (Veterinary Dean, Paraguay)
Prof. Timothy Ogilvie (Veterinary Dean, Canada)
Dr Dao Bui Tran Anh (Veterinary academician, Vietnam)
Dr Brian G. Bedard (The World Bank)
Dr Etienne Bonbon (European Commission)
Dr Tjeerd Jorna (Past President, World Veterinary Association)

(OIE [Office International des Épizooties])
12, rue de Prony, 75017 Paris, FRANCE
Telephone: 33-(0)1 44 15 18 88
Fax: 33-(0)1 42 67 09 87
Electronic mail: oie@oie.int
www.oie.int

Introduction

The OIE developed these guidelines for a Model Core Veterinary Curriculum to serve as a companion to its recommendations on the Competencies of graduating veterinarians ('Day 1 graduates') to assure high-quality of National Veterinary Services. The Competencies were published in May 2012 (www.oie.int/en/support-to-oie-members/veterinary-education/). It is proposed that the following Guidelines can serve as a tool for Veterinary Education Establishments (VEE) in OIE Member Countries to use when developing curricula to educate veterinary students to the expected level of competency.

As stated in the Competencies document, veterinarians in every nation are responsible for the delivery of Veterinary Services of public interest —that is services provided under the legislative framework and the auspices of the governmental authority of a given country to implement animal health to assure the health and wellbeing of animals, people and ecosystems. Because the OIE definition of Veterinary Services covers both government and private sector veterinarians, these Model Core Veterinary Curriculum Guidelines apply equally to those working in the private and public sectors. It must be noted however, that the OIE is not recommending adoption of a single global curriculum. Indeed, the OIE recognises the autonomy of universities and veterinary faculties in its Member Countries, particularly with regard to development and delivery of the curriculum. Further, given the vast societal, economic, and political differences among OIE Member Countries, the Model Core Curriculum Guidelines described here are primarily offered for those developing and in-transition countries seeking tools that can be used to improve the quality of veterinary medical education as an initial step in enhancing the delivery of National Veterinary Services and public and private support for VEEs.

The OIE recognises that these Guidelines refer to but one model core curriculum and does not presume that this is the only model that can be implemented to successfully educate veterinary students for provision of high-quality of National Veterinary Services. In addition, this model is intended to accommodate a variety of veterinary educational systems that occur over a four-, five- or six-year curriculum. For example in the USA, students typically complete at least two years of undergraduate university education to fulfil minimum educational prerequisites prior to being admitted to a VEE with a four-year curriculum leading to the professional degree of DVM (or VMD). In many other countries, veterinary schools accept students directly following successful completion of secondary (high) school, and the VEE curriculum is five or six years leading to a variety of degrees (BVM, BVSc, MV, MVS, MVSc). Furthermore in some countries, secondary school curricula may include courses more commonly taught in undergraduate university-level curricula in other countries. As such, the recommended sequencing of the courses in this Model Core Veterinary Curriculum must be adjusted to reflect the length of the veterinary degree programme and the pre-veterinary course requirements.

Model Core Veterinary Curriculum

The Model Core Veterinary Curriculum is presented in the following Table. It includes a brief description of each recommended course (or course content). Each course is then linked (or 'mapped') to one or more of the previously described day 1 Competencies addressed by that course. Some competencies (e.g., Research, an advanced competency) are not specifically mapped, because they are inherently addressed by the vast majority of recommended courses. Likewise, although Communication Skills, a specific competency, is only mapped to the communication course/course content listed in Table 1, this skill is also addressed by all other courses/course content.





The Model Core Veterinary Curriculum also offers sequencing recommendations for each course; that is, whether the course content should be offered early, midway, or late in the curriculum. The recommended sequencing will need to be adjusted when developing a specific curriculum for a given VEE in an OIE Member Country in order to reflect the length of the veterinary degree programme and the pre-veterinary course requirements in that country. For example, courses to address general competencies, to include basic veterinary sciences and animal production, may be included in their entirety early within the veterinary curriculum or as pre-veterinary educational requirements for admission into a VEE.

The recommended course content described in the Table may be offered as discrete, individual courses or, alternatively, course content may be combined and integrated over multiple courses, depending, in part, on the teaching modalities used by each VEE (e.g., didactic learning, laboratory or hands-on learning, small-group learning, problem-based learning, self-directed learning). Each VEE will also need to consider the anticipated level of competency desired of the day 1 graduate for basic vs advanced competencies (i.e., mastery vs general awareness and appreciation of) when determining the duration and depth of each course to include in its curriculum.

The following assumptions have been made and definitions used in developing this Model Core Veterinary Curriculum:

– The Model Core Veterinary Curriculum assumes that each student enters veterinary school with a solid understanding of the basic sciences (e.g., chemistry and physics) as well as the Arts and Humanities as required by the parent University for initial admission into the programme. As such, these courses are not addressed at all in this model.

– The Model Core Veterinary Curriculum assumes that there is less need for the OIE to make specific recommendations on the competence of the day 1 graduate in medicine, surgery, diagnostic imaging, theriogenology, and anesthesiology than in matters relating directly to the OIE mandate. As such, the model groups these disciplines together and describes them under course content as 'clinical and diagnostic skills.' It is understood, though, that in some Member Countries, licensure or registration to practice through a veterinary statuary body (VSB) will require a higher level of competency in these disciplines. Veterinary Education Establishments in these countries will, therefore, need to place a greater emphasis on instruction in these clinical skills.

– The terms 'animals,' 'groups of animals' and 'species of interest' include all those animals of veterinary interest in a specific country or region, such as: animals domesticated for food production (herds, flocks and other groupings), non-domesticated animals (captive and free-ranging terrestrial, avian, aquatic and marine wildlife), companion animals, and service and sporting animals.

Finally, it must be emphasised that given the vast societal, economic, and political differences among OIE Member Countries in relation to educational needs, each VEE may need to complement this Model Core Veterinary Curriculum accordingly to meet its specific local or national educational needs. However, it must be emphasised that such country – or VEE-specific modifications need to retain the original intent of the Model – that is, to educate veterinary students to achieve the Competencies of graduating veterinarians ('Day 1 graduates') to assure high-quality of National Veterinary Services.

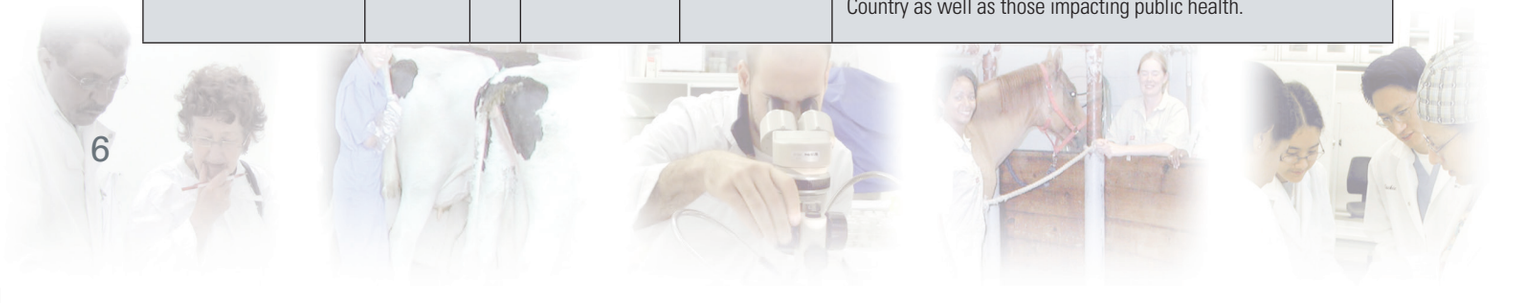
Model Core Veterinary Curriculum

Course or course content	Sequence in VEE Curriculum	Day 1 competencies addressed			Description
		General	Specific	Advanced	
Biochemistry	Early	✔			Biochemistry provides the linkage between the inanimate world of chemistry and the living world of biology. Course content should provide the veterinary student with a broad understanding of the structure and function of essential biological molecules (e.g., proteins, lipids, carbohydrates, DNA, RNA) and metabolic and regulatory pathways. Comparative features among animal species of particular relevance to the Member Country should be highlighted.
Genetics	Early	✔			Genetics is the branch of biology that deals with heredity, especially the mechanisms of hereditary transmission and variation of inherited characteristics among similar or related organisms. Course content should provide the veterinary student with a broad understanding and use of basic concepts of general and molecular genetics (e.g., molecular constitution of genes and chromosomes, manner in which genes move through generations in a population, genetic abnormalities, genetic testing). Focus should be on animal species of particular relevance to the Member Country.
Anatomy	Early	✔			Anatomy is the study of the structures of domestic animals, and includes relevant histology (study of the microscopic anatomy of cells and tissues) and embryology (study of embryos and their development). Course content should provide the veterinary student with a broad understanding of the development, structure and function, both at the gross and microscopic level, of the major systems (e.g., musculoskeletal, nervous, cardiovascular, immune) in animal species of particular relevance to the Member Country. Course content should be augmented with laboratory instruction in dissection methods and microscope use. Comparative anatomic features should be highlighted.
Physiology	Early	✔			Physiology is the study of the normal functions of living organisms and their parts, including how organisms, organ systems, organs, cells, and bio-molecules carry out chemical and physical functions that exist in a living system. Course content should provide the veterinary student with a broad understanding of basic physiological principles and techniques (laboratory) focusing on major systems within animal species of particular relevance to the Member Country. Comparative physiologic features should be highlighted. Central themes to be addressed should include the relationship of structure (anatomy) to function, processes of adaptation, and homeostasis and feedback control systems.





Course or course content	Sequence in VEE Curriculum	Day 1 competencies addressed			Description
		General	Specific	Advanced	
Immunology	Early	✔			Immunology is the study of the structure and function of the immune system; innate and acquired immunity; mechanisms that allow bodily distinction of self from non-self; and the basics of vaccinology (i.e., vaccine development and vaccination theory and practice). Course content should provide the veterinary student with a broad understanding of fundamental immunological concepts and mechanisms and the ability to apply these to appropriate settings (e.g., control and prevention of infectious diseases; use of immunotherapies; use and interpretation of immunologic-based diagnostic tests). Instruction can be focused on animal species of particular relevance to the Member Country, and comparative features among species should be highlighted.
Biomathematics	Early	✔	Epidemiology		Biomathematics is the application of mathematics to the field of biology and includes instruction in biomedical statistics, information acquisition, and the use of common mathematical and statistical software. Course content should provide the veterinary student with a broad understanding of fundamental principles of biomathematics including biostatistics, study design, planning/implementation of experimental and survey data collection, management and analysis of data, and critical evaluation of published information.
Animal welfare and ethology	Early to mid	✔	Animal welfare		Animal welfare means how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and if it is not suffering from unpleasant states such as pain, fear and distress. It involves consideration for all aspects of animal well-being, including proper housing, management, nutrition, disease prevention and treatment, responsible care, humane handling, and, when necessary, humane euthanasia. Ethology is the scientific study of animal behaviour, especially as it occurs in a natural environment. Course content should provide the veterinary student with a broad understanding of fundamental welfare and behavioural principles of, and issues facing, animal species of particular relevance to the Member Country. Additionally, content should familiarise students with, and provide a basic understanding of, local, national, regional and international regulations governing the welfare of animal species of particular relevance to the Member Country.
Parasitology	Mid	✔	Zoonoses		Veterinary parasitology is the study of the morphology and biology of endo- and ectoparasites of veterinary importance. Course content should provide the veterinary student with a broad understanding of the lifecycle and pathogenesis of animal parasites; immunologic and pathophysiologic aspects of host/parasite relationships; importance of zoonotic parasitic infections/infestations; and principles of and protocols for diagnosing, treating, and controlling parasitic infections/infestations. Course content should be augmented with laboratory instruction in diagnostic methodologies and identification of important lifecycle stages. Focus should be on parasites impacting the health and welfare of animal species of particular relevance to the Member Country as well as those impacting public health.



Course or course content	Sequence in VEE Curriculum	Day 1 competencies addressed			Description
		General	Specific	Advanced	
Pharmacology/ toxicology	Mid	✔	Veterinary products		Veterinary pharmacology is the science and study of drugs of veterinary importance, including their composition, uses and effects, and includes content addressing pharmacotherapy (i.e, treatment of disease through the administration of drugs) and best operating procedures for veterinary pharmacies. Toxicology is the study of the nature, effects, and detection of poisons, including poisonous plants, and the treatment of poisoning. Course content should provide the veterinary student with a broad understanding of general principles of drug action, including dose response; contribution of chemical properties to pharmacokinetics; species differences in response to drugs; adverse responses to drugs; mechanisms of drug resistance; comparisons of pharmacodynamics and pharmacokinetics among subtypes of important drug classes; principles of and legal requirements for storing, dispensing and disposing of drugs appropriately (e.g., regulations governing prescription writing, drug withdrawal intervals for animals/animal products entering the human food chain); principles of therapeutic decision making (e.g., selection of appropriate drugs, evaluating the risks and benefits of drug treatment, monitoring course of therapy); identification and mechanisms of action of toxic agents including poisonous plants; diagnosis, treatment, and prevention of toxicoses; and principals of toxicity testing. Focus should be on drugs and toxic agents of importance to animal species of particular relevance to the Member Country.
Pathology	Mid	✔	Zoonoses Transboundary diseases Epidemiology Emerging and re-emerging diseases		Pathology is the scientific study of the nature of disease and its causes, processes, development and consequences. It includes clinical, diagnostic, and anatomical pathology. Course content should be augmented with appropriate laboratory or other hands-on experience and provide the veterinary student with a broad understanding of general pathological principles, to include mechanisms of cellular reaction to injury, inflammation, circulatory disturbances and neoplasia; pathogenesis of specific lesions and diseases of each organ system at the gross and microscopic level; diagnostic characteristics of diseases and interpretation of common findings; relationship of abnormal clinical laboratory data to specific organ dysfunctions; diagnostic and prognostic value of pertinent laboratory tests; correct sample collection techniques and interpretation of results for common hematology and clinical chemistry assessments, urinalysis and cytology; and necropsy techniques, to include interpretation of findings of gross and histological examination of tissue specimens. Focus should be on pathogenesis of the important diseases impacting the major animal species of particular relevance to the Member Country.

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Course or course content	Sequence in VEE Curriculum	Day 1 competencies addressed			Description
		General	Specific	Advanced	
Transmissible diseases	Mid		Zoonoses Epidemiology Transboundary animal diseases Disease prevention and control programmes Emerging and re-emerging diseases	Management of contagious diseases	Course content may be referred to by other names such as: Foreign Animal Diseases, Emerging and Re-emerging Diseases of Animals or Infectious Diseases. Content may also be taught across other courses such as microbiology and immunology. Regardless, course content should provide the veterinary student with comprehensive knowledge (i.e., pathogenesis, diagnosis, susceptible species, economic and public health impact, prevention and control methods and programmes) of specific transmissible diseases. Focus should be on OIE-listed diseases, zoonotic diseases with serious public health implications, and other important diseases either impacting or with the potential to impact the major animal species of particular relevance to the Member Country.
Microbiology	Mid	✔	Transboundary animal diseases Zoonoses Emerging and re-emerging diseases Disease prevention and control programmes Food hygiene Veterinary products	Food hygiene	Microbiology is the study of microorganisms (i.e., bacteria, fungi, viruses, prions) and their effects on other living organisms. Course content should be augmented with appropriate laboratory or other hands-on experience and provide the veterinary student with a broad understanding of basic microbiological principles (e.g., physical and chemical characteristics of bacteria, fungi, viruses, prions; replication and transmission processes; classification schemes; isolation and identification), as well as comprehensive knowledge of the epidemiology and pathogenesis of infection with important agents of each type; development of animal immunity or resistance to infection; prevention and control programmes, including vaccination; clinical signs and diagnosis of infection; treatment options, including the judicious use of antimicrobials and the development of antimicrobial resistance by the pathogen; and the prognostic and diagnostic value of available laboratory and clinical tests. Focus should be on general basic principles, with more advanced focus on pathogens impacting animal and public health, reportable disease agents, and agents of particular significance to the Member Country.
Epidemiology	Mid		Epidemiology Disease prevention and control programmes Veterinary legislation and ethics Emerging and re-emerging diseases	Management of contagious diseases Food hygiene Risk analysis	Epidemiology is the study of the causes, distribution/patterns and control of disease or other health-related events in populations. Course content should provide the veterinary student with a broad understanding of the basic principles of epidemiology, including descriptive/analytical epidemiology and principles of risk analysis, and basic information needed, and techniques used, to conduct disease outbreak investigations and develop disease prevention programmes. More advanced content will provide students with an introductory understanding of the design of epidemiological studies, to include outbreak investigation, epidemiologic data collection, management and analysis, use of epidemiological software, evaluation of analyses and critical evaluation of published information.

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Course or course content	Sequence in VEE Curriculum	Day 1 competencies addressed			Description
		General	Specific	Advanced	
Rural economics, business management, and animal production	Mid to late	✔		Administration and management	Course content in these areas should provide the veterinary student with a general understanding of basic rural economics specific to the Member Country (e.g. farm and non-farm industries; economic growth, development, and change; size and spatial distribution of production units and interregional trade; land use; migration and depopulation; finance; and government policies), with an introductory understanding of international economics as it relates to trade in animals and animal products; business management skills (e.g. personal and business finance, marketing, teamwork in veterinary practice, communication and professionalism), and basic livestock production principles (i.e., feeding, breeding, housing and marketing) focusing on the major livestock species of importance to the Member Country.
Clinical and diagnostic sciences	Mid to late		Veterinary products		Course content in this area should address teaching of both hands-on clinical skills and clinical reasoning in the following disciplines: anaesthesiology, diagnostic imaging, medicine, surgery and theriogenology. Course content should provide the veterinary student with access to clinical cases (clients and patients) and instruction so that the student becomes comfortable with and proficient (to at least an entry-level) at completing an appropriate physical examination; taking a complete history from a client; using clinical reasoning to develop differential and final diagnoses and diagnostic and treatment plans; and communicating effectively, both verbally and in writing, with clients, colleagues and support staff. Although students should be able to apply these skills to multiple animal species, the focus should be on applying these skills to the major animal species of importance to the Member Country.
National and international veterinary legislation	Mid to late		Disease prevention and control programmes Food hygiene Veterinary products Animal welfare Veterinary legislation and ethics General certification procedures	Organisation of Veterinary Services Inspection and certification procedure Management of contagious diseases Food hygiene International trade framework	Course content may be referred to by other names such as: Public Policy, Veterinary Policy; Governmental Policy. Regardless, course content should provide the veterinary student with an overview of the formulation and implementation of public policy at the local, national, regional and international levels through legislation, regulation and operational strategy. Relevant public policy related to veterinary medicine, animal and human health such as health inspections and certification, food safety, animal disease control, animal welfare and trade in animals and animal products should be addressed. Focus should be on legislation and organisational structure of the specific Member Country and the global community (e.g. OIE, Codex Alimentarius Commission).





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Course or course content	Sequence in VEE Curriculum	Day 1 competencies addressed			Description
		General	Specific	Advanced	
Herd health management and nutrition	Late		Veterinary products Animal welfare Epidemiology Zoonoses Disease prevention and control programmes Food hygiene	Management of contagious diseases Inspection and certification procedures Food hygiene Application of risk analysis	Course content should provide the veterinary student with a broad understanding of general principles of herd health management and nutritional needs of livestock and aquatic animal species. Topics to be addressed include development and maintenance of biosecurity measures, maintenance of animal hygiene, best practices in maintenance of medical records, prudent use of veterinary products, preventive medicine principles, application of principles of animal welfare and ethology, and assessment and mitigation of risk factors that contribute to incidence of disease and production inefficiencies. A variety of livestock and aquatic species should be covered, with a particular focus on major animal species of importance to the Member Country.
Public health	Late		Zoonoses Disease prevention and control Food hygiene Veterinary products	Organisation of Veterinary Services Inspection and certification procedures Management of contagious diseases Food hygiene	Veterinary public health is defined by the World Health Organization (WHO) as 'the sum of all contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science.' Course content will provide the veterinary student with a broad understanding of the basic principles of and programmes within public health, to include environmental health and safety, food inspection and safety, and biological waste management. Students should also gain an understanding and appreciation of the One Health concept, defined as the 'collaborative effort of multiple health science professions, together with their related disciplines and institutions – working locally, nationally, and globally – to attain optimal health for people, domestic animals, wildlife, plants, and our environment.' Focus should be on programmes of specific importance to the Member Country and the global community (i.e., OIE, Codex Alimentarius, WHO, FAO).
Food safety/ hygiene	Late		Zoonoses Disease prevention and control programmes Food hygiene Veterinary products Veterinary legislation and ethics General certification procedures	Inspection and certification procedures Food hygiene International trade framework	Course content should provide the veterinary student with a general understanding of the basic principles of food safety, to include development and enforcement of laws and regulations impacting food animal processing industries and food consumers (e.g., traceability and ante- and post-mortem inspection and certification requirements); approaches to microbiological and physical foodborne hazard identification, testing and sampling; and foodborne hazard prevention and control. Focus should be on practices relevant to the Member Country and those impacting international trade.

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Course or course content	Sequence in VEE Curriculum	Day 1 competencies addressed			Description
		General	Specific	Advanced	
Professional jurisprudence and ethics	Late		Veterinary legislation and ethics General certification procedures		Course content will provide the veterinary student with a broad understanding of, and appreciation for, codes of professional conduct and veterinary medical ethics and local and national laws and regulations governing the practice of veterinary medicine.
Communication	Through-out	✔	Communication skills	Administration and management	It is assumed that veterinary students will be well grounded in the arts and humanities and have significant communication skills prior to being admitted to a VEE. Oral and written communication skills are essential to the delivery of National Veterinary Services, and should be practiced, assessed and improved upon throughout the veterinary school curriculum. A separate series of classes focusing only on writing or speech skills need not be included in the curriculum. Instead, the appropriate communication skills should be taught in relevant classes (e.g., medical record writing and client communication in clinical and diagnostic skills courses; critical reading and thinking in epidemiology, immunology and microbiology). Course content in communication will allow the veterinary student to become proficient in composition/writing, public speaking, critical reading and critical thinking in his/her common language. It is also highly recommended that veterinary students gain at least rudimentary skills in these areas in at least one of the official OIE languages (i.e., French, English, Spanish).





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12, rue de Prony • 75017 París, Francia
tel. 33 (0)1 44 15 18 88 • fax 33 (0)1 42 67 09 87
www.oie.int • oie@oie.int