

## AMERICAN COLLEGE OF VETERINARY MICROBIOLOGISTS PROCEDURE FOR CERTIFICATION REQUIREMENTS FOR EXAMINATION

To qualify as a candidate for the ACVM Board Examination, an applicant must:

- i. have satisfactory moral and ethical standing in the veterinary profession
- ii. have a D.V.M. or equivalent degree from a veterinary school or college; and
- iii. must be sponsored by two (2) Active Diplomates of the College.

In addition to having earned the D.V.M. degree, the candidate must satisfy the following requirements:

To be admitted by **Route 1**, the candidate must have earned the Ph.D. degree\* with major emphasis in veterinary microbiology. The latter is defined as a knowledge and mastery of veterinary microbiology, which includes the disciplines of bacteriology, mycology, parasitology, virology, and immunology, as they apply to veterinary medical science. The science of microorganisms includes knowledge of molecular biology, structure, function, propagation and biological and ecological relationships of microbes and prions with animals, plants, humans, other microbes, and the environment. Immunology includes knowledge of the components and functions of host defense mechanisms in both antigen- specific and non-specific responses, and applications of immunological processes in laboratory assays. Veterinary medical science includes knowledge of the etiology, pathogenesis, transmission, immunity/resistance, diagnosis, therapeutics, prevention, and control of diseases of animals and zoonotic diseases as applied in the practice of teaching, research, clinical veterinary medicine, comparative medicine, or public health. Therefore, knowledge of veterinary microbiology is not to be narrowly defined as related only to microbial agents of disease in non-human animals or the laboratory characteristics of microbes. A major emphasis in veterinary microbiology means that in over half of the number of course credits for the degree (i) the candidate received a grade of at least a "B average" or a "Pass," and (ii) the courses which were graded at least a "B average" or a "Pass" were in subjects that, in the opinion

of the Examinations Committee, were directly related to veterinary microbiology. Veterinary microbiology includes veterinary bacteriology, mycology, immunology, parasitology, and virology, and (iii) the thesis was in an area directly related to veterinary microbiology (as defined above). The learning experience for a candidate who has not taken courses must, in the opinion of the Examinations Committee, be equivalent to that required above as determined by a review of the applicant's description of the learning experience.

\*individuals may also qualify if a defense date is set within the year in which the application is submitted (provide a letter with date from mentor). Proof of successful defense of the degree is required to take examinations and proof of conferment of the degree is required prior to receiving diplomate status if earned

To be admitted by **Route 2**, the candidate must have earned the Master's degree with major emphasis in veterinary microbiology (as defined above) and have met either one of the following two criteria:

(1) gained sufficient additional experience relevant to veterinary microbiology (as defined above) to equal or exceed the experience of a candidate who has completed a Ph.D. degree. Experience relevant to veterinary microbiology may be obtained through teaching, research or service that concentrates on veterinary microbiology (as defined above). The experience should, in the opinion of the Examinations Committee, be sufficient to make the candidate proficient in the practice of veterinary microbiology (as defined above) and an expert in at least one of the specialties: bacteriology/mycology, immunology, parasitology, and/or virology. Examples of acceptable experience are:

- i. full- time practice in a diagnostic laboratory run by a university, state, or commercial organization; or
- ii. full-time practice in research in a university, state, not-for- profit, federal or commercial organization; or
- iii. full-time teaching at the undergraduate (baccalaureate) and graduate levels in a university (most of the courses taught should be in veterinary microbiology; and at least one course each year should

be taught at the graduate level; and teaching at non-degree institutions does not qualify); or

- iv. a combination of the above three points performed on a full-time basis.

(2) gained sufficient additional experience through full-time participation in a structured clinical training program with emphasis on multiple aspects of veterinary microbiology (as defined above). Such a training program must go beyond the coursework and research curriculum of a typical master's degree program. Examples of structured clinical training programs are designated residency programs in clinical veterinary microbiology. These programs will include all elements of a traditional master's degree program (i.e. coursework and research) plus clinical work involving cases and rounds. These programs will include coordinated and mentored study, preferably by an ACVM diplomate, in veterinary bacteriology/mycology, immunology, parasitology, and/or virology, along with specialized laboratory training and experience.

To be admitted by **Route 3**, the candidate must satisfactorily complete a training program that is a minimum of 104 weeks\*, as outlined in the **ACVM Residency Training Standards**.

\*Individuals may apply if 78/104 weeks of the training program have been completed. A letter of documentation must be supplied by the program leader, faculty advisor, or institution of the residency. Proof of satisfactory completion of the program must be supplied prior to being permitted to take examinations.

To be admitted by **Route 4**, the candidate must, subsequent to earning the DVM, VMD, or equivalent professional degree, have sufficient professional experience (as defined above) relevant to veterinary microbiology (as defined above), with increasing responsibility over this time period to equate with a candidate who qualifies by the Routes 1 and 2.

The applicant shall submit to the Board complete and full details of qualifications, including a list of all publications and any other evidence of

professional experience, competence, and achievements as a veterinary microbiologist.

A candidate for Diplomate status must have capabilities extending over the broad area encompassed by microbiology as applied to veterinary medical science. A candidate must be well informed in bacteriology, mycology, virology, parasitology, and immunology, and must be qualified to assume responsibility for the basic and/or applied aspects of veterinary microbiology in research and teaching, or clinical and diagnostic microbiology. A candidate must have knowledge of infectious disease (including the zoonoses) of animals with emphasis in etiology, pathogenesis, transmission, immunity, diagnosis, prevention and control, and is expected to know current literature and modern laboratory techniques.

## **EXAMINATION PROCESS**

The official requirements for examination and certification are described in Article V of the ACVM By-Laws. The following explanation is provided as a convenience but does not supersede any requirement of the By-Laws.

The Board of Examination in Veterinary Microbiology consists of two (2) parts; namely, a **general veterinary microbiology (Part I) examination and a specialty (Part II) examination**. The general veterinary microbiology (part I) qualifying examination includes: (a) material of a fundamental or general nature in bacteriology, mycology, virology, immunology, and serology, and (b) material of an applied or specialized nature pertinent or applicable to veterinary microbiology, including ecological relationships relating to animal and human exposure and methods of prevention and control.

The general veterinary microbiology (Part I) examination consists of 240 multiple choice questions and must be completed in four (4) hours. The "**blueprint**" for the general veterinary microbiology examination is provided at the end of this document. All percentages listed are approximate and will evolve over time. The pass mark for the general veterinary microbiology (Part I) examination is statistically determined by a modified Angoff method. The general Veterinary Microbiology specialty (Part II) examination is offered in three areas: **(a) Bacteriology and Mycology, (b) Virology, and**

(c) **Immunology.** The examination includes material of (a) a fundamental or generalized nature, including molecular biology, biochemistry and history; and (b) an applied and specialized nature pertinent or applicable to the specialty area. The specialty certifying examination is an **advanced-level and practical examination** utilizing visual aids and involving both a test of theoretical knowledge and an ability to solve problems. A candidate is asked to recognize, interpret, and analyze the material presented, as if in a real world, clinical/diagnostic/research situation. A candidate will be expected to interpret photographic slides (gross or microscopic lesions, cultures, diagnostic test results, tables etc.) to provide information necessary to answer the questions correctly. Questions are in a multiple-choice format and each specialty examination consists of 100 questions. The pass mark for each specialty examination is statistically determined by a modified Angoff method. A sample blueprint of the exams is provided at the end of this document. All percentages listed are approximate and will evolve over time.

Alternatively, the Board of Examination in Veterinary Microbiology consists of a **Parasitology general microbiology (Part I) examination and a specialty (Part II examination).** The general Parasitology veterinary microbiology (part I) qualifying examination includes: (a) material of a fundamental or general nature in parasitology, entomology, immunology related to veterinary parasitology, molecular biology related to veterinary parasitology, and parasite biochemistry, and (b) material of an applied or specialized nature pertinent or applicable to veterinary microbiology, including ecological relationships relating to animal and human exposure and methods of prevention and control.

The general (Part I) examination consists of approximately 240 multiple choice questions and must be completed in four (4) hours. The "**blueprint**" for the general veterinary parasitology examination is provided at the end of this document. All percentages listed are approximate and will evolve over time. The pass mark for the general veterinary Parasitology (Part I) examination is statistically determined by a modified Angoff method.

The specialty (Part II) **Veterinary Parasitology** examination includes material of an applied and clinical nature pertinent or applicable to veterinary parasitology. The clinical examination is an advanced-level examination

utilizing visual aids and involving both a test of theoretical knowledge and an ability to solve problems. Candidates will be asked to recognize, interpret, and analyze the material presented, as if in a real world, clinical/diagnostic/research situation. A candidate will be expected to interpret photographic slides (gross or microscopic lesions, fecal flotation results, diagnostic test results, tables etc.) to provide information necessary to answer the questions correctly. Questions will be in a multiple-choice format and the examination will consist of 100 questions. The pass mark for the specialty examination is statistically determined by a modified Angoff method.

A candidate may sit for one, two, three, or four of the specialty examinations pending ACVM Board approval. A candidate must pass at least one specialty examination and the general veterinary microbiology or parasitology examination to be certified. A candidate may elect to take the examinations in any order within the 5-year period and is not required to pass the general veterinary microbiology or general parasitology examination before attempting the specialty examinations. A candidate will be certified in each specialty area for which competence is demonstrated.

Please note the following stipulations:

1. Diplomates can only be certified in the specialty of Parasitology by passing the General Parasitology and Specialty Parasitology Examinations.
2. Diplomates can only be certified in Bacteriology / Mycology, Immunology, or Virology by passing the General Microbiology Exam and the relevant Specialty Examinations.

After successfully completing the general veterinary microbiology examination and a specialty examination and before receiving the certificate, each candidate must prepare and submit to the Chair of the ACVM Examinations Committee a minimum of ten (10) questions, including five (5) questions with slides or graphics, in their area of specialty. The questions and slides must meet a minimum standard but are not graded. At the discretion of the ACVM Examinations Committee, suitable questions may be added to the question bank for future examinations. Certificates will be mailed after

questions are provided for the examination bank.

A candidate has five (5) years (five consecutive examination periods) after the application is accepted to complete all phases of the examination successfully. The year of approval is defined as year 1. A limit of two (2) attempts during one five-year period will be granted for the general veterinary microbiology examination or general parasitology examination and two attempts for each specialty examination. Any candidate who has not successfully completed all phases of the examination within five years after application or who does not pass the general examination after two attempts will be permitted to re-apply after a waiting period of one (1) year. Such candidates will be required to submit new applications (including all required materials) and examination fees and must take the entire examination. If a candidate exhausts all exam attempts before the end of the 5-year period, the candidate may reapply before the end of the 5 years but the one (1) year waiting period still pertains.

## **FEES AND APPLICATION PROCEDURE**

**Application for Examination.** The **deadline** for the receipt by the Secretary (uploaded to the ACVM website) of completed application forms, and original signed **letters from two (2) sponsoring Diplomates in “good standing”** of the ACVM, and the non-refundable **fee of \$350** (in US currency payable to ACVM) is **April 30th**. Application materials submitted after this date will not be accepted for consideration. Sponsor letters must support your application and reference your knowledge in the field of microbiology, and any work experience. This is not to be a personal reference letter, but a letter outlining why the diplomate supports your eligibility. Applicants must create an application via the ACVM website. Materials to be provided/uploaded include

1. Education tab
  - a. Professional degree information
  - b. Official transcripts (including course grades or scores) from universities for which each degree was received
2. Sponsor tab
  - a. Names and email addresses for Sponsor letters

- b. Letters can be uploaded by Sponsors or sent directly to the Secretary for upload
3. Additional Information tab
- a. Curriculum vitae with appropriate professional experience for all applicants
  - b. Letter from Residency Supervising Diplomate for applicants applying via Route 3
  - c. Letter from PhD major advisor advising the anticipated defense date for students who have not yet completed their PhD program applying via Route 1
  - d. Information on additional experience that you believe will be useful to the committee evaluating your application

You should receive an acknowledgment of receipt of your application from the ACVM website and/or Secretary. If you do not receive an acknowledgment within 3 weeks, please take the initiative and contact the Secretary. The application will be evaluated by the ACVM Examinations Committee. Assuming satisfaction of the prerequisites, the Board of Governors, prior to or at the time of the annual meeting of the American Veterinary Medical Association (usually early in July) will approve the application for candidacy and you will be informed thereof within ten (10) days of the meeting.

## **Examinations**

Approved candidates must declare to the secretary the selection of examinations to be taken and submit the appropriate examination fees to the treasurer. The deadline for receipt of notification by Secretary of your intent to take an examination(s) and receipt of fees is **September 30th**. The general veterinary microbiology examination fee is \$400.00. The general veterinary parasitology examination fee is \$400.00. The specialty examination fee is \$400.00 for each attempt of each specialty examination. These fees are non-refundable and only apply for the current test year. A candidate may elect to take the examinations in any order within the 5-year period.

## **Appeal Procedure**

You have the right to appeal a decision by the ACVM for denial of eligibility



for Board examination, or denial of certification. The Secretary will advise you of an adverse decision within thirty (30) days. You must adhere to the following appeal procedures:

You may petition for reconsideration or review of the decision of the ACVM on the grounds that the ACVM ruled erroneously by:

- a) disregarding the established ACVM criteria for certification; or
- b) failing to follow its stated procedures; or
- c) failing to consider relevant evidence and documentation presented with the application; or
- d) incorrectly calculating the total number of questions answered correctly on a certifying examination.

### **Petition for reconsideration**

- a) You may, at your option, petition the Board of Governors of the ACVM to reconsider its decision by filing with the Secretary of the ACVM a written petition for reconsideration, which must include a statement of the grounds for reconsideration, and documentation, if any, in support of the petition.
- b) Such petition must be received in the Secretary's office within 30 days of the date on which the ACVM announced its adverse decision.
- c) If an appeal is based on a concern regarding the calculation of the number of questions answered correctly on an exam, the Exam Committee Chair will compare the candidate's answer sheet with the answer key to confirm the number of questions marked incorrectly. The exam will not be re-graded.
- d) You may, at the discretion of the Board of Governors of the ACVM, be invited to participate in the next regular meeting of the appeals committee of the college. The cost of your travel, food and lodging must be borne by you if the meeting is held in person.
- e) The ACVM Appeals Committee will meet in executive session to reach its final decision, which will then be forwarded to the ACVM Board of Governors.
- f) The Secretary will be notified of the decision by the President of the Board of Governors and the decision will be sent to the affected Person not more than thirty (30) days after this final decision is made and at Least 45 days prior to any ACVM examination.

## STUDY GUIDE

**Nature of Examination.** The comprehensive nature of the qualifying examination requires a thorough and systematic review of relevant materials. Some sort of structured study regime is strongly recommended. It must be individually tailored to suit the candidate's own specific needs.

**Development of a Study Plan.** It is suggested that the candidate devise a suitable study plan, which should include a timetable, with dates, for completion of each part of the plan. It is suggested by some that the study plan cover a two- year period. This is probably a realistic timeframe. Others indicate that a shorter study period is sufficient. It is strongly recommended that time be set aside each and every day for some aspect of study. Candidates are free to contact Diplomates on any aspects of study. Candidates will find Diplomates most eager to help.

**Subject Areas Covered.** Subject areas covered in the general veterinary microbiology (Part I) or general veterinary parasitology (Part I) and specialty (Part II) examinations include the following topics within each specialty area.

### A. Bacteriology/Mycology

1. Principles of animal bacteriology
  - Structure and morphology
  - Classification and nomenclature
  - Propagation, isolation, and identification
  - Pathogenesis of bacterial infections
  - Bacterial genetics
  - Molecular biology of bacteria and bacteriophages
  - Immunization, disinfectants, and chemotherapeutics
  - Bacterial-host interactions
2. Conduct and interpretation of laboratory procedures
  - Serology
  - Biochemical reactions
  - Antibiotic susceptibility testing
  - DNA/RNA manipulation
3. Bacterial diseases of animals (including lab animals and fish)

- Pathogenesis
- Clinical presentation
- Pathology
- Diagnosis

## B. Virology

1. Principles of animal virology
  - Structure and morphology
  - Classification and nomenclature
  - Cultivation and assay of viruses
  - Viral replication strategies
  - Pathogenesis of viral infections
  - Virus-host interactions
  - Immunization, disinfectants and chemotherapeutics
2. Conduct and interpretation of laboratory procedures
  - Serology
  - Viral cytopathology
  - Electron microscopy
  - Immunohistochemistry
  - Pathology
  - Molecular detection methods, primarily for nucleic acid products
3. Viral diseases of animals (including lab animals and fish)
  - Pathogenesis
  - Clinical presentation
  - Pathology
  - Diagnosis
4. Prion Associated Diseases
  - Pathogenesis
  - Diagnostic Methods

## C. Immunology

1. Basic cellular and molecular immunology
  - Ontogeny of the immune response
  - Genetics of the immune response
  - Histocompatibility
2. Cellular interactions in the immune system
  - Cells and organs of the immune system

- Immune cell receptors
- Cellular regulation of immune responses
- Cytokines
- 3. Immunity to infectious agents
  - Bacterial
  - Viral
  - Mycotic
- 4. Clinical Immunology (pathogenesis, diagnosis, and treatment)
  - Autoimmunity
  - Hypersensitivities (types I-IV)
  - Immunodeficiency
- 5. Conduct and interpretation of laboratory procedures
  - Serology
  - Immunochemistry
  - Assays for cell-mediated immunity
  - Leukocyte function assays

#### D. Parasitology

1. Basic parasitology concepts
2. Pathology of parasites
3. Immunology
4. Regulatory environment (registrations), reporting, meat inspection
5. Viral / bacterial vector-borne pathogens
6. Epidemiology
7. Molecular biology/technology

## **EXAMINATION STUDY METHODS MICROBIOLOGY**

Updated January 2023

- Candidates are advised to review relevant and current veterinary medical curriculum notes, but are reminded that as specialty certification examinations, the expected level of preparation and knowledge is much higher than a review of veterinary medical curriculum.
- Candidates should plan to study advanced and graduate level information resources. Review particularly relevant subjects such as bacteriology, mycology, immunology, parasitology, virology, infectious diseases,

epidemiology, histology, pathology, therapeutics, statistics, and molecular biology and technology.

**Microbiology Review Texts.** There are many excellent and useful textbooks available. Pay particular attention to the most recent editions of the listed examples. The figures, diagrams and photographs in texts are particularly useful in preparing for the specialty (Part II) examinations. The following are examples of some textbooks that will be helpful. The list is not all-inclusive and is provided as a guideline; nor is it necessary to study all texts:

- Veterinary Microbiology and Microbial Diseases, 2nd ed., 2011 Quinn et al.
- Essentials of Veterinary Microbiology, 6th ed., 2003 Carter et al.
- Diagnostic Procedures in Veterinary Bacteriology and Mycology, 5th ed., 1990 Carter and Cole.
- Cellular and Molecular Immunology, 9th ed., 2018. Abbas, Lichtman and Pillai
- Veterinary Immunology: An Introduction, 10th ed., 2018 Tizard
- Basic and Clinical Immunology, 2nd ed., 2010 Peakman et al.
- Fenner's Veterinary Virology, 5th ed., 2016 Maclachlan et al.
- Infectious Diseases of the Dog and Cat, 4th ed., 2011 Greene.
- Hsuing's Diagnostic Virology: As Illustrated by Light and Electron Microscopy, 4th ed., 1994, Fong et al.
- Pathogenesis of Bacterial Infections in Animals, 4th ed., 2010 Songer et al.
- Virulence Mechanisms of Bacterial Pathogens, 4th ed., 2007 Brogden et al.
- Microbial Diseases: A Veterinarian's Guide to Laboratory Diagnosis, 1st ed., 1993 Carter and Chengappa.
- Veterinary Microbiology, 4th ed., 2022 McVey et al.
- Advances in Veterinary Virology, 1st ed., 1990 Edwards.
- Veterinary Mycology Laboratory Manual, 1st ed., 1998 Hungerford et al.
- Clinical Veterinary Microbiology, 2nd ed., 2013 Quinn et al.
- ASM Manual of Clinical Microbiology, 11th ed., 2015 Jorgensen and Pfaller.
- Medically Important Fungi: A Guide to Identification, 5th ed., 2011 Larone.

- Bacterial Pathogenesis: A Molecular Approach, 3rd ed., 2011 Wilson & Salyers.
- Mims' Pathogenesis of Infectious Disease, 5th ed., 2015 Nash et al.
- The Comprehensive Sourcebook of Bacterial Protein Toxins, 4th ed., 2015 Landant et al.
- Case Studies in Veterinary Immunology, 2017, Gershwin.
- Diseases of Poultry, 12<sup>th</sup> ed., 2008, Saif (editor-in-chief) et al.
- World Organization for Animal Health (OIE) Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (most recent edition)

**Read current scientific literature.** Read thoroughly and critically all journals you feel to be pertinent. This is a formidable, but not impossible task. Place greater emphasis on refereed journals. Figures and diagrams in journals are particularly useful for the specialty (Part II) examination.

**Potential Relevant and Recommended Journals:**

- Infection and Immunity
- Journal of Clinical Immunology
- Veterinary Immunology and Immunopathology
- Veterinary Microbiology
- Virology
- Virology Journal
- Veterinary Research
- Journal of Veterinary Diagnostic Investigation

**EXAMINATION STUDY METHODS PARASITOLOGY**

Updated Dec 2020

In general, careful study of up-to-date textbooks in veterinary parasitology will provide candidates with solid preparation for the general and specialty examinations. Reading the current clinical parasitology literature is appropriate to further prepare for the examinations. Examples of appropriate textbook and journals that should be the focus of preparation are listed below. The most current editions of textbooks and journals from the past 5 years should be studied.

**Parasitology Review Texts (most recent edition):**

- Flynn's Parasites of Laboratory Animals, 2nd ed. 2007 (David G. Baker)

- Georgis' Parasitology for Veterinarians, 11th ed. 2020 (Dwight D. Bowman)
- Handbook of Equine Parasite Control, 2nd ed. 2018 (Martin K. Nielsen, Craig R. Reinemeyer)
- Medical and Veterinary Entomology, 3rd ed. 2019 (Gary R. Mullen, Lance A. Durden)
- Parasitic Diseases of Wild Mammals, 2nd ed. 2001 (William M. Samuel, Margo J. Pybus, A. Alan Kocan)
- Veterinary Clinical Parasitology, 9th ed. 2021 (Anne M. Zajac, Gary A. Conboy, Mason Reichard, Susan Little)
- Veterinary Parasitology, 4th ed. 2016 (M.A. Taylor, R.L. Coop, R.L. Wall)

### **Journals: (last 5 yrs)**

- International Journal for Parasitology (Elsevier)
- International Journal for Parasitology: Drugs and Drug Resistance (Elsevier)
- Parasite Immunology (Wiley online library)
- Parasites and Vectors (Biomed Central)
- Parasitology Research (Springer)
- Trends in Parasitology (Elsevier)
- Veterinary Parasitology (Elsevier)
- Veterinary Parasitology: Regional Studies and Reports (Elsevier)

**Attend seminars, lectures, and courses.** These are available through the AVMA, specialty interest groups, and national, state, and local groups. Good sources are veterinary schools, hospitals, and industry such as biologics manufacturers. Make a special effort to attend lectures or seminars given by ACVM Diplomates or sponsored by the ACVM. If you know you have a weak area, sign up for a course in that area. Many universities will allow faculty to "audit" a course without charge.

**Participate in AVMA tutorials.** The AVMA has prepared a variety of videotape, slide, and film presentations of specific infectious diseases which may be helpful. Join study groups. In some parts of the country, it will be

possible to form study groups of 2 to 5 people. This system works well only for some.

**Publish.** Contribute to the literature. Reviews of the literature are fine learning tools and good publications require a good literature review.

## Exam Blueprints

<b>Bacteriology/Mycology</b>		Part I Exam (percent)	Part II Exams (percent each section)
b.1	Knowledge of bacterial pathogenesis, including toxin production and immunopathology	7	20
b.2	Identification of bacteria and fungi by phenotype	6	20
b.3	Understanding and application of molecular diagnostic tests for bacterial/fungal disease and their genetic basis.	3	10
b.4	Knowledge of collection methods, transport media and growth requirements for optimal initial organism isolation.	6	20
b.5	Diagnosis and treatment of bacterial and fungal disease, including antimicrobial susceptibility testing, CLSI standards, and selection of antimicrobial drugs	7	20
b.6	Serologic testing for bacterial and fungal diseases	2	5
b.7	Application of epidemiological concepts in diagnostics, such as sens/spec, predictive value, signal detection	2	5
		Total = 100	
<b>Immunology</b>			
i.1	Structure and function of the immune system, including species differences.	5	15
i.2	Understanding the immune response required to control the various pathogens: bacteria, viruses, fungi, parasites	6	20
i.3	Pathological, mechanistic and clinical aspects of immune dysregulatory disease: (includes immunodeficiency, autoimmunity, hypersensitivity). Includes clinical diagnosis and laboratory diagnosis as well as basic therapeutics	5	20
i.4	Knowledge of principles of vaccination including laboratory testing that assess responses to vaccination	6	15
i.5	Understanding the immune response to neoplasia	3	5
i.6	Knowledge of genetically modified animals used as models for human disease or research into the basic biology of the immune system.	2	5
i.7	Understanding and interpretation of assays to measure humoral, mucosal and cell mediated immune responses	6	20
		Total = 100	



<b>Virology</b>			
v.1	Knowledge of different viruses, their structure, classification and taxonomy	5	14
v.2	Viral pathogenesis and clinical manifestations of viral disease in different animal species, including disease transmission and epidemiology	5	16
v.3	Knowledge of viral genetics, replication and transmission	5	14
v.4	Understanding principles of diagnostic test validation including the application of statistics to validation data.	5	14
v.5	Knowledge of antivirals and assay development for evaluating antivirals	3	11
v.6	Detailed knowledge of vaccinology including: Knowledge of major antigens Production of sterilizing immunity or protective immunity. Vaccine production and assessment of safety and efficacy Knowledge of U.S. and international regulatory requirements for vaccine production (USDA,FDA, OIE)	4	12
v.7	Knowledge of transboundary animal diseases and trade restrictions on movement of animals and animal products including knowing application of appropriate diagnostic tests for certification of freedom.	2	5
v.8	Control of viral disease in populations and treatment of disease in individuals	5	14
		Total = 100	Total = 100

<b>Parasitology</b>		<b>Part I Exam points (%)</b>	<b>Part II Exam Points (%)</b>
p.1	Knowledge of protozoa, helminth, and arthropod structure, classification and taxonomy (includes life cycles and transmission strategies)	43 (18%)	12 (12%)
p.2	Knowledge of diseases produced by various parasites in various species	60 (25%)	25 (25%)
p.3	Knowledge of zoonotic parasites and the ability to make case-specific, evidence-based recommendations to limit the spread of zoonotic parasites from animals to people	24 (10%)	5 (5%)
p.4	Knowledge of transboundary animal parasites, particularly those of recent or immediate importance in North America, and the skills to develop evidence-based programs that limit the risk of introduction of transboundary animal parasites or slow the spread of these parasites within North America	19 (8%)	3 (3%)
p.5	Knowledge of antiparasitic compounds, and the skills to design treatment and control schemes for parasitic infections based on available tools and with a comprehensive understanding of resistance to antiparasitic compounds, including strategies for preserving drug activity and alternatives to antiparasitic use.	41 (17%)	15 (15%)
p.6	Knowledge of diagnostic methods for identification of parasites and parasitic infection including morphologic, histopathologic, immunologic and molecular methods, and skills to accurately interpret information gathered by these methods.	53 (22%)	40 (40%)
<b>Total points =</b>		<b>240</b>	<b>100</b>