

VCS5008: APPLIED ADVANCED DIAGNOSTIC MEDICINE

Effective Term

Semester A 2026/27

Part I Course Overview

Course Title

Applied Advanced Diagnostic Medicine

Subject Code

VCS - Veterinary Clinical Sciences

Course Number

5008

Academic Unit

Veterinary Clinical Sciences (VCS)

College/School

Jockey Club College of Veterinary Medicine and Life Sciences (VM)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

The course "Applied Advanced Diagnostic Medicine" equips veterinary clinicians and diagnosticians with cutting-edge laboratory techniques essential for modern disease detection and research. Focused on molecular, immunological, and imaging-based diagnostics, the course covers PCR (conventional, real-time, multiplex), phylogenetics for pathogen tracking, and PARR for lymphoid neoplasia. Flow cytometry and immunohistochemistry (IHC) are explored for cell phenotyping, alongside immunocytochemistry (ICC) and in situ hybridization (ISH) for localized pathogen detection. Serological techniques like ELISA and rapid point-of-care (POC) tests are analyzed for field applications. Advanced methods such as transmission electron microscopy (TEM) for viral identification and mass spectrometry (proteomics/metabolomics) for biomarker discovery are included. Through lectures, case studies, and hands-on labs, participants will master test selection, interpretation, and integration into clinical workflows. Emphasis is placed on diagnostic accuracy, cost-effectiveness, and emerging technologies, preparing professionals for high-complexity diagnostics in research and practice.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the principles, applications, and limitations of advanced diagnostic techniques (PCR, phylogenetics, PARR, flow cytometry, IHC/ICC, ISH, ELISA, POC tests, TEM, and mass spectrometry) in veterinary medicine.		x	x	
2	Select appropriate diagnostic methods based on clinical scenarios, considering factors such as sensitivity, specificity, cost, and turnaround time.		x	x	x
3	Perform basic laboratory procedures (e.g., PCR setup, flow cytometry sample preparation, IHC staining) and interpret results accurately.		x	x	
4	Analyze phylogenetic data to track pathogen evolution and outbreaks, and apply bioinformatics tools for sequence alignment and tree construction.		x	x	x
5	Differentiate neoplastic vs. reactive lymphoid populations using PARR (PCR for antigen receptor rearrangements) and flow cytometry.		x	x	x
6	Evaluate ELISA, immunohistochemical, and in situ hybridization results to localize pathogens or biomarkers in tissues.		x	x	x
7	Interpret mass spectrometry and TEM data for pathogen identification.		x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will engage in teacher-controlled lecture activities to learn about molecular, immunological, and imaging-based diagnostics	1, 2, 3, 4, 5, 6, 7	18 hours total
2	Guided tutorials	Students will engage in structured tutorial activities to apply diagnostic procedures to answer clinical questions	1, 2, 3, 4, 5, 6, 7	21 hours total

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Quiz	1, 2, 3, 4	50	-	No
2	Presentation	1, 2, 3, 4	10	Additional CILOs may be addressed depending on the specific topic students choose to present on.	No
3	Examination	1, 2, 3, 4, 5, 6, 7	0	weighting = 40%	No

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Assessment Rubrics (AR)**Assessment Task**

Written examinations and quizzes

Criterion

Demonstrates knowledge of diagnostic tests and interpretation.

Excellent (A+, A, A-)

Excellent knowledge

Good (B+, B, B-)

Good knowledge

Fair (C+, C, C-)

Acceptable knowledge

Marginal (D)

Minimally acceptable knowledge

Failure (F)

Poor/absence of knowledge

Assessment Task

Presentations

Criterion

Students will be evaluated on the scientific rigor of their proposed diagnostic test (including primer/probe design or antibody selection), validation methodology (sensitivity/specificity calculations, controls), clinical relevance, and feasibility of implementation in real-world veterinary practice.

Excellent (A+, A, A-)

Excellent in understanding and ability to develop and explain proposed diagnostic test, feasibility, and interpretation.

Good (B+, B, B-)

Good in understanding and ability to develop and explain proposed diagnostic test, feasibility, and interpretation.

Fair (C+, C, C-)

Fair in understanding and ability to develop and explain proposed diagnostic test, feasibility, and interpretation.

Marginal (D)

Marginal in understanding and ability to develop and explain proposed diagnostic test, feasibility, and interpretation.

Failure (F)

Poor in understanding and ability to develop and explain proposed diagnostic test, feasibility, and interpretation.

Part III Other Information

Keyword Syllabus

Polymerase chain reaction (PCR)

Test validation

Next generation sequencing (NGS)

Nanopore sequencing

Phylogenetics

PCR for Antigen Receptor Rearrangements (PARR)

Flow cytometry

Immunohistochemistry (IHC)

Immunocytochemistry (ICC)

In situ hybridization (ISH)

ELISA

Transmission electron microscopy (TEM)

Mass spectroscopy (MS)

Reading List