REF. NO.	**C-VCR.1**
TITLE:	**CLINICAL RESEARCH**
VALUE:	**10 CREDITS**
NOTIONAL STUDY HOURS:	**100**

GENERAL GUIDANCE NOTES

Before embarking on this, or other modules, candidates must fulfil the following criteria:

a) Candidates should hold a veterinary qualification which would entitle them to register as a member of RCVS
b) Candidates should have at least one year's experience working in veterinary practice before enrolling for any module. Candidates graduating in 2007 or later will be expected to have completed the RCVS Professional Development Phase (PDP) before enrolling for any modules.
c) Candidates should enrol with the RCVS if intending to take the full Certificate in Advanced Veterinary Practice (enrolment will be valid for 10 years)

MODULE OBJECTIVES

At the end of the module, candidates should be able to:

- Formulate an answerable research question and design a research project to obtain evidence of the correct answer avoiding obvious sources of bias and other errors.
- Undertake the research proposed in the project design.
- Write up the results of a clinical research project to a standard that would pass the standard veterinary journal peer review process.

ASSESSMENT

It is suggested that this module could be assessed by the following methods:

- Preparation of a research proposal document to include: significance and relevance of the research question; numbers of subjects; methodology; technical feasibility; financial & time costs; and ethical considerations.
- Maintenance of a research log or diary during the research as a record of the research conduct and progress.
- Production of a final study report in the form of a standard scientific paper that would be subject to a process equivalent to the standard peer review used by veterinary journals.

SYLLABUS

Please note that an exhaustive knowledge of all the topics listed below may not be required for successful completion of the module. Candidates should note that in order to conduct a conventional quantitative study and to write it up to publication standard will require appropriate study design, methods, analysis and critical appraisal. The suggested syllabus indicates the core knowledge that will be required for most clinical research. The successful completion of individual research projects will require additional specialist knowledge unique to the research question being addressed.

1. INTRODUCING SCIENTIFIC METHOD AND PROCESS

- **Objectives**
  - Understand what is meant by scientific method
  - Understand the components and progression of a clinical research project
  - Be able to form a focussed research question
- **Knowledge**
  - The anatomy of research: What it's made of
  - The physiology of research: How it works
  - Designing the study
  - Origins of a research question
  - Characteristics of a good research question
  - Developing the research question and study plan

2. FINDING AND APPRAISING SCIENTIFIC PAPERS

- **Objectives**
  - Be able to perform a methodical appraisal of a research paper
  - Be able to perform a literature search using Pubmed

3. SAMPLING

- **Objectives**
  - Understand what is meant by scientific method
  - Know the components and mechanism of a clinical research project
  - Be able to form a focussed research question
- **Knowledge**
  - The anatomy of research: What it's made of
  - The physiology of research: How it works

- Designing the study
- Origins of a research question
- Characteristics of a good research question
- Developing the research question and study plan

4. VARIABLES

- **Objectives**
  - Understand the type of measurement that may be required
  - Be able to optimise precision, accuracy and validity of measures
- **Knowledge**
  - Planning the Measurements: Precision and Accuracy
    - Continuous variables
    - Categorical variables (nominal & ordinal)
    - Precision
    - Accuracy
    - Validity

5. ESTABLISHING THE HYPOTHESIS

- **Objectives**
  - Be able to translate a research questions into null hypotheses
  - Understand underlying statistical principles
- **Knowledge**
  - Getting Ready to Estimate Sample Size: Hypotheses & Underlying Principles
  - Characteristics of a good hypothesis
  - Types of hypothesis (relation with null hypothesis)
  - Underlying statistical principles
    - Type I & Type II errors
    - Magnitude of effect
    - Alpha & Beta probabilities, and power
    - P value
    - Multiple and post-hoc hypotheses

6. HOW MANY ANIMALS/PATIENTS ARE NEEDED?

- **Objectives**:
  - Appreciate the importance of statistical advice at the planning stage
  - Be able to estimate sample size and power
  - Understand some basic statistical tests
- **Knowledge**
  - Estimating Sample Size & Power
  - Sample size techniques for analytic studies and experiments
    - Student's t test
    - Chi-squared test
    - Correlation coefficient
    - Dropouts
    - Categorical variables
    - Survival analysis
    - Clustered samples
    - Matching
    - Multivariate adjustment
    - Equivalence studies
  - Sample size techniques for descriptive studies
    - Continuous variables
    - Dichotomous variables
  - Fixed sample size considerations
  - Estimating sample size in the face of insufficient information

7. COHORT STUDIES

- **Objectives**
  - Understand the strengths and weaknesses of cohort studies
  - Understand variations of cohort study designs
  - Be able recognise when a cohort study would be appropriate
- **Knowledge**
  - Designing an Observational Study: Cohort Studies
    - Prospective cohort studies
    - Retrospective cohort studies

- Nested case-control studies & case-cohort studies
- Multiple-cohort studies & external controls
- Planning a cohort study

8. CROSS-SECTIONAL AND CASE-CONTROL STUDIES

- **Objectives**
  - Understand the strengths and weaknesses of case control studies
  - Understand the strengths and weaknesses of cross-sectional studies
  - Be able recognise when these studies would be appropriate
- **Knowledge**
  - Designing an Observational Study: Cross-Sectional and Case-Control Studies
    - Cross-sectional studies
    - Case-control studies
  - Enhancing Causal Inference in Observational Studies
    - Spurious associations due to chance and bias
    - True associations other than cause-effect
    - Anticipating confounders at the design stage
    - Dealing with confounders at the analysis stage

9. THE RANDOMISED BLINDED CONTROLLED TRIAL

- **Objectives**
  - Understand the strengths and weaknesses of the RBCT
  - Be able to plan and implement a RBCT
  - Be able to recognise when a RBCT would be appropriate
- **Knowledge**
  - Randomised blinded controlled trial
  - Selecting participants
  - Measurement of baseline variables
  - Randomisation
  - Choice of intervention & control
  - Follow-up and adherence to the protocol
  - Measuring the outcome
  - Clinical vs surrogate outcomes
  - Statistical characteristics

- Number of outcome variables
- Adjudication of outcomes
- Adverse effects
- Analysing the results
- Intention to treat analysis
- Monitoring clinical trials
- Alternatives to the randomised blinded controlled trial
- Good clinical practice guidelines (VMD requirements)

10. STUDIES ON DIAGNOSTIC TESTS

- **Objectives**
  - Understand the utility of diagnostic tests (sensitivity, specificity)
  - Understand clinically relevant questions that can be asked of a test
  - Be able to plan and implement a study on a diagnostic test
- **Knowledge**
  - Designing Diagnostic Test Studies
  - Determining if a test is useful
  - Studies of test reproducibility
  - Studies of the accuracy of tests
  - Effect of test results on clinical decisions
  - Studies of feasibility, costs, and risks of tests
  - Studies of the effect of testing on outcome
  - Pitfalls in the design or analysis of diagnostic test studies
- **11. DESIGNING QUESTIONNAIRES**
- **Objectives**
  - Understand the principles of creating good questionnaires
  - Be able to design and use questionnaires and interviews
- **Knowledge**
  - Designing Questionnaires & Data Collection Instruments
  - Designing good questions
  - Open-ended vs closed questions
  - Formatting

- Wording
- Setting the time frame
- Common pitfalls
- Measuring abstract variables
- Steps in assembling the instruments for the study
- Listing the variables
- Collecting existing measures
- Composing a draft
- Revising the draft
- Pre-testing
- Validation
- Administering the instruments
- Questionnaires vs interviews

12. STUDY IMPLEMENTATION

- **Objectives**
  - Appreciate the need to consider the need for quality control
  - Be able to implement appropriate quality control strategies
- **Knowledge**
  - Pre-testing
  - Quality control
  - Quality control and clinical procedures
  - Quality control of laboratory procedures
  - Quality control of data
  - Protocol revisions once the data collection has begun

13. DATA MANAGEMENT

- **Objectives**
  - Understand basic requirements for effective storage & use of data
  - Be able to implement manage simple data using a spreadsheet program
- **Knowledge**
  - Defining the variables
  - Names
  - Format and range of permissible values

- Creating the study database & data dictionary
- Simple databases
- Complex databases
- Statistical analysis software
- Data dictionary
- Entering the data and correcting errors
- Creating dataset for analysis
- Backing up and archiving

14. WRITING A RESEARCH PROTOCOL AND APPLYING FOR FUNDING

- **Objectives**
  - Be aware of sources for clinical research funding
  - Understand the structure(s) of a grant proposal
  - Understand the grant review process
  - Understand the grant awarding/monitoring process
  - Be able to write grant proposals
- **Knowledge**
  - Writing and funding a Research proposal

15. WRITING AND REVIEWING SCIENTIFIC PAPERS

- **Objectives**
  - Understand the linguistic conventions of scientific writing
  - Know the structure of a conventional research papers
  - Understand the refereeing process
  - Be able to write and review research papers

16. ETHICAL AND LEGAL CONSIDERATION

- **Objectives**
  - Know the appropriate legislation, particularly the Animal Procedures Act
  - Be able to recognise if a study is likely to require a license
  - Be aware of the GCP guidelines that may be relevant to a study
  - Understand some of the ethical issues that may impinge on a study
  - Understand the requirements for informed consent by clients
- **Knowledge**

- Thefundamental ethical principles of autonomy, beneficence, nonmaleficence, and justice and applies these principles to clinical research.
- The use of unproven therapies, the use of placebos, the consent process
- Institutional review board submission and review processes,
- Conflict of interests
- Costs of clinical research
- The legislation pertinent to animal research and pharmaceutical registration