Course Objectives

The course will provide students with an understanding of the conceptual basis of epidemiology and with training in essential methodological skills for the design, conduct, analysis, interpretation and communication of epidemiological studies, surveillance and disease control in animal and human populations. On completion of the course, students will be able to:

- demonstrate a profound understanding of epidemiology as the study of patterns and factors that affect health and welfare in animal and human populations;
- recognise the importance of related disciplines and methods such as economics and mathematical modelling and how they contribute to epidemiology, with the opportunity to learn and apply these;
- demonstrate advanced knowledge and understanding of the role of epidemiology, the major health issues in both human and animal populations and the contribution of epidemiology to other health related disciplines;
- select an appropriate study design when confronted with an epidemiological research question and develop a study protocol capable of answering the research question;
- enter and manage computerised epidemiological data and carry out appropriate statistical analyses;
- assess the results of epidemiological studies (their own or other investigators’), including critical appraisal of study question, study design, methods and conduct, statistical analysis and interpretation;
- apply epidemiological principles to surveillance and infection and disease control within animal and human populations;
- communicate effectively with researchers from different disciplinary backgrounds, and with people who have an interest in human and animal health, including the general public and key policy makers;
- demonstrate advanced integration and problem solving skills;
- continue to develop independent and lifelong learning skills to promote their own personal and professional development as veterinary epidemiologists and leaders.

Duration

The course can be undertaken on a full-time basis over one year or on a part-time basis over two years (or over three years in exceptional circumstances).

Teaching Strategy and Methods

The course can be taken purely as an on-site course, or as a mixture of on-site and distance learning modules. Note that only selected units are offered in distance learning mode and if a student is interested in pursuing this option then they must discuss this with the course directors first. The teaching methods will include a mixture of lectures and group work. Case studies and problem-based exercises will form a significant part.

Course Overview

Credits

The course is worth 180 credits in total. Credits are awarded for each study unit and the research component. Further details are available below.
Course content

The course comprises:

- a taught component over three academic terms leading to examinations in June
- an individual 12 week research project

Term 1

All students take the core units and usually take the recommended units. Students are advised to take at most one optional unit unless they are very familiar with the content of several core or recommended units. This term has to be taken full-time during the first year of enrolment.

Core units:

- Epidemiological Aspects of Laboratory Investigations
- Epidemiology in Practice
- Extended Epidemiology
- Statistics for EPH
- Surveillance of Animal Health & Production.

The Term 1 study units form a super module and are worth a total of 60 credits.

Recommended Unit
Global health lecture series

Optional Unit
Molecular Epidemiology of Infectious Diseases

Term 2

Each study unit is taught for 2.5 days per week. It is important to consider that some of these units are pre-requisites for units taught later on, whether in the same or the following term. Part time students should discuss their pattern of study with the course directors to ensure they follow an appropriate route.

Core units:
Economics of One Health (C1)
Statistical Methods in Epidemiology (C2)
Modelling & Dynamics of Infectious Diseases (D1)
Epidemiology & Control of Communicable diseases (D2)

The Term 2 study units are worth 15 credits each

Term 3

1 study unit is taken. The study unit is taught for 2.5 days per week. The remaining part of the week is dedicated to examination revision and project preparation.

Core unit:
Applied Veterinary Epidemiology (E2)

The term 3 study unit is worth 15 credits.

Following this study unit there are two weeks allocated for examination revision and then the exams (2 papers) take place in early June.
**Project Report**

Students spend half of Term 3 and full time for the following three months of the course working on an individual project, with the guidance of a member of staff. The project gives students the opportunity to apply knowledge and skills gained during the course to a substantial individual piece of work. Students sponsored by an employer may undertake a project related to their work, and students from overseas are encouraged to bring data to London for this purpose, where possible. The project is worth a total of 45 credits.

**Teaching locations**

The teaching is delivered using the excellent facilities of the LSHTM in London as well as at the RVC’s Camden and Hertfordshire Campuses. Note that the Hawkshead campus is located outside London to the north of the city.

**Assessment methods**

Term 1 material will be assessed in written examinations in June. Term 2 and 3 modules will be assessed by an in-course assignment and in written examination papers in June. Paper 1 examines the content of Term 1 teaching and Paper 2 is a synthesis of the whole year, examining skills, concepts and methods related to course objectives. In addition, a written project report will be produced and students will sit an oral examination in September.
Epidemiology in Practice (LSHTM 2056)

ORGANISERS: Professor Betty Kirkwood, Dr Melanie Morris, Keith Tomlin, Krystyna Makowiecka

TIMETABLE SLOTS: The module runs for 10 weeks at two half-days per week; this module runs on Monday mornings (in weeks 3-7); Monday afternoons (in weeks 9-13) and on Wednesday afternoons (in weeks 3-7 and weeks 9-13)

TEACHING LOCATION: LSHTM

AIM
To provide students with essential practical skills required when working as an epidemiologist, and to encourage students to think about the ways in which epidemiological research links into wider public health and policy issues.

OBJECTIVES
By the end of this module, students should be able to:

- Assess when epidemiological evidence is sufficient to justify a public health policy or intervention;
- Formulate the problems of dealing with uncertainty when making public health policy, when epidemiological evidence does not or cannot give a clear answer;
- Unpack a public health issue, evaluate relevant evidence, examine logistic and ethical issues, and formulate recommendations;
- Evaluate the barriers to acting upon epidemiological evidence (vested interests, costs, practicalities) and to collecting epidemiological data (resource constraints, political issues);
- Demonstrate the importance of effective communication of research findings including with the media, and also how epidemiological evidence can be misrepresented or misused;
- Formulate ethical issues and appreciate their importance in the conduct of epidemiologic research and in making public health policy;
- Apply practical skills in questionnaire design, database design (using EpiData), and preparing data for analysis (using STATA), and appreciate the importance of a comprehensive strategy for collecting and managing epidemiological data;
- Demonstrate the skills required to write scientific papers;
- Critically assess an epidemiological study, and systematic reviews of epidemiological evidence.

CONSTITUENCY
This module is part of the core course for the MSc in Epidemiology and the MSc in Veterinary Epidemiology.

CONCEPTUAL OUTLINE
The module is expected to include sessions addressing the following topics (though please note that these may be subject to change):

- Communicating and appraising research evidence for a range of major public health issues
- Key skills in communicating findings in research papers and with the media
- Unpacking public health issues
- Critical appraisal
- Systematic reviews
- Principles of questionnaire design and data management
• Entering and preparing data for statistical analysis using EpiData and STATA.

TEACHING STRATEGY
This module employs a problem-based learning strategy and mixed methods: lectures, seminars, group discussions and presentations, workshops, debates and practical sessions.

LEARNING TIME
The notional learning time for the module totals 200 hours, consisting of:
• Contact time ≈ 60 hours
• Directed self-study ≈ 70 hours
• Self-directed learning including review and revision ≈ 70 hours

ASSESSMENT
Each student will be expected to submit a certificate showing successful completion of the National Institutes of Health (NIH) Office of Extramural Research Web-based training course “Protecting Human Research Participants”, and to write a critique of a paper over the winter break. Summative assessment through written examination takes place in June 2015.

ASSESSMENT DATES

MODULE CREDIT
Part of MSc Vet Epi Term 1 ‘super-module’ which holds 60 credits in total.
Molecular Epidemiology of Infectious Diseases (LSHTM 2052)

ORGANISER: Prof Judith Glynn

TIMETABLE SLOT: Monday mornings in Term 1 for weeks 9-13. The module runs for 5 weeks at 0.5 days per week;

TEACHING LOCATION: LSHTM

AIM
To give students a basic understanding of the techniques used and an appreciation of the importance and potential of molecular epidemiology in infectious disease epidemiology.

OBJECTIVES
By the end of this module, students should be able to:
- Understand papers which describe molecular epidemiological findings
- Appreciate the roles of molecular techniques – including whole genome sequencing - in furthering our understanding of the epidemiology of infectious diseases
- Apply basic epidemiological principles to the critical interpretation of molecular epidemiological studies

CONSTITUENCY
The course is open to those attending at least basic epidemiology, or with equivalent experience. Students should have at least a basic understanding of biology.

CONCEPTUAL OUTLINE
The module is expected to include sessions addressing the following topics (though please note that these may be subject to change):
- The use of genetic variation of pathogens in the epidemiological study of infectious diseases.
- Molecular biological techniques
- Introduction to the principles of phylogenetic trees.
- Epidemiological applications covering studies of geographical distribution, transmission, and pathogenesis

TEACHING STRATEGY
Teaching will consist of lectures, computer session, and practical classes in which students will work in small groups. There is no laboratory component.

LEARNING TIME
The notional learning time for the module is 50 hours, consisting of:
- Contact time = 15 hours
- Directed self-study = 30 hours
- Self-directed learning = 5 hours

ASSESSMENT
None.
Global Health Lecture Series (LSHTM 2019)

ORGANISERS: Professor David Schellenberg, Dr Heidi Larson and Professor Charlotte Watts

TIMETABLE SLOT: Terms 1 & 2 Mondays 5.15 p.m., weekly

TEACHING LOCATION: LSHTM

AIM
To provide an overview of current major issues in global health.

OBJECTIVES
By the end of this series of lectures students should be able to:

- identify key areas in global health;
- demonstrate an understanding of selected issues of current importance in global health.

CONSTITUENCY
These lectures are open to anyone with an interest in global health.

CONCEPTUAL OUTLINE
The Global Health Lecture Series (GHLS) aims to provide an overview of the hot topics and debates in global health through a series of 20 lectures and panel discussions delivered at weekly intervals throughout the first two terms (except Reading Weeks).

Leading experts from LSHTM will present “State of the Art” summaries of a range of global health issues. In addition to the lectures there will be three panel discussions across the two terms, to stimulate discussions of key topics across global health.

The talks will provide sufficient background so that members of the audience without much previous knowledge of the specific subject area will be able to understand why the issues covered in the lecture are important.

TEACHING STRATEGY
Each lecture consists of a 45 to 60 minute presentation followed by time for questions/discussion.

LEARNING TIME
Total learning time is 20 hours, composed of: contact time = 20 hours.

ASSESSMENT
The lectures are not assessed directly.
Extended Epidemiology (LSHTM 2007)

ORGANISERS: Professor Oona Campbell, Dr Kalpana Sabapathy and Dr Audrey Bonaventure

TIMETABLE SLOT: The module runs for 10 weeks at 1 day per week; this module runs on Tuesday and Wednesday mornings.

TEACHING LOCATION: LSHTM

AIM
To introduce the basic concepts in the design, analysis and interpretation of epidemiological studies and an introduction to epidemiological methods applied to public health.

OBJECTIVES
By the end of this module, students should be able to:

- Identify and state the key considerations in the planning and design of epidemiological studies;
- Describe, apply and interpret correctly epidemiological measures, including measures of disease frequency, measures of effect, and measures of public health impact;
- Describe the principles and evaluate the relative merits of different study designs, including the main analytic methods available;
- State the uses, strengths and limitations of routine data sources in both developed and developing countries;
- Summarize the key concepts and implications of sampling error, bias and confounding in epidemiological studies and know how to apply strategies for addressing these;
- Summarize the concept of effect modification(interaction) and know how to apply a strategy to address this;
- Describe and apply the concepts of misclassification and validity of disease and exposure measurements, including the principles and practice of disease screening;
- Judge the adequacy of evidence supporting causal links between exposure and disease;
- Evaluate the results and interpretations of published epidemiological studies;
- Select an appropriate study design to address specific epidemiological questions.

CONSTITUENCY
Extended Epidemiology is a core teaching module for all students on the MSc Epidemiology, MSc Veterinary Epidemiology and MSc Public Health in Developing Countries courses.

CONCEPTUAL OUTLINE
The module is expected to include sessions addressing the following topics (though please note that these may be subject to change):

- Cases, measures of disease frequency (rates/risks) and measures of effect;
- Population impact;
- Dynamics of infection and transmission;
- Study design (cross-sectional, intervention, cohort, case-control, ecological);
- Error, bias and confounding; interaction;
- Causality;
- Screening;
- Use of routine data (including surveillance).
TEACHING STRATEGY
Teaching will consist of twenty half-day sessions principally composed of one hour lectures followed by one-and-a-half hour practical classes where students work in small groups. There will be a problem-based exercise on study design and logistics during the latter half of the module, with students working in groups. We illustrate lectures and practicals using examples and data from high, middle and low-income countries, and with communicable and non-communicable diseases. Students are expected both to read around the topic and to do additional exercises in their own time.

LEARNING TIME
The notional learning time for the module totals 150 hours, consisting of:

- Contact time ≈ 55 hours
- Directed self-study ≈ 35 hours
- Self-directed learning ≈ 10 hours
- Assessment, review and revision ≈ 50 hours.

ASSESSMENT
We make two informal assessments of progress during the course of the teaching module, neither of which count towards the final degree: a mid-term test, to be carried out in the student’s own time and a compulsory invigilated closed-book test towards the end of term. The mid-term or end of term assessments will not be remarked. Summative assessment through written examination takes place in June 2015.

ASSESSMENT DATES
Informal assessments will be 17 November 2014 and 17 December 2014. Summative assessment through written examination takes place in June 2015.

MODULE CREDIT
Part of MSc Vet Epi Term 1 ‘super-module’ which holds 60 credits in total.
Statistics for Epidemiology and Population Health (LSHTM 2021)

ORGANISERS: Dr Gian Luca Di Tanna, Dr Phil Edwards and Dr Emily Webb

TIMETABLE SLOT: The module runs for 10 weeks at 1 day per week; this module runs on Tuesday afternoons and Friday mornings

TEACHING LOCATION: LSHTM

AIM
To introduce the basic statistical methods used in medical and public health research, and to help students develop the skills needed to apply them using the STATA statistical software.

LEARNING OUTCOMES
By the end of this module, students should be able to:
- Describe and apply statistical methods in epidemiology and population health, and in their own disciplines;
- Demonstrate skills in handling data on a computer and otherwise, and in deriving and presenting quantitative results using appropriate tables, figures and summaries;
- Explain the nature of sampling variation and the role of statistical methods in quantifying it, and be able to calculate confidence limits and evaluate hypotheses;
- Identify the key features of the normal distribution;
- Identify the key features of methods appropriate for sampling surveys;
- Select appropriate statistical methods for the analysis of simple data sets and apply them on computer using STATA statistical software;
- Interpret and assess the output from statistical analyses carried out on a computer in relation to research and other questions being asked;
- Present and discuss the findings from statistical analyses in a clear, concise and logical manner.

CONSTITUENCY
This is a core module for the MSc courses in: Epidemiology, Demography & Health, Public Health in Developing Countries, Reproductive & Sexual Health Research, Nutrition for Global Health, Global Mental Health and Veterinary Epidemiology. It does not assume any previous knowledge of statistics and is a pre-requisite for the more advanced statistical courses taught in Term 2.

CONCEPTUAL OUTLINE
The module is expected to include sessions addressing the following topics (though please note that these may be subject to change):
- Basic methods of presenting data
- Sampling variation, estimation and hypothesis testing
- Analysis of numerical and binary outcomes
- Regression analysis
- Survey sampling
- Interpretation of data analysis will be a central theme throughout the module

TEACHING STRATEGY
Teaching will be carried out in a mixture of lectures and practical sessions. Practicals will involve ‘pen & paper’ exercises working in small groups, or computer exercises mainly working in pairs. The emphasis will be on making appropriate tabulations and graphical displays of data and appreciating their meaning, selecting and applying appropriate methods for statistical inference, and correctly interpreting the results. All methods will be illustrated using data from medical studies in developed and developing countries.

LEARNING TIME
The notional learning time for the module totals 150 hours, consisting of:
- Contact time ≈ 70 hours
- Directed self-study ≈ 10 hours
- Self-directed learning ≈ 35 hours
- Assessment, review and revision ≈ 35 hours

ASSESSMENT
Informal assessment will comprise one multiple choice test and one data analysis assignment (neither of which will count towards students' final MSc degree grades). Summative assessment through written examination takes place in June 2015.

ASSESSMENT DATES
Summative assessment through written examination takes place in June 2015.

MODULE CREDIT
Part of MSc Vet Epi Term 1 ‘super-module’ which holds 60 credits in total.
Surveillance of Animal Health and Production (RVC)

ORGANISERS: Professor Javier Guitian and Ms Jane Gibbens

TIMETABLE SLOT: Generally Thursday mornings in Term 1 for 12 weeks.

TEACHING LOCATION: Camden campus of Royal Veterinary College

AIM
The aim of this unit is to provide participants with an understanding of the design and purposes of surveillance systems and of routine production and management systems used to monitor herd level performance. The use of Risk Analysis as a decision-making tool is also introduced and its applications in the design of surveillance systems discussed.

OBJECTIVES
By the end of this unit, participants should be able to:

- Describe the concepts and components of veterinary surveillance systems;
- Critically evaluate existing surveillance systems and data sources;
- Prepare an outline plan for surveillance of an animal disease problem in a particular location;
- Identify key performance indicators for different animal production systems (dairy, pig etc);
- Use routine farm data to report on a farm’s productivity and to investigate the impact of clinical or sub-clinical disease;
- Explain the processes involved in risk analysis and undertake qualitative risk assessments;
- Demonstrate awareness of the use of risk analysis in the context of international trade and in veterinary public health;

CONSTITUENCY
This Unit is intended for students with an interest in animal health and disease control. It is a core Unit for the MSc in Veterinary Epidemiology.

CONCEPTUAL OUTLINE
This Unit will focus on animal health surveillance issues as they affect different levels of animal populations - from evaluating surveillance as a component of farm-level production systems, through to its role in disease control at a district, regional, national and international level.

TEACHING STRATEGY
The Unit will comprise a formal teaching (lectures), and case studies will be used to allow students to develop an understanding of the sources of data and their interpretation. Group practicals and discussions will complement the case studies.

LEARNING TIME
30 hours of contact time.

ASSESSMENT
Four formative self-assessed assignments via RVC Learn will be set throughout the module. A formative multiple choice assessment will take place in January. Summative assessment through written examination takes place in June 2015.

MODULE CREDIT
Part of MSc Vet Epi Term 1 ‘super-module’ which holds 60 credits in total.
Epidemiological Aspects of Laboratory Investigations (RVC)

ORGANISERS: Prof Dirk Pfeiffer and Dr Jackie Cardwell

TIMETABLE SLOT: Generally Thursday afternoons in Term 1 for 12 weeks.

TEACHING LOCATION: Camden Campus of Royal Veterinary College

AIM
To enable students to understand the relevance of quantitative test characteristics for investigating and diagnosing animal disease.

OBJECTIVES
At the end of the course students should be able to:

- Demonstrate an understanding of the importance of the choice of a suitable case definition
- Select appropriate laboratory tests for disease surveillance or diagnosis based on their quantitative performance characteristics.
- Describe the principles and methods of quantitative evaluation of diagnostic techniques and laboratory tests.
- Demonstrate an understanding of the importance of test sensitivity/specificity and how sensitivity/specificity can differ depending on the circumstances in which the tests are applied: e.g. to groups rather than individuals, for pooled testing or for screening compared to specific diagnosis.
- Discuss the relevance of typing techniques (e.g. genetic fingerprinting) from an epidemiological perspective
- Apply epidemiological principles to the review of literature which incorporates laboratory tests.

CONSTITUENCY
This Unit is intended for students with an interest in animal health and disease control. It is a core study unit for the MSc in Veterinary Epidemiology.

CONCEPTUAL OUTLINE
Diagnosis of disease requires the use of specific diagnostic methods, many of which are laboratory tests. As part of disease investigation an informed choice needs to be made in relation to selection of diagnostic tools, specifically based on their quantitative performance, that suits the investigational objectives. This study unit will assist students in learning how to identify relevant laboratory support of disease investigations based on epidemiological considerations, interpret test results arising from laboratory techniques and epidemiological investigations.

TEACHING STRATEGY
The study unit will be based upon a combination of didactic teaching and problem-based exercises.

LEARNING TIME
30 hours contact time.

ASSESSMENT
Four formative self-assessed assignments via RVC Learn will be set throughout the module. A formative multiple choice assessment will take place in January. Summative assessment through written examination takes place in June 2015.

MODULE CREDIT
Part of MSc Vet Epi Term 1 ‘super-module’ which holds 60 credits in total.
Economics of One Health (RVC)

ORGANISER: Prof Jonathan Rushton

TIMETABLE SLOT:
The module runs for 5 weeks at 2.5 days per week; this module runs between Monday morning and Wednesday lunchtime in Term 2.

TEACHING LOCATION: Camden Campus of Royal Veterinary College

AIM
To introduce students to the principles of economics as applied to One Health and to the practical use of economic methods.

OBJECTIVES
By the end of the study module students should be able to:

- Describe the losses and expenses of human and animal diseases and the link between health expenditure and direct losses
- Interpret economic data using gross margin analysis, partial budgeting, cost-benefit analysis, cost-effectiveness analysis and decision tree analysis
- Understand the linkage between food system analysis and risk analysis
- Discuss the role of economics in decision making in One Health problems and their control at individual, local, national levels
- Give a critical evaluation of the application of economics to One Health problems, recognising underlying assumptions and limitations.

CONSTITUENCY
The module is intended for students interested in the control of One Health problems at every level from the individual, local to national, in developed or less developed countries. No prior knowledge of economics is required, but students should be familiar with basic epidemiology, and familiarity with spreadsheet software is expected. The study module is compulsory for the MSc courses in Veterinary Epidemiology and One Health.

CONCEPTUAL OUTLINE
The application of economics to One Health is to assist in:

- Understanding why people have made health decisions in the past
- Predicting how people will make health decisions in the future
- Guiding people on how to improve future health decisions for the benefit of individuals and society in general.
- Where sufficient data and modelling expertise are available the application of economic methods and concepts can help in making optimal health decisions.
- The Study Module addresses three areas:
  - The quantification of the economic effects of One Health problems
  - The use of economic methods to aid decisions at individual level either human or animal, local and national levels
  - The economic evaluation of specific One Health interventions and wider control programmes.
- The module will complement students’ understanding of diseases and One Health problems from an epidemiological perspective and how this is influenced by the socio-economic impact of the problem and its management and control.
TEACHING STRATEGY
The study module will be based upon class activities that are a combination of lectures and discussion with individual and group exercises. This is reinforced by a marked in-course assignment and selected readings.

LEARNING TIME
Total learning time is 150 hours, composed of: contact time = 51 hours, reading time = 50 hours and assessment/assignment time = 49 hours.

ASSESSMENT
In-course assessment - Written report with 4 questions.

ASSESSMENT DATE
In-course assessment hand in date is 12th February 2015.

MODULE CREDIT
15 M-level credits.
Statistical Methods in Epidemiology (LSHTM 2402)

ORGANISERS: Professor Simon Cousens, Dr Katherine Fielding and Dr Susannah Woodd

TIMETABLE SLOT: The module runs for 5 weeks at 2.5 days per week; this module runs between Wednesday lunchtime and Friday afternoon in Term 2.

TEACHING LOCATION: LSHTM

AIM
To equip students with the skills needed to analyse and interpret data from cohort, case-control and cross-sectional studies, using cross-tabulation, stratification and regression models.

OBJECTIVES
By the end of this module, students should be able to:

- Explain the key statistical and epidemiological concepts which underlie the analysis of epidemiological data;
- Perform analyses of data arising from epidemiological studies, using appropriate computer software (the software used throughout will be STATA);
- Investigate and assess confounding and effect modification (interaction) in epidemiological data;
- Interpret appropriately the results of these analyses, taking into account study design issues;
- Write a clear report presenting and interpreting the results of an analysis of epidemiological data.

CONSTITUENCY
This module is primarily intended for students who have attended the Term 1 modules in Statistics for EPH (2021) and Extended Epidemiology (2007), are familiar with STATA and who wish to acquire further skills in the analysis and interpretation of epidemiological studies.

CONCEPTUAL OUTLINE
The module is expected to include sessions addressing the following topics (though please note that these may be subject to change):

- Cohort studies: analysis of rates using stratification to investigate confounding and interaction; simple survival analysis (life tables and Kaplan-Meier). Introduction to Poisson and Cox regression.
- Case-control studies: design issues including matching; analysis of studies using stratification to investigate confounding and interaction.
- Likelihood theory.
- Logistic regression for the analysis of case-control, cross-sectional and fixed-length cohort studies.

TEACHING STRATEGY
Teaching consists mostly of lectures followed by computer practical sessions. Methods are illustrated using data drawn from research work of staff in the Departments of Epidemiology & Population Health, and Infectious and Tropical Diseases. These include both high and low income country studies. The computer package STATA is used extensively.

LEARNING TIME
The notional learning time for the module totals 150 hours, consisting of:

- Contact time \(\approx 38.5\) hours
- Directed self-study \(\approx 1.5\) hours
- Self-directed learning \(\approx 70\) hours
- Assessment, review and revision \(\approx 40\) hours

ASSESSMENT
Students will analyse an epidemiological dataset. They will each write a brief report describing their approach to the analysis and presenting and interpreting their results.

ASSESSMENT DATE
Assessments will be due on the last day on the module (13 February 2015).

MODULE CREDIT
15 M-level credits.
Modelling & the Dynamics of Infectious Diseases (LSTM 2464)

ORGANISERS: Dr Richard White, Dr Emilia Vynnycky and Dr Adam Kucharski

TIMETABLE SLOT: The module runs for 5 weeks at 2.5 days per week; this module runs between Monday morning and Wednesday lunchtime in Term 2.

TEACHING LOCATION: LSHTM

AIM
To introduce students to key methods for setting up models of the transmission dynamics of infectious diseases and their application.

OBJECTIVES
By the end of this module, students should be able to:

- Understand the basic methods for setting up deterministic and stochastic infectious disease models;
- Understand some of the host and pathogen factors determining variation in infectious diseases over time and how to incorporate these into models;
- Analyse seroprevalence data using models to estimate age and time-dependent transmission rates and their application for understanding control of childhood infections;
- Understand the applications of modelling in infectious disease epidemiology and of some of the insights that models have provided, including describing the time-course of outbreaks and predicting the impact of control strategies;
- Understand the application of modelling to measles, mumps, rubella and influenza, STI/HIV, tuberculosis, vector-borne diseases and applications in veterinary epidemiology;
- Critically read and interpret modelling papers.

CONSTITUENCY
The course aims to bring a conceptual understanding of mathematical models and their applications in infectious disease research to individuals who have not had any advanced training in mathematics. It is also suitable for individuals with a background in mathematical disciplines who wish to obtain an understanding of the broad range of applications of mathematical models in infectious disease epidemiology and who may wish to specialize in this area in the future.

CONCEPTUAL OUTLINE
The module is expected to include sessions addressing the following topics (though please note that these may be subject to change):

- Basic methods and motives for developing infectious disease models;
- Analysis and applications of seroprevalence data: methods for elucidating age (and time-) dependent transmission; application for designing models for predicting the impact of control strategies;
- Additional methods and dynamics - stochastic and network modelling, model-fitting and sensitivity analyses;
- Applications of modelling.

TEACHING STRATEGY
A variety of teaching methods are employed including lectures, computer practicals, small group work and paper discussions. The course will introduce participants to the use of mathematical models for analysing a wide range of problems involving many different pathogens, and will equip participants with the skills to build and analyse simple models for their own area of interest. We use periodic review sessions to consolidate and expand on concepts covered during the course. Paper discussion sessions are included to enhance understanding of modelling papers and to encourage critical thinking of model structures and the underlying assumptions.

LEARNING TIME
The notional learning time for the module totals 150 hours, consisting of:
- Contact time = 50 hours
- Directed self-study = 35 hours
- Self-directed learning = 20 hours
- Assessment, review and revision = 25 hours

ASSESSMENT
The assessment consists of two components: a data analysis/modelling exercise that students carry out in small groups (20%) and an MCQ exam taken individually (80%) of 1.5 hours.

ASSESSMENT DATES
The groupwork assessment is carried out during the 3rd or 4th week of the module. The MCQ occurs in the final week of the module.

MODULE CREDIT
15 M-level credits.
Epidemiology & Control of Communicable Diseases (LSHTM 2437)

MODULE ORGANISERS: Professor Paul Fine and Dr Daniela Manno

TIMETABLE SLOT: The module runs for 5 weeks at 2.5 days per week, from Wednesday lunchtime to Friday afternoon in Term 2.

TEACHING LOCATION: LSHTM

AIM
To provide four perspectives on the epidemiology of communicable diseases: basic concepts and methods; epidemiological aspects of vaccination; surveillance and outbreak investigation; and detailed discussion of the epidemiology of important representative infectious diseases.

OBJECTIVES
By the end of this module, students should be able to:

- Demonstrate understanding of the factors determining the temporal, spatial and social distributions of infectious diseases;
- State and explain the principles underlying simple mathematical models of communicable diseases;
- Design, carry out, analyse, interpret and report an outbreak investigation;
- Interpret and evaluate surveillance systems for communicable diseases;
- Plan, conduct and evaluate immunization programmes, including estimation of vaccine efficacy and effectiveness, and identification of reasons for programme failure;
- Critically assess practical applications of epidemiological methods employed in the study of particular infectious diseases.

CONSTITUENCY
This module is intended for students interested in the epidemiology and control of infectious diseases in either developing or developed countries.

CONCEPTUAL OUTLINE
The module is expected to include sessions addressing the following topics (though please note that these may be subject to change):

- Methods and concepts: incubation periods, epidemic patterns, modes of transmission, transmission dynamics, measures of infectiousness, secondary attack rates, mathematical models of infection dynamics and sero-epidemiology.
- Outbreak investigation and surveillance: includes a simulated outbreak which students investigate, analyse and write-up.
- Vaccination: includes technical and clinical/immunological aspects, schedules, adverse reactions, contraindications, vaccine efficacy, impact assessment, UK and EPI programme issues.
- Specific diseases: will include some or all of TB, Malaria, Polio, STIs, AIDS, Meningococcal meningitis, Hepatitis B, and Measles.

LEARNING TIME
The notional learning time for the module totals 150 hours, consisting of:

- Contact time = 65 hours
• Directed self-study ≈ 40 hours
• Self-directed learning ≈ 3 hours
• Assessment, review and revision ≈ 42 hours

ASSESSMENT
Assessment will be based upon a group-written outbreak investigation report (20%) and a multiple choice question examination (80%).

ASSESSMENT DATES
The module choice question examination will take place on the last day of module; the outbreak investigation report will be due at the end of Week 3 of the module.

MODULE CREDIT
15 M-level credits.
Applied Veterinary Epidemiology (RVC)

ORGANISERS: Prof Javier Guittian and Dr Kristien Verheyen

TIMETABLE SLOT: This module runs for half of the week from Wednesday afternoons in Term 3 for 5 weeks.

TEACHING LOCATION: Hawkshead and Camden campuses of the Royal Veterinary College

AIMS
To introduce students to statistical methods for analysis of cohort, correlated and spatial data
To develop students’ applied skills in risk assessment and disease control in animal populations.

OBJECTIVES
By the end of the study unit students should be able to:

- Analyse multivariable cohort and correlated data
- Visualise spatial epidemiological data
- Use methods of exploratory analysis to identify spatial and temporal disease clusters
- Apply quantitative risk assessment methodologies to practical problems
- Describe and apply different approaches to disease control in animal populations
- For a given research problem, formulate study objectives, choose an appropriate and ethical study design and plan field and analytical procedures

CONSTITUENCY
This unit is intended for students interested in the epidemiology and control of animal diseases. A willingness to carry out quantitative data analysis is required. Students should have completed the Term 1 core study units of the MSc Veterinary Epidemiology. It is compulsory for students enrolled in the MSc Veterinary Epidemiology.

CONCEPTUAL OUTLINE
- Analysis of cohort data
- Analysis of correlated data
- Visualisation of spatial and temporal data
- Exploration of spatial and temporal data with an emphasis on detection of spatial and temporal clusters
- Development of disease control strategies
- Risk assessments for policy-relevant questions
- Design and plan epidemiological studies

TEACHING STRATEGY
The course will be delivered using a combination of lectures and computer practicals. The computer packages used will include ArcGIS, Excel, STATA and @Risk.

LEARNING TIME
Total learning time is 70 hours, composed of 58 hours contact time and 12 hours self-study time for the assessment.

ASSESSMENT
Students will write a brief report presenting the results of an exercise involving data analysis.

ASSESSMENT DATE
In-course assessment hand in date is 22nd May 2015.
MODULE CREDIT
15 M-level credits.