

# MSc Wild Animal Biology/Health

---

COURSE CONTENT 2017/18

## **Educational philosophy**

The modular structure of the Master of Science Courses in Wild Animal Biology and Wild Animal Health is built around practical rotations and problem-based learning scenarios, which together encourage critical thinking, decision-making, exploration and inquiry, and awareness of current issues at the forefront of wild animal health and biology. Important systematic knowledge and insights into novel research are given in lectures to complement the problem-based approach, while additional practical skills are taught through visits to selected advanced institutions.

Students may not always have access to the learning aids used by external lecturers.

**Lectures written in red are WAH only; those written in blue are WAB only.**

| <b>Introductory Week</b>  |   |     |
|---|---|-----|
| Important information on the Course objectives, the mission of the partner organizations running the Course and the services you receive is provided in the first week. |   |     |
| <b>Introduction to ZSL</b>  |   |     |
| Introduction to the Course and Zoological Society of London   | Dr Tony Sainsbury, Professor Ken Norris, Ms Angela Ryan | 4   |
| Health, safety and fieldwork guidance at ZSL  | Ms Lynne Rushton  | 1   |
| <b>Introduction to generic learning skills</b>  |   |     |
| Introduction to Problem-Based Learning  | Dr Tony Sainsbury                                       | 1   |
| Learning in groups through concept maps   | Dr Camille B. Kandiko Howson                            | 1   |
| Epidemiological thinking  | Dr Julian Drewe   | 3   |
| <b>ZSL Library Services and Computing</b>   |   |     |
| Introduction to the use of the ZSL Library  | Ms Emma Milne   | 1   |
| Literature searching in the ZSL Library   | Ms Emma Milne   | 1   |
| Introduction to IT  | Miss Alexandra Thomas                                   | 1   |
| IT refresher session  | Miss Alexandra Thomas                                   | 1   |
| <b>Introduction to Practical Studies</b>  |   |     |
| Introduction to Whipsnade   | Mr Nick Lindsay   | 1.5 |
| Introduction to Whipsnade and Ellerman Centre   | Dr Nic Masters  | 1   |
| Introduction to Wild Animal Conservation and Management Rotations   | Dr Tony Sainsbury, Ms Anna Cucknell                     | 1   |
| Introduction to WZ animal collections   | Mr Nick Lindsay and team                                | 2   |
| Trapping and handling free-living birds   | Mr Bill Haines  | 1   |
| Introduction to rotation groups, tour of Veterinary Hospital at RP  | Dr Amanda Guthrie                                       | 1   |
| Introduction to zoo animal management rotations   | Ms Angela Ryan  | 1   |
| Monitoring of restraint and anaesthesia of wild animals, including emergency support for biologists   | Dr Polly Taylor   | 1   |
| Monitoring of restraint and anaesthesia of wild animals, including emergency support for veterinarians  | Dr Polly Taylor   | 1   |
| Remote injection systems  | Dr Fieke Molenaar                                       | 1   |
| Practical – Remote injection systems  | Dr Fieke Molenaar                                       | 2   |
| Introduction to pathology at ZSL  | Dr Edmund Flach   | 2   |
| Introduction to pathological investigations   | Professor Ken Smith                                     | 3   |
| Practical on pathological examinations of mammals   | Professor Ken Smith                                     | 3   |

## Certificate in Wild Animal Biology / Wild Animal Health

### **Learning objectives**

A graduate of the **Certificate** in Wild Animal Health/Biology must demonstrate:

- a conceptual understanding of population dynamics, threats to wildlife populations and how resources can be allocated for wildlife conservation
- a critical understanding of epidemiology and the impact of disease on wild animal populations
- the ability to evaluate the effect of interventions on the health, welfare and conservation of captive and free-living wild animals
- a systematic understanding of the biological principles underpinning wild animal management, and the husbandry, care and welfare of wild animals

## **Module 1 – Conservation Biology**

Following some introductory lectures in this module, we develop a conceptual understanding of why certain species and populations are more vulnerable to extinction than others, examine the models we can use to assess population viability, explain how we can monitor population dynamics and critically analyse how resources to conserve species can be most successfully allocated using a scientific approach.

### **Introduction**

|                                       |                     |   |
|---------------------------------------|---------------------|---|
| Principles of conservation biology    | Dr Marcus Rowcliffe | 2 |
| Introduction to population ecology    | Dr Rajan Amin       | 2 |
| Introduction to conservation genetics | Dr Patricia Brekke  | 1 |
| Conservation genetic techniques       | Dr Patricia Brekke  | 1 |

### **Population monitoring**

|  |                                       |        |
|--|---------------------------------------|--------|
| Techniques for monitoring (sampling) populations               | Dr Rajan Amin                         | 2      |
| <i>Censusing of semi-free-ranging populations at Whipsnade</i> | Dr Marcus Rowcliffe and Dr Rajan Amin | 2 days |

### **Using population data to plan conservation programmes**

|                               |                     |   |
|-------------------------------|---------------------|---|
| Species conservation planning | Dr Paul de Ornellas | 1 |
|-------------------------------|---------------------|---|

### **Causes of extinction**

|  |                   |   |
|--|-------------------|---|
| Problem-based Learning Scenario: The kakapo – an endangered parrot | Multiple          | 8 |
| Introduction to Conservation Programmes at ZSL                     | Ms Sarah Christie | 1 |
| Management of island birds for conservation                        | Dr John Ewen      | 1 |

### **Allocation of conservation resources**

|  |                  |   |
|--|------------------|---|
| Problem-based Learning Scenario: The agony of choice                                     | Multiple         | 8 |
| The role of species management plans, zoos and other captive collections in conservation | Ms Nicky Needham | 1 |
| Monitoring global biodiversity   | Dr Monika Bohm   | 1 |
| Developing the tiger conservation programme at ZSL                                       | Ms Jo Cook       | 1 |
| From hurricanes to Ebola: forecasting future biodiversity                                | Dr David Redding | 1 |

### **Pathology**

|                            |   |   |
|----------------------------|---|---|
| Clinicopathological skills | Dr Balazs Szladovits, Dr Michael Waters | 2 |
|----------------------------|---|---|

### **Tutorials**

|  |          |   |
|--|----------|---|
| Tutorial 1: Differences between learning at undergraduate and postgraduate level | Multiple | 1 |
| Tutorial 2 - Strategies for reading and managing scientific papers               | Multiple | 1 |

## **Module 2: The Impact of Disease on Populations**

The effects of diseases on populations can be complex but even subtle influences can markedly unbalance free-living and captive populations of wild animals. An understanding of these effects requires a critical evaluation of epidemiology and the population biology of infectious agents, and armed with this knowledge we can make informed decisions on control methods, where these are considered an ethical approach.

|  |  |            |
|--|--|------------|
| Problem-based learning scenario – Avian malaria and avian pox in Hawaiian birds  | Multiple   | 8          |
| Introduction to epidemiology   | Dr Jackie Cardwell, Dr Julian Drewe, Dr Sarah Rosanowski | 12         |
| The impact of infectious disease on free-living populations  | Dr Tony Sainsbury  | 2          |
| Computer modelling of diseases in wildlife populations   | TBC  | 2          |
| Epidemiology of infectious diseases in free-living Artiodactyls  | Professor Richard Kock                                   | 2          |
| Chemical restraint and surgical anaesthesia of birds   | Dr Steve Smith   | 1.5        |
| <i>Aspects of avian surgery</i>  | <i>Dr Steve Smith</i>                                    | <i>1</i>   |
| <i>Practical - Orthopaedic surgery in birds (fracture repair, amputations and surgery to prevent flying)</i>   | <i>Dr Steve Smith</i>                                    | <i>2.5</i> |
| <b>Disease Management in Wildlife</b>  |  |            |
| Methods of disease control in free-living wild animals are fundamentally different from those in captive animals, and require a profound knowledge of epidemiology and ethics. In this unit we examine the control methods available to wild animal health professionals using examples of diseases in carnivores. |  |            |
| Wildlife disease epidemiology: investigation of disease outbreaks and implementation of control measures   | Dr Felix Lankester                                       | 3          |
| Wildlife disease investigation and control: case studies and biopolitics   | Dr Marc Artois   | 2          |
| Wildlife disease epidemiology: investigation of disease outbreaks and implementation of control measures: problem solving using examples followed by student presentations and discussion  | Dr Felix Lankester and Dr Marc Artois                    | 6          |
| <b>Coursework Planning</b>   |  |            |
| Introduction to the Scientific Review  | Professor Brian Catchpole                                | 1          |

### **Module 3: Health and Welfare of Captive Wild Animals**

Considering the enormous diversity of animal species, the management of healthy populations in captivity is an exacting challenge. In this module we gain a critical understanding of the principles of animal management and preventive medical approaches to maintain healthy populations and enhance their welfare.

|  |   |     |
|--|---|-----|
| Problem-based learning scenario: An African exhibit  | Multiple  | 8   |
| Management of invertebrates  | Mr Paul Pearce-Kelly  | 1   |
| <i>Discussion tour - Management of invertebrates</i>   | Mr Paul Pearce-Kelly  | 1   |
| Diversity in the anatomy and physiology of invertebrates   | Professor John E Cooper   | 1   |
| <i>Demonstration - Physical restraint, clinical examination and administration of medicines to invertebrates</i> | Professor John E Cooper, Mr David Clarke                        | 1   |
| Selecting amphibian species for <i>ex situ</i> management and managing amphibian in <i>ex situ</i> programmes    | Mr Ben Tapley and Dr Stephanie Jayson                           | 1   |
| <i>Management of amphibians: discussion tour</i>   | Mr Ben Tapley, Mr Joe Capon, Mr Daniel Kane Dr Stephanie Jayson | 1.5 |
| The management of reptiles   | Mr Ben Tapley and Dr Stephanie Jayson                           | 1   |
| <i>Discussion tour – Management of reptiles</i>  | Mr Ben Tapley, Mr Joe Capon, Mr Daniel Kane Dr Stephanie Jayson | 1.5 |
| UV monitoring  | Mr Christopher Michaels and Dr Stephanie Jayson                 | 1   |
| Management of Anseriformes   | Dr Nigel Jarrett  | 1   |
| Preventive medicine for captive collections of Anseriformes  | Dr Katie Beckmann   | 0.5 |
| Health management for avian conservation breeding/rearing programmes   | Dr Katie Beckmann   | 1   |
| Mycobacterium avium infections in wildfowl and other taxa  | Dr Ruth Cromie  | 2   |
| <i>Practical – Post-mortem examination of tuberculous wildfowl</i>   | Taiana Coster   | 1   |
| The aetiological agents of disease in captive wild animals   | Dr Nic Masters  | 1   |
| Management of raptors  | Dr Tom Dutton   | 1   |
| Preventive medicine for captive collections of raptors   | Dr Tom Dutton   | 1   |
| Therapeutics of birds (route of administration, supportive therapy, antibacterials, antifungals, parasiticides)  | Dr Tom Dutton   | 1   |
| Bumblefoot, arthritis and other musculoskeletal problems in birds  | Dr Tom Dutton   | 1   |
| <i>Discussion tour on the management of artiodactyls and perissodactyls</i>                                      | Mr Chris Smart  | 2   |
| The management and biology of deer   | Dr John Fletcher  | 2   |
| <i>Discussion tour at Woburn Park on the management and biology of deer</i>                                      | Dr John Fletcher  | 1   |

|   |                                  |          |
|---|----------------------------------|----------|
| Management, preventive medicine, therapeutics and physical and chemical restraint of camelids   | Dr Maurizio Dioli                | 1        |
| <i>Demonstration - Management, and physical and chemical restraint of camelids</i>  | Dr Maurizio Dioli                | 1        |
| Infectious and non-infectious diseases of Camelidae   | Dr Maurizio Dioli                | 1        |
| Management of carnivores  | Mr Graham Law                    | 2        |
| Management of primates  | Mr Neil Bemment                  | 2        |
| <i>Gorilla management discussion tour</i>   | Ms Tracey Lee                    | 1        |
| <i>Carnivore management discussion tour</i>   | Ms Tracey Lee                    | 1        |
| <b>Surgical skills technique</b>  | <b>Clinical Skills Centre</b>    | <b>1</b> |
| <i>Discussion tour and practical- Raptor restraint and management</i>   | Ms Jane Robertson and colleagues | 6        |
| <i>Practical – Handling, clinical examination and administration of medicines to raptors</i>  | Dr Tom Dutton                    | 2        |
| <i>Practical on pathological examinations of birds</i>  | Dr Jenny Jaffe                   | 3        |
| <b>Surgery of the reproductive tract of the iguana</b>  | Dr William Lewis                 | 1        |
| <i>Practical on surgery of the reproductive tract in the iguana</i>   | Dr William Lewis                 | 4        |
| <b>Dentistry</b>  |                                  |          |
| History, treatment, objectives and ethics of veterinary dental treatment of wild animals  | Mr Peter Kertesz                 | 1        |
| Dental and surgical equipment in veterinary dentistry - an overview - and, the principles of dental and oral surgical techniques relevant to veterinary dentistry | Mr Peter Kertesz                 | 1        |
| Elephant dental surgery video and discussion  | Mr Peter Kertesz                 | 1        |
| Dental disease in captive wild animals and its treatment - part I - developmental conditions  | Mr Peter Kertesz                 | 0.5      |
| Dental disease in captive wild animals and its treatment - part II - traumatic and degenerative conditions  | Mr Peter Kertesz                 | 1        |
| <b>Coursework Planning and Generic Teaching</b>   |                                  |          |
| Planning your Critical Review – Journal clubs   | Dr Michael Waters                | 3        |
| Introduction to Ethics and Animals  | Dr Martin Whiting                | 1        |
| Debate: Culling or Contraception?   | Dr Martin Whiting                | 2        |



### Module 4: Interventions

Where anthropogenic threats endanger free-living populations of animals, people increasingly see a need to intervene for the conservation or welfare of these populations. However, given the need to understand complex ecological systems and the potential stress of intervention methods, such activities require detailed planning, highly skilled input and scientific evaluation to ensure lessons are learned. Using real examples this module develops a conceptual understanding of intervention methods.

|   |                                 |          |
|---|---------------------------------|----------|
| Problem-based learning scenario: Translocations: Boas and orangutans  |                                 | 8        |
| Post-release survival of rehabilitated wildlife   | Mr Adam Grogan                  | 1        |
| Changes in host-parasite interactions associated with translocations  | Dr Tony Sainsbury               | 1        |
| Disease risk analysis, disease risk management and post-release health surveillance to assess and manage the disease risks of translocation                 | Dr Tony Sainsbury               | 2        |
| Resolving wildlife-human conflict   | Professor Rosie Woodroffe       | 1        |
| Viral infections of reptiles  | Dr Rachel Marschang             | 2.5      |
| Primate medicine  | Dr Steve Unwin                  | 2        |
| Retroviral infections in primates   | Professor Myra McClure          | 2        |
| Mycobacterial infections in primates  | Dr Sarah E Wolfensohn           | 1        |
| Shigellosis in primates   | Dr Sarah E Wolfensohn           | 1        |
| Legislation relevant to free-living and captive wildlife  | Mrs Margaret E Cooper           | 1        |
| Capture and translocation of African mammals  | Professor Richard Kock          | 1        |
| <i>Practical – Handling, clinical examination, and administration of medicines to marine mammals</i>  | Ms Alison Charles               | 3        |
| <i>Practical – Treatment of oil toxicosis in seabirds</i>   | Ms Alison Charles               | 1        |
| <b>Ophthalmic disease in wild birds</b>   | <b>Dr David Williams</b>        | <b>1</b> |
| <b><i>Practical - Ophthalmic assessment of wild birds prior to release</i></b>  | <b>Dr David Williams</b>        | <b>1</b> |
| Amphibian husbandry, veterinary procedures and interactive cases  | Dr Stephanie Jayson             | 1        |
| Physical restraint and administration of medicines to reptiles  | Mr Matthew Rendle               | 1.5      |
| Reptilian therapeutics  | Professor Stephen Divers        | 1        |
| Hepatic and renal diseases in reptiles  | Professor Stephen Divers        | 1        |
| Chemical restraint and surgical anaesthesia of reptiles (administration, suitable agents, pre-operative management, monitoring of anaesthetic and recovery) | Professor Stephen Divers        | 1        |
| <b>Aspects of reptile surgery</b>   | <b>Professor Stephen Divers</b> | <b>1</b> |
| <b>Reptilian endoscopy</b>  | <b>Professor Stephen Divers</b> | <b>1</b> |
| <b>Reptilian endoscopy videos</b>   | <b>Professor Stephen Divers</b> | <b>1</b> |

|   |                                      |   |
|---|--------------------------------------|---|
| Reptilian radiology   | Professor Stephen Divers             | 1 |
| <i>Amphibian and reptilian field techniques – Site visit (to take place in May)</i> | Mr Gary Powell                       | 3 |
| <b>Coursework Planning and Generic Teaching</b>                                     |                                      |   |
| <b>Examination planning</b>   |                                      |   |
| Preparing for your examination  | Dr Michael Waters, Dr Tony Sainsbury | 1 |
| Preparing and giving scientific talks   | Dr Kim Whittlestone                  | 6 |

## Diploma in Wild Animal Biology / Wild Animal Health

### **Learning objectives**

A graduate of the **Diploma** in Wild Animal Health/Biology must demonstrate (in addition to the achievements of the PG Certificate):

- A critical awareness of methods to detect disease, disease surveillance systems and the effects of emerging diseases on captive and free living wild animal health
- A conceptual and practical understanding of the diagnosis, management (WAB), investigation (pathology), treatment (WAH only) and control of disease in captive and free-living wild animal populations
- a comprehensive insight into the interdependence of human, domestic animal and ecosystem health
- a creative approach to the evaluation of the health, welfare and reproduction of captive and free-living wild animals

### **Module 5: Detection, Surveillance and Emerging Diseases**

Morbidity and mortality in free-living populations of wild animals are difficult to detect and monitor given their natural absorption into the ecosystem. Complex methods are required to detect and monitor changes in endemic diseases and to detect emergent diseases, and interpret the findings in a scientific manner.

|   |                                    |     |
|---|------------------------------------|-----|
| Problem-based Learning Scenario: Seals and amphibians   |                                    | 8   |
| Wildlife disease surveillance programmes  | Dr Tony Sainsbury                  | 2   |
| Introduction to epidemiology – diagnostic testing   | Dr Jackie Cardwell                 | 3   |
| Military sonar and bubble-gas syndrome in cetaceans   | Dr Paul Jepson                     | 0.5 |
| Anthropogenic impacts on the health of cetaceans, sharks and turtles: bycatch; ship-strike; bottlenose attack (and infanticide); grey seal predation and chemical and noise pollution | Dr Paul Jepson                     | 2   |
| Pathology of phocine distemper virus infection in marine mammals  | Dr Paul Jepson                     | 1   |
| Introduction to molecular biology   | Dr Robert Noad                     | 3   |
| Introduction to immunology  | Professor Brian Catchpole          | 3   |
| Infectious diseases of amphibians   | Professor Andrew Cunningham        | 2   |
| Emerging infectious disease of birds in the UK  | Dr Becki Lawson                    | 2   |
| Parasites, environment and amphibian declines   | Professor Trent Garner             | 2   |
| The invasion of squirrelpox virus and apparent competition between squirrels  | Dr Tony Sainsbury                  | 1   |
| Geographical information systems as a tool in epidemiological assessment and wildlife disease management  | Dr Kim Stevens                     | 3   |
| Chemical restraint and surgical anaesthesia of marine mammals   | Dr John Lewis                      | 1   |
| Chemical restraint and surgical anaesthesia of carnivores   | Dr John Lewis                      | 1   |
| <b>Management of Stranded Cetaceans</b>   |                                    |     |
| Introduction to the biology and ecology of cetaceans  | Mr Stephen Marsh                   | 1   |
| Veterinary management of cetacean strandings  | Dr James Barnett                   | 1   |
| <i>Practical - management and veterinary care of cetacean strandings</i>  | Dr James Barnett, Mr Stephen Marsh | 2   |
| <b>Communication skills</b>   |                                    |     |
| Preparing and giving scientific talks   | Dr Kim Whittlestone                | 6   |

## **Module 6: Ecosystem Health**

In this module we examine the impact of anthropogenic stressors on the ecosystem and how ecosystem health can be measured, with a focus on harvesting of ecosystem resources and sustainable utilisation. We develop our understanding through examples and specifically examine the influence of human behaviour on our interpretation of the scientific evidence and, consequently, policy changes. The module concludes with a series of case studies in ecosystem health, in which there is interplay between the health of domestic animals, humans and wildlife, including bovine tuberculosis, zoonotic viral infections and myiasis.

|   |  |                   |
|---|--|-------------------|
| Problem-based Learning Scenario: Rio Grande and Amazon  | Multiple                                 | 8                 |
| Introduction to ecosystem health  | Dr Tony Sainsbury                        | 1                 |
| Energy flow through ecosystems, ecosystem services, and biodiversity and ecosystem function   | Dr Peter Lurz                            | 2                 |
| Sustainable utilisation   | Professor Richard Kock                   | 1                 |
| Ecosystem effects of fishing  | Dr Kirsty Kemp                           | 2                 |
| The Importance of Tropical Coastal Ecosystems   | Dr David Curnick                         | 1                 |
| Human attitudes and beliefs and conservation  | Ms Sarah Thomas                          | 1                 |
| An introduction to the history of bovine tuberculosis globally  | Dr Angela Cassidy                        | 1                 |
| Badgers, cattle, Mycobacterium bovis and ecosystem health   | Professor Rosie Woodroffe                | 1                 |
| The effect of human behaviour and attitudes on policy relating to the health of free-living wild animals – an example from badgers and tuberculosis | Dr Angela Cassidy                        | 1                 |
| The epidemiology and management of bovine tuberculosis in mammals   | Professor Rosie Woodroffe                | 2                 |
| Tick-transmitted virus infections of wild animals   | Professor Patricia Nuttall               | 1                 |
| Influenza in wild birds: from low to high pathogenic  | Professor Thijs Kuiken                   | 1                 |
| Influenza in mammals: crossing the species barrier  | Professor Thijs Kuiken                   | 1                 |
| Myiasis in wild animals   | Dr Martin Hall                           | 1                 |
| Parasite identification techniques at the NHM   | Dr Martin Hall                           | 1                 |
| The risk to wildlife from anticoagulant rodenticides - assessing exposure and effects   | Professor Richard Shore                  | 2                 |
| Algal and cyanobacterial toxins and wildlife disease  | Professor Geoffrey Codd                  | 2                 |
| Forensic pathology  | Dr Harriet Brookes                       | 1                 |
| Signs of disease in fish  | Dr Sue Thornton                          | 2                 |
| Anaesthesia, euthanasia and post-mortem examination of fish   | Dr William Wildgoose                     | 1.5               |
| <i>Anaesthesia, euthanasia and post-mortem examination of fish practical</i>  | Dr William Wildgoose                     | 1.5               |
| Anthropogenic impacts on migratory fish populations   | Dr Adam Piper                            | 1                 |
| <a href="#">Attachment, analysis and conservation implications of remote tracking</a>   | <a href="#">Professor Robert Kenward</a> | <a href="#">2</a> |
| <a href="#">Remote monitoring and tracking of wild animals</a>  | <a href="#">Dr Malcolm Nicoll</a>        | <a href="#">3</a> |

|  |                        |   |
|--|------------------------|---|
| <i>Practical - Diagnostic laparoscopy and surgical sexing of birds</i> | Professor Romain Pizzi | 2 |
|--|------------------------|---|

| <b>Module 7: Evaluation of the Health and Welfare of Captive Wild Animals</b>  |                            |     |
|--|----------------------------|-----|
| In the Certificate we gained a critical understanding of the management and preventive medical care required to maintain healthy populations. In this Module we investigate the scientific evaluation of wild animal welfare and critically analyse the relationship between health and firstly reproduction, and secondly, nutrition. |                            |     |
| Problem-based Learning Scenario: Successful artificial insemination in an Asian elephant   | Multiple                   | 8   |
| Principles of animal welfare   | Dr Charlotte Burn          | 1   |
| Welfare assessment: choice of lectures: either HPA axis or stereotypic behaviour   | Dr Charlotte Burn          | 1   |
| Welfare of wild animals: choice of lectures: either the welfare implications of controlling pest rodents or the welfare implications of keeping elephants in zoos  | Dr Charlotte Burn          | 1   |
| Discussion tour on elephant management at Woburn   | Mr Mike Thomson            | 2   |
| Reproductive studies and conservation  | Professor Bill Holt        | 2   |
| Control and monitoring of reproduction in wild animals   | Dr Thomas Hildebrandt      | 2   |
| The management of elephants in Asia  | Dr Khyne Mar               | 1   |
| Reproductive management of zoo and wild animals  | Dr Yedra Feltrer           | 1.5 |
| Management, preventive medicine and therapeutics of elephants  | Dr Fieke Molenaar          | 2   |
| <i>Demonstration - Handling, clinical examination, therapeutics and preventive medicine of elephants</i>   | Dr Fieke Molenaar          | 1   |
| Preventive medicine and therapeutics for artiodactyls and perissodactyls (administration, supportive therapy, antibacterials, parasiticides and parasite control programmes)   | Dr Nic Masters             | 2   |
| Energy and nutrient requirements including the effects of allometry, scaling, core body temperature and patterns of growth   | Dr Marcus Clauss           | 1   |
| Reptile nutrition and nutritional diseases   | Professor Jean-Michel Hatt | 1   |
| Reptile dermatology  | Professor Jean-Michel Hatt | 1   |
| Reptile gastro-intestinal diseases   | Professor Jean-Michel Hatt | 1   |
| Rational use of medicines in reptiles  | Professor Jean-Michel Hatt | 1   |
| Zoo animal nutrition including iron storage disease  | Dr Marcus Clauss           | 1   |
| Comparative digestive anatomy and physiology of herbivores   | Dr Marcus Clauss           | 1.5 |
| <i>Practical – Comparative digestive anatomy and physiology of herbivores</i>  | Dr Marcus Clauss           | 1.5 |
| The investigation and control of gastrointestinal parasitism of zoo ungulates  | Dr Edmund Flach            | 1   |
| Field parasitological techniques   | Professor Mark Fox         | 1   |
| <i>Practical – Field parasitological techniques</i>  | Professor Mark Fox         | 2   |

|  |                        |   |
|--|------------------------|---|
| Chemical restraint and surgical anaesthesia of rhinos and elephants  | Professor Richard Kock | 1 |
| Physical and chemical restraint and surgical anaesthesia of artiodactyls and capture myopathy in ungulates | Dr Fieke Molenaar      | 2 |
| <b>Pharmacology and Scaling</b>  |                        |   |
| Pharmacological aspects of allometry, scaling, and core body temperature                                   | Dr Kathryn Gamble      | 1 |
| Anatomical and physiological influences on pharmacodynamics and pharmacokinetics in wild animals           | Dr Kathryn Gamble      | 1 |
| Investigating the pharmacokinetics of therapeutic agents in wild animals                                   | Dr Kathryn Gamble      | 1 |

|  |  |        |
|--|--|--------|
| <b>Module 8: Practical Module</b>  |  |        |
| Our ability to effectively maintain healthy captive populations of wild animals, and monitor and intervene in the health of free-living populations requires a complex set of skills covered in detail in this Module. |  |        |
| <b>Pathology</b>   |  |        |
| <i>Pathological investigations rotation groups</i>   | Dr Edmund Flach, Dr Paul Jepson, Dr Tony Sainsbury, Mr Rob Deaville, Mr Matthew Perkins, Dr Becki Lawson, Dr Jenny Jaffe, Dr Katharina-Seilern-Moy | 30     |
| Clinical pathology rotation  | Dr Michael Waters  | 3      |
| <b>Zoo Animal Management</b>   |  |        |
| <i>Zoo Animal Management Rotation Groups</i>   | Curators, Team Leaders and Keepers   | 80 max |
| <i>Zoo Animal Management rounds</i>  | Curators, Team Leaders and Keepers   | 25     |
| <b>Wild Animal Conservation and Management</b>   |  |        |
| <i>Selected Conservation Management Rotations</i>  | Mr Shaun Marriott, Dr Richard Bullock, Mr Bill Haines, Ms Helen Harvey, Ms Anna Cucknell   | 80 max |
| <b>Clinical Rotations</b>  |  |        |
| <i>Clinical rotations at Regent's Park and Whipsnade</i>   | Dr Nic Masters, Dr Amanda Guthrie, Dr Taina Strike, Dr Fieke Molenaar  | 90     |
| <i>Clinical rounds</i>   | Dr Nic Masters, Dr Amanda Guthrie, Dr Taina Strike   | 25     |
| <b>Examination Planning</b>  |  |        |
| Preparing for your examination   | Dr Michael Waters, Dr Tony Sainsbury   | 1      |

### Master of Science in Wild Animal Biology / Wild Animal Health

A graduate of the **Master of Science** in Wild Animal Health/Biology must demonstrate (in addition to the achievements of the PG Certificate and Diploma):

- A comprehensive understanding of research and inquiry including (i) critical appraisal of the literature, (ii) scientific writing and (iii) scientific presentation
- The ability to design and analyse hypothesis-driven laboratory and/or field studies

| <b>Module 9: Research Project</b>   |                                 |    |
|---|---------------------------------|----|
| <b>Assessment Planning</b>  |                                 |    |
| Scientific reading  | Dr Christine Thuranira-McKeever | 2  |
| Scientific writing  | Professor Adrian Boswood        | 2  |
| Evidence-based medicine   | Dr David Brodbelt               | 2  |
| Producing and presenting a poster   | Dr Felicity D’Mello             | 1  |
| Introduction to the Case Report   | Professor Ken Smith             | 1  |
| Introduction to the Management Case Report                                | Dr Tony Sainsbury               | 1  |
| <b>Research Planning</b>  |                                 |    |
| Data Collection and Analysis  | Dr Ruby Chang                   | 12 |
| Research planning, project preparation and grant writing                  | Dr Clive Bate                   | 2  |
| Developing ideas for research projects at ZSL                             | Dr Tony Sainsbury               | 1  |
| Addressing health and safety requirements for research projects           | Ms Amber Dyson                  | 1  |
| Designing a behavioural research project                                  | Mr Paul Rose                    | 2  |
| What’s the point of ethical review for research?                          | Dr Martin Whiting               | 1  |
| Effective interactions with the media in wildlife health and conservation | Mr Tom Jennings                 | 1  |
| <b>Tutorials</b>  |                                 |    |
| Tutorial 3 planning your research project                                 | Multiple                        | 1  |
| Tutorial 4 – Discussion: how to write a grant application                 | Multiple                        | 1  |
| Tutorial 5 – Planning for a Career in Wild Animal Biology / Health        | Multiple                        | 1  |