

Advance

SHARING SKILLS AND KNOWLEDGE



Medical
Research
Council

Course Brochure 2021



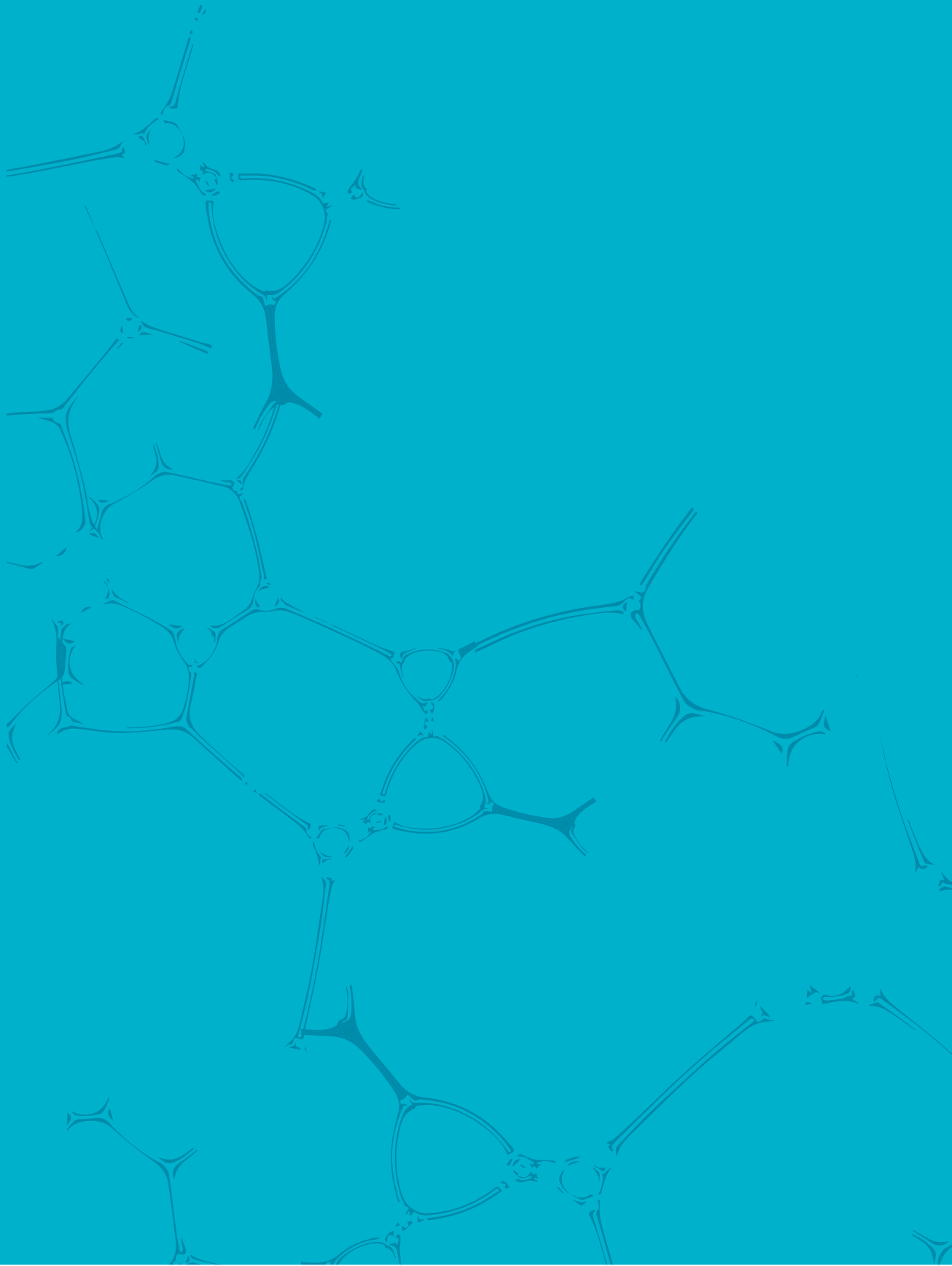


Table of Contents

What is Advance?.....4

Welcome.....5

Our Courses

Genetics.....6

Introduction to Genetically Altered Mice7

Advanced Mouse Genetics8

Conditional Transgenics9

DNA to Disease: Genetics for Beginners10

Transgenic Technologies.....12

Mouse Embryo and Sperm Cryopreservation13

1 and 2-Cell Cytoplasmic Microinjection14

Pathology16

Histopathology Training Week17

Where to find us.....18

How do I book a course?.....19



Opening Offer

All of the course prices here are offered at a special introductory rate. Places are limited so have a browse and get in touch to book your place!

What is Advance?

Advance is a state-of-the-art scientific training centre dedicated to training and skills transfer within the life sciences. Located at MRC Harwell, Advance offers a mixture of practical and theoretical courses in laboratory animal science and genetics to the research community worldwide.

The centre is purpose built to deliver high-quality scientific training. The centre brings together some of the country's experts in laboratory animal science to provide engaging training courses in mouse genetics, genome editing, pathology and laboratory skills. Our goal is to address the vital need to develop skills in life sciences by expanding training and education opportunities for researchers and technicians. We aim to deliver quality training courses that develop the expertise that scientists can offer in a competitive global research industry, whilst maintaining a strong emphasis on animal welfare.

As a wide-reaching knowledge and research base, we aim to develop links with external training providers, including academic organisations, societies and commercial companies, to support, collaborate and produce bespoke training courses. Advance also offers unique facilities, including laboratory space equipped to support *in vivo* techniques alongside seminar rooms and modern meeting spaces for workshops and training courses.



Welcome

We are delighted to be opening the doors to the new Advance training centre on the Harwell Science Campus in Oxfordshire. MRC Harwell has a rich history in genetic research and in training the next generation of scientists and technicians, so establishing a centre dedicated to developing skills and providing high-quality training is the natural next step in our journey.

From the early planning stages, it was essential for us that Advance would focus strongly on practical training, supported by classroom-led teaching and engaging interactive workshops. Incorporated into the design of the building are two fully equipped laboratories that provide the ideal environment for hands-on collaborative learning. Our highly experienced trainers aim to provide specialised and comprehensive training in all aspects of laboratory science as well as specialist training in mouse genetics.

The Advance centre is particularly keen to forge new partnerships with other organisations, both on campus and further afield, who may wish to use the facilities and resources we have on offer for their own training or educational purposes. It is an exciting time for the Mary Lyon Centre at MRC Harwell and Advance will be an integral part in developing a cooperative and dynamic future.

Sara Wells

*Director of the Mary Lyon Centre
at MRC Harwell*



Genetics

Genetically altered mice remain one of the most commonly used animals in biomedical research and disease. As technology and science advance so does the complexity of animal models for genetic research. Understanding the background of mouse genetics, including allele crosses and the development of breeding strategies, is vital to advance medical research through the use of *in vivo* models.

Our genetics courses provide complete training, from an introduction to DNA and disease, through to an understanding of more advanced mouse genetics. Each course is designed to develop the knowledge and skills required by researchers and technicians to maintain high levels of expertise in this rapidly changing field.

Our genetics training includes the following courses:

- Introduction to Genetically Altered Mice - **2 day course**
- Advanced Mouse Genetics - **2 day course**
- Conditional Transgenics - **2 day course**
- DNA to Disease: Genetics for Beginners - **1 day course**



● Introduction to Genetically Altered Mice



**Monday 13th–Tuesday 14th September, 2021
or Monday 15th–Tuesday 16th November, 2021**



£500

Who is this for?

- Animal Technicians
- Early Career Researchers
- PhD Students

This course introduces animal technicians and researchers to the background of mouse genetics and will cover topics such as Mendelian gene inheritance and genetic crosses, as well as aspects of more complex genetics intended to inform breeding strategies in establishing new genetically altered lines.

After the course, you will be able to:

- Understand Mendelian gene inheritance
- Predict the outcomes of genetic crosses
- Have a working knowledge of the genetic background of mouse strains
- Understand how to maintain the genetic integrity of inbred lines
- Plan breeding schemes with consideration of the minimum number of animals required

- Perform multiple allele inheritance calculations
- Understand how genetically altered lines can be established from modern transgenic technologies



● Advanced Mouse Genetics



Monday 20th–Tuesday 21st September, 2021
or Monday 22nd– Tuesday 23rd November, 2021



£500

Who is this for?

- Senior Animal Technicians
- Colony Managers
- Researchers

This course explores more complex genetic topics, including multiple allele crosses and will inform breeding strategies and experimental design rather than give a complete guide to the molecular biology. Our team of experienced trainers will support you to examine how to plan breeding schemes, as well as how to identify appropriate controls and analyse recombinase (Cre) expression.

After the course, you will be able to:

- Predict the outcomes of genetic crosses
- Understand the fundamentals of mouse genetic engineering
- Have a working knowledge of the different genetic backgrounds of mouse strains
- Understand how to maintain the genetic integrity of inbred lines
- Perform multiple allele inheritance calculations
- Understand how genetically altered lines can be established from modern transgenic technologies
- Understand the basic principles of conditional mutagenesis
- Understand how to set up breeding programmes for conditional mutagenesis, including the choice of appropriate control cohorts





Conditional Transgenics



Monday 8th–Tuesday 9th November, 2021



£600

Who is this for?

- Animal Facility Managers
- Researchers with a previous knowledge of advanced mouse genetics

Transgenic mice are an important resource to understand gene function, regulation and expression. This course is designed to introduce the principles behind conditional genetic modifications, experimental design and analysis.

After the course you will be able to:

- Understand the basic principles of conditional mutagenesis
- Identify the advantages and challenges of these systems
- Plan for restricting the expression of a transgene
- Analyse recombinase (Cre) expression



● DNA to Disease: Genetics for Beginners



Monday 6th September, 2021
or Monday 8th November, 2021



£250

Who is this for?

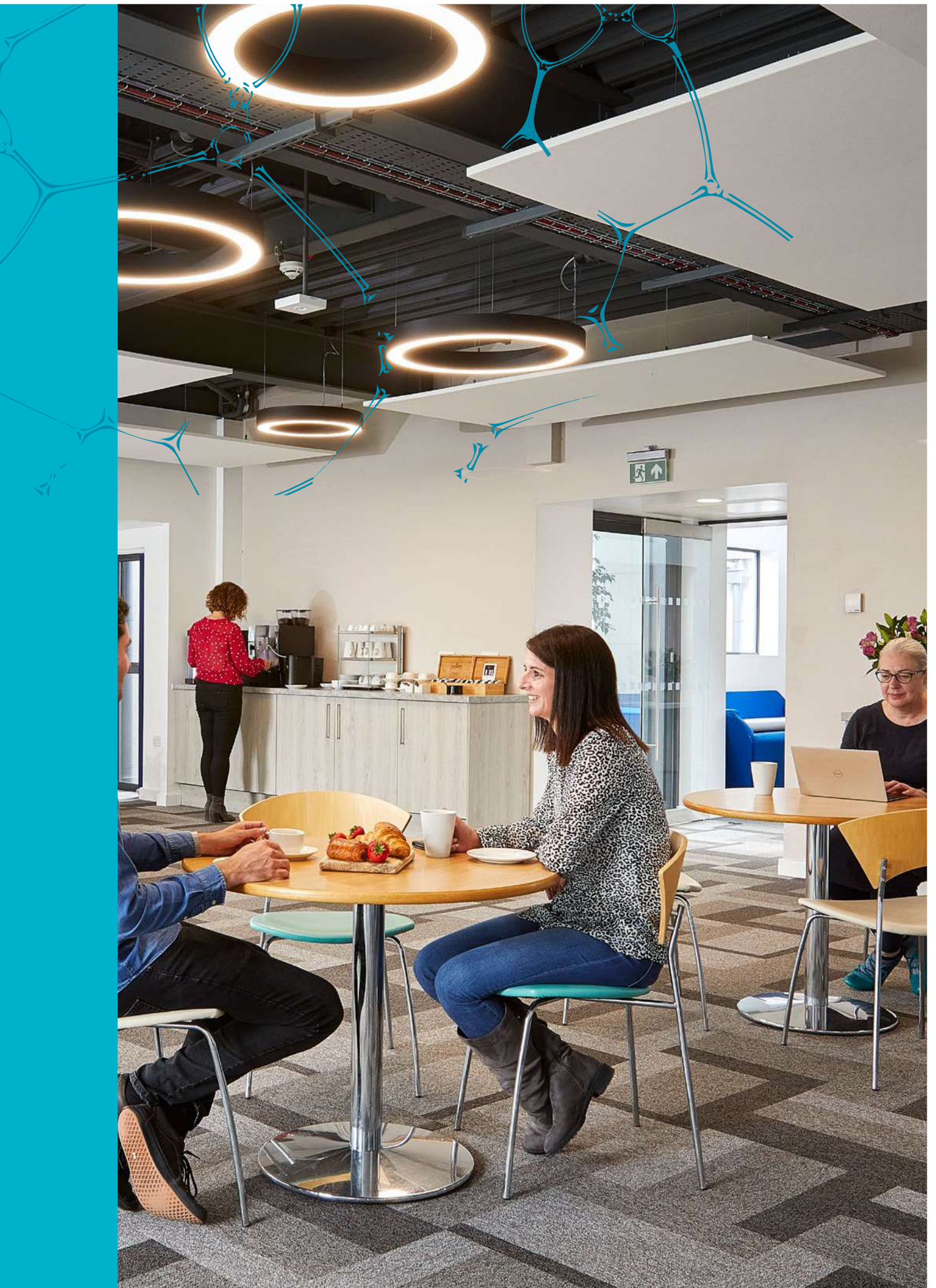
- Animal Technicians
- Technical Staff
- Those who are new to genetics

What is a gene? What is DNA? How do these make proteins? What goes wrong and causes disease in the human body? This course provides a comprehensive introduction into genetics, covering the genetic code and how this leads to protein formation, as well as how errors in DNA can lead to disease.

After this course, you will be able to:

- Understand the concept of DNA and how genetic traits are inherited from one generation to the next
- Understand what genes are and how they code for different proteins
- Understand the role of different proteins in making different cell types
- Understand some of the processes by which genetic disease can occur





Transgenic Technologies

Over the last decade, the use of nucleases and more recently the highly efficient CRISPR-Cas9, has allowed for the direct targeting of embryos and the rapid production of genetically altered (GA) mice, an essential tool in biomedical research.

With a range of techniques available for introducing CRISPR-Cas9 into the developing embryo, in addition to the use of cryopreservation to securely archive scientifically relevant mouse models, our Advance courses offer researchers the opportunity to develop their knowledge of genome editing and the importance of mouse strain preservation and protection.

All Advance transgenic technology courses, led by experts in the field, are designed to teach and develop the necessary skills to keep up with current techniques when producing and archiving GA mouse lines.

Our transgenic technology training includes the following courses:

- Mouse Embryo and Spermatozoa Cryopreservation
- CRISPR Designs and Embryo Electroporation
- 1 and 2-Cell Cytoplasmic Microinjection



● Mouse Embryo and Sperm Cryopreservation



Monday 18th–Thursday 21st October, 2021



£1,400

Who is this for?

- Researchers
- Senior Animal Technicians
- PhD Students

Cryopreservation allows long-term storage of embryos and sperm, providing a convenient way to preserve, protect and transport mouse strains used in biomedical research. Archiving scientifically relevant mouse lines also adheres to good animal welfare practices by removing the need for continued animal breeding and is integral to any comprehensive colony management programme.

Running bi-annually since 2004, this course provides practical experience in murine embryo and spermatozoa freezing techniques routinely used at MRC Harwell and a simple, robust *in vitro* fertilisation procedure. The course will also cover the basic laboratory skills required when working in an assisted reproductive biology environment such as pipetting, weighing, microscope use and embryo handling.

Following this course, you will have:

- Practical experience of sperm harvesting and freezing/thawing
- A clear understanding of how

to set up an *in vitro* fertilisation session using both frozen and freshly harvested sperm

- Practical experience of oocyte and embryo harvesting for *in vitro* fertilisation and embryo freezing, respectively
- Practical experience of embryo cryopreservation/thawing using a simple vitrification method
- An understanding of surgical embryo transfer, including some practical experience of pre-operative aseptic techniques and sub-cuticular suturing
- Practical experience of non-surgical embryo transfer techniques
- An understanding of the current methods used for handling and shipping samples and managing a cryo-archive, as well as an overview of blastocyst genotyping



● 1 and 2-Cell Cytoplasmic Microinjection



Tuesday 5th–Thursday 7th October, 2021



£1,100

Who is this for?

- Researchers
- Senior Animal Technicians
- PhD Students

The Advance microinjection course provides one-to-one tailored and hands-on training in embryo harvesting, sorting, set up and operation of microinjection rigs, as well as introducing CRISPR-Cas9 reagents to embryos using the cytoplasmic microinjection technique.

In addition, this course offers a demonstration of surgical embryo transfer, and the opportunity to meet and discuss your specific requirements with experts in IVF technology, CRISPR-Cas9 design and mouse colony management.

Following this course, you will have:

- Experience harvesting 1-cell and 2-cell embryos
- Experience sorting fertile 1-cell and 2-cell embryos
- Practical training in cytoplasmic injection of CRISPR-Cas9 reagent into the embryo (1-cell and 2-cell embryos)
- Practical training in general laboratory techniques frequently used in a micro-injection laboratory
- An understanding of the principles of colony management, IVF and cryopreservation





Pathology

Research pathology plays an important role in identifying and analysing disease phenotypes. This discipline involves a range of techniques including *in vitro* analysis of blood and urine as well as evaluation of tissue sections to study disease processes.

Our specialised combined pathology course provides comprehensive training to develop the necessary skills to ensure that standardised and reproducible techniques are used to obtain pathology data. Appropriate use of pathology techniques will allow researchers to identify spontaneous and induced pathological changes, evidence of disease progression and the effect of experimental interventions.



● Histopathology Training Week



Monday 18th–Friday 22nd October, 2021



£1,500

Who is this for?

- Technical Staff
- Researchers
- Students
- Medical or Veterinary Pathology Trainees

This combined week-long training course will provide and incorporate introductory practical training in histology, microscopy and pathology based procedures.

Day 1

Basics of Histology introduces a range of histological procedures, the reasoning behind the use of histology in research and the importance of using various techniques in processing, sectioning and staining of mouse tissues.

Day 2

Practical Microscopy delves into the accurate use of microscopes which is important for any researcher; using a microscope correctly prevents eyestrain, saves time and avoids the presence of artefacts in the final image.

Day 3

Recognising Tissues and Artefacts in Histological Sections is aimed at those wishing to learn how to recognise and evaluate normal mouse tissue and to identify common

artefacts in hematoxylin and eosin stained histological sections.

Day 4 & 5

Pathology in the Mouse covers a theoretical and practical introduction to mouse pathology common in particular genetic backgrounds. This final section of the training week aims to demonstrate how spontaneous and induced pathology can be distinguished and how pathology data can be recorded.

This course is designed as a cohesive and comprehensive week-long training experience and trainees are expected to attend the full syllabus. If you are interested in specific parts of the course please contact us at training@har.mrc.ac.uk to discuss your needs in more detail.



Where to find us



Advance at MRC Harwell
Harwell Campus
Oxfordshire
OX11 0RD
UK

How do I book a course?

Book online or get in touch with the Advance team via one of the contact points below to find the course that's right for you.



www.har.mrc.ac.uk/training



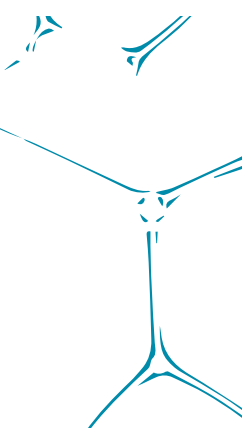
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