QGGA MSc/Diploma

EXAMPLE of PROGRAMME for SEMESTER 2

(taken from the 2010-11 course handbook)

Three Compulsory Courses

Genome Analysis (PGBI11004)
QTL Detection & Genome Analysis(PGBI11036)
Mini Research Project (PGBI11007)

Two Optional Courses

***Either** Bioinformatics (PYBM10021)*
***Or** Molecular Phylogenetics (PGBI11035)*

And ONE of the following Block 4Courses

Evolutionary Genetics(PGBI11008)
Human Genetics(PGBI11009)
Principles of Genetic Improvement(PGBI11010)

SEMESTER 2 PROGRAMME

BLOCK 3 : THREE COMPULSORY COURSES

Genome Analysis (Course code PGBI11004) 20 credits
(Semester 2 Weeks 1 – 6)

The genome analysis course focuses on the principles of genome analysis and the application to data from human, animal and plant populations. The course introduces genomic technologies for trait dissection, applications in population biology and linkage and association analyses for mapping trait loci.

The topics are covered in lectures, tutorials, group discussions of key scientific papers and computer practicals. Students are also expected to attend relevant graduate-level seminars and genetics journal clubs.

Assessment: 1x2h closed book written examination and 1x2h supervised assignment (open-book exam)

QTL Detection and Genome Analysis (Course code PGBI11036) 10 credits
(Semester 2 Weeks 1 – 6)

This course applies and consolidates the theory of genome analysis technologies, including Quantitative Trait Loci (QTL) analysis, covered in the lectures and tutorials in PGBI11004, which runs concurrently. Through computer tutorials and practical exercises considerable hands-on experience is gained in using a wide variety of the current software packages required for genetic data analysis.

Assessment: In-course assignments to be completed in student's own time

Mini Research Project (Course code PGBI11007) 10 credits
(Semester 2 Weeks 1 - 11)

During semester 2, all students are required to carry out a short research project which aims to consolidate taught genetics theory and develop analytical and computer skills, and also provide an introduction to independent research as required for the dissertation stage. Projects involve the statistical analysis and interpretation of data that can come from animal, plant or human populations. Data from theoretical populations may also be utilised. Mini-projects will not require 'wet lab' work to generate new data. Students may suggest their own topic to the programme organisers for approval or select from a range of topics reflecting the subjects studied. All projects are individually supervised and students have to submit their findings in a written report and also give a short oral presentation in Week 11. As preparation for the latter, a one-day generic skills course in *'Effective Presentations'* will be arranged.

Assessment: Written project report and oral presentation to provide feedback to student.

PLUS ONE OF THE FOLLOWING TWO COURSES

Bioinformatics (Course code INFR11005) 10 credits
(Semester 2 Weeks 1-11)

The course consists of parts of the MSc in Informatics degree programme and covers basic principles of computational biology together with the range and impact of Bioinformatics tools used in biological sciences. The syllabus includes: Introduction & biological databases; pairwise sequence alignment; sequence databases and multiple alignment profiles; gene finding, genomics and proteomics; and functional genomics. Lectures are supplemented by on-line exercises and tutorials and in-course assignments.

Lecture times: 1 lecture per week

Assessment: One in-course assignment to be completed in student's own time and one written exam

Molecular Phylogenetics (Course code PGBI11035) 10 credits
(Semester 2 Weeks 1 – 5)

Prerequisite course for PGBI11008 Evolutionary Genetics

This course introduces modern molecular phylogenetics in the general context of evolutionary genetic analysis. It will discuss problems and opportunities associated with molecular phylogenetics, different evolutionary models for nucleotide sequence data, and phylogeny reconstruction by a range of approaches. The use of phylogenetic approaches in evolutionary genetics studies will be discussed.

Teaching: 2 lectures & computer practicals per week

Assessment: In-course assignment

IMPORTANT:

Students who plan to take the 'Evolutionary Genetics' course in Block 4 MUST take 'Molecular Phylogenetics' in Block 3.

Students selecting 'Human Genetics' or 'Principles of Genetic Improvement' in Block 4 may take either 'Bioinformatics' or 'Molecular Phylogenetics'.

BLOCK 4 ONE of the following OPTIONS

Evolutionary Genetics (Course code PGBI11008) 20 credits
(Semester 2 Weeks 7 – 10) Full Time

(Prerequisite course in Block 3: PGBI11035 Prohibited courses PGBI11009 and PGBI11010)

This specialist course builds on lectures in evolutionary genetics in PGBI11001 and examines the use of quantitative and population genetics methods to study the evolution of natural populations. The syllabus includes:

1st Week (21 – 25 February) Evolutionary genetics

2nd Week (28 February – 4 March) Evolutionary genetics of bacteria

3rd Week (7 – 11 March) Evolutionary genetics of wild animal populations

4th Week (14 – 18 March) Evolutionary genetics of viruses

The course consists of lectures, discussions of key papers, computer-based data analysis sessions in week 3 and guest seminars by senior researchers in evolutionary genetics.

Assessment: 1 x 1.5h written exam (50%) and in-course assignments (50%)

Human Genetics (Course Code PGBI11009) 20 credits
(Semester 2 Weeks 7 – 10) Full Time

(Prohibited courses PGBI11008 and PGBI11010)

The aim of this specialist course is to apply population and quantitative trait analysis theory to problems in human genetics, focusing on the particular pedigree structure of human populations and the genetics of disease traits. It covers a range of topics including: methods of genetic analysis of human populations, analysis of single gene and complex disorders, positional cloning, genetic databases, animal models of human disease, clinical and forensic applications. Subject material will reflect the current research interests of staff in the Medical genetics Section at the Molecular Medicine Centre (UoE) and the MRC Human Genetics Unit, Edinburgh. Teaching is primarily through lectures, research seminars and scientific paper discussions led by academics and senior researchers in the field of human genetics.

Assessment: 2 x 1.5h written exam (70%) and in-course assignments (30%)

Principles of Genetic Improvement (Course Code PGBI11010) 20 credits
(Semester 2 Weeks 7 – 10) Full Time

(Prohibited courses PGBI11008 and PGBI11009)

The aim of this specialist course is to understand the principles involved in genetic improvement of livestock through artificial selection programmes. The subjects covered include: genetic improvement of livestock; breeding objectives and selection; breeding value prediction; single and multi-trait improvement; breed structure and breeding programmes in different species; genetic conservation. Teaching is through lectures, tutorials, scientific paper discussions and computer practicals led by senior academics and researchers in the field of animal breeding and conservation.

Assessment: 2 x 1.5h written exam (70%) and in-course assignments (30%)