Behavioural Genetics

Objectives
This course will provide a systematic introduction to behavioural genetics. Conceptual, historical, theoretical and ethical issues will be discussed alongside developments in specific fields (e.g. behavioural genetics and psychopathology). The course will cover the methodology used in contemporary Quantitative Genetics, including Twin Studies, Adoption Studies, Adoption at Conception/IVF designs, and the latest addition to the Quantitative genetics tool box – the GCTA analysis. The course will also introduce students to research questions and methods in contemporary Molecular Genetics, extending to Behavioural Genomics. The aim of the course is not to train molecular geneticists, but rather to provide enough background and training in this field to engage in successful interdisciplinary collaborations with geneticists and molecular biologists, as well as to be able to conduct behavioural genomic investigations.

Outline Syllabus
The course will promote an understanding of the current state of affairs with regards to behavioural genetics. Basic principles as well as recent developments will be explored in relation to a broad range of phenotypes. Historical and ethical issues will be discussed. The structure and function of DNA will be studied in the context of investigations into individual variation in psychological traits. Students will be introduced to behavioural genomic analysis, such as investigating gene-environment interaction, testing educational interventions, and testing the generalist genes hypotheses - using information on measured genes and measured environments. The course also covers ethical and legal considerations of genetic research. Additionally, an important part of scientific research is the dissemination of ideas and the open discussion of empirical findings. Research into the interplay between genes, psychology and education is relatively new and easily misunderstood. Thus, the sharing of scientific information and ideas with experts, the scientific community in general and the wider public is critical. This module facilitates cross-cultural exchange, research dissemination, and public engagement activities.

Intended Learning Outcomes:
On successful completion of this module, students should be able to:
1. Describe the techniques used in Quantitative genetic research
2. Describe the techniques used in Molecular genetic research
3. Describe the theoretical foundations of current molecular genetic research
4. Critically evaluate Quantitative genetic techniques
5. Critically discuss the strengths and limitations of linkage and association methods
6. Critically assess the logic of whole genome association approaches
7. Critically evaluate the state of affairs in the current quest for molecular underpinnings of individual variation in psychological and neurophysiological traits.
8. Describe step-by-step methodology of molecular analyses and the relevant technology
9. Summarise and draw conclusions from quantitative and molecular genetic reports.
10. Demonstrate significant insight into the structure and function of DNA
11. Integrate knowledge of molecular issues into individual variation research.
12. Describe Quantitative genetic research exploring the origins of one or more variable
13. Discuss associations between genetic and environmental influences (gene-environment correlations, interactions, epigenetic regulation, etc.)

14. Define what is meant by ‘endophenotype’ in behavioural genetic research

15. Explain what is meant by ‘imaging genomics’.

16. Discuss ethical, legal and societal implications of behavioural genetic research applied to medicine, education, economics and other fields – in historical and cross-cultural contexts

17. Communicate effectively knowledge and understanding of the main concepts in behavioural genetics both orally and in written form

18. Demonstrate successful public engagement and research dissemination strategies and skills, including presentations, publications, internet resources (websites, blogs, twitter), newsletters, film, creative design, and other media

Course Co-ordinators: Professor Yulia Kovas and Fatos Selita

Lecturing staff: Yulia Kovas (YK)  Fatos Selita (FS)

12, 1.2 hour sessions

Timetable October/November 2015

PART 1: 6 paired sessions over 3 days

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<tr>
<th>Date:</th>
<th>Lecture Topic:</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>Session 1 – 5 October 2015</td>
<td>Introduction to Behavioural Genetics</td>
<td>YK</td>
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<tr>
<td>Session 2 – 5 October 2015</td>
<td>Molecular genetics (DNA)</td>
<td>YK</td>
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<tr>
<td>Session 3 – 7 October 2015</td>
<td>Molecular genetics (Methods)</td>
<td>YK</td>
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<tr>
<td>Session 4 – 7 October 2015</td>
<td>Gene-environment interplay</td>
<td>YK</td>
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<tr>
<td>Session 5 – 9 October 2015</td>
<td>Quantitative Genetics (Methods)</td>
<td>YK</td>
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<tr>
<td>Session 6 – 9 October 2015</td>
<td>Multivariate Questions in quantitative genetics (e.g. Co-morbidity, development, heterogeneity) Behavioural genetic research into cognitive/learning abilities and disabilities Behavioural genetic research into psychopathology</td>
<td>YK</td>
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Over the next month students are expected to read the suggested texts and to prepare for an Oral Examination, guided by the questions provided.

PART 2: 6 sessions over 4 days

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<tr>
<th>Date:</th>
<th>Lecture Topic:</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>Session 7 – 16 Nov 2015</td>
<td>Critical evaluation of behavioural genetics</td>
<td>YK</td>
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<tr>
<td>Session 8 – 16 Nov 2015</td>
<td>Ethical concerns surrounding behavioural genetics research. Ethical, Legal and Societal</td>
<td>FS</td>
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implications of genetic research for education, medicine, economics and other fields.

**Session 9 – 18 Nov 2015**
Communicating findings from behavioural genetic studies to diverse audiences (ORALLY).

**Session 10 – 18 Nov 2015**
Communicating findings from behavioural genetic studies to diverse audiences (IN WRITTEN FORM)*.

**Session 11 – 19 Nov 2015**
Discussion and Revision Session (+ Optional Film Screening)

**Session 12 – 20 Nov 2015**
ORAL EXAMINATION

**Assessment**

1. **Oral examination**: the assessment will take place in Session 12. Each student will participate in an assessment session during which they will be required to demonstrate knowledge and understanding of the key concepts learned during the first 11 sessions of the course. Students’ performance will be evaluated on correctness of the answers and depth of understanding. The student will need to answer 3 questions randomly selected from the pool of 25. Students will receive their grade and feedback on the day of the assessment.

2. ***Assessed Written assignment** (to be submitted within 1 month following the course)

**Recommended Reading**

- Most references are useful for more than one lecture.

**Course books:**


**Additional Reading**


