6BBA3012 - Laboratory-based Project in Neuroscience

School of Biomedical and Health Sciences

2010 - 2011 COURSE BOOKLET

Introduction

Welcome to the course! Please **read this booklet carefully** as it contains important information and should answer most of your questions. You may find that doing a lab project is demanding, but it is also hopefully a very rewarding experience.

Course organisers and tutors

Course organiser: Professor Sarah Guthrie
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Course co-organiser: Dr Isabella Gavazzi
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Course tutors: Professor Uwe Drescher (uwe.drescher@kcl.ac.uk)
Dr Britta Eickholt (britta.eickholt@kcl.ac.uk),
Dr Richard Wingate (richard.wingate@kcl.ac.uk),

Aim of the course

The aim of the course is for you to carry out an original neuroscience research project in an active research laboratory. Your project will address a novel research question. First, you and your supervisor will outline a hypothesis on the basis of the current research literature. You will then carry out supervised experimental work to test the hypothesis, and collate and analyse your data to write up as a dissertation. You will receive training in contemporary scientific techniques and guidance in all aspects of the project. During the project, you will also participate fully in the life of the laboratory, including interaction with other lab members, attendance at lab meetings and departmental/campus seminars.

Through your project dissertation and a seminar on the project, you will learn to communicate your scientific findings and ideas effectively. The accompanying course 6BBA3009 Principles of Neurobiological Research is designed to complement the project, by giving you an appropriate background in the scientific method and literature, and information on a range of relevant topics such as model systems, molecular biology and statistics. The theoretical basis of the accompanying taught modules 6BBL0392 Systems Neuroscience, 6BBA3008 Developmental Neurobiology and 6BBA3121 Mechanisms of Development (you will take 2 out of 3 of these modules) will provide you with appropriate background and context for your project of choice.

Eligibility and choice of project

In order to be eligible to undertake a Neuroscience project, we stipulate that, regardless of your degree route, you should have achieved an average mark of 60% across your end of second year exams. As individual labs usually take one student, or two students maximum, the number of places on the course may be limited. Currently no interview is required.

Each project is individual and will be carried out in one of many laboratories of several King's research Centres, which include the MRC Centre for Developmental Neurobiology, the Wolfson Centre for Age-Related Diseases, the Institute of Psychiatry, or the Department of Craniofacial Development within the

Dental Institute. There are therefore a wide variety of topics for projects, encompassing neural development and function, neurodegenerative diseases, repair and regeneration of the damaged nervous system and craniofacial development. Individual supervisors for projects belong to a range of departments and have a range of research expertise. You can learn more about the types of projects on offer and the research within these Centres via the KCL website, which contains information about the research programmes of the individual supervisors.

Laboratory projects and supervisors will have been allocated during the summer period 2010. By the beginning of the new semester (September 2010) you should have made contact with your supervisor, and arranged with them some preliminary reading for your project. If you have not already done this by the beginning of the semester, don't panic, you still have plenty of time to contact your supervisor. Although the majority of the project practical work takes place in the second semester (January to March), you should have some time to go to the lab during the first semester and to begin to pick up on some techniques and think about how to plan your project.

(For a list of the supervisors and project topics available in 2010 - 2011 see next page)

Learning outcomes

By the end of the course, students will be expected to be able to:

1. understand experimental techniques and perform them independently; negotiate and solve problems; co-operate with other laboratory members.

2. understand in depth how to conduct scientific research, including formulation of hypotheses, devising experiments, collation and analysis of experimental data.

3. describe and present their scientific research findings, through completion of a project dissertation in a scientific style with correct annotation and referencing, and through presentation of a seminar on their project.

4. evaluate their research findings in the context of their chosen research field.

For a skills matrix for the Laboratory Project, see page 13 of the Neuroscience BSc course booklet.

Allocation of marks

75% - Project dissertation: 7,000 - 10,000 words: double-marked

15% - Seminar on the project: 15 - 20 minutes: double-marked

10% - Supervisor's report: to include a consideration of attitude and effort, experimental ability, originality.

List of Supervisors and Neuroscience Project Topics for 2010 - 2011

Research Centre/Supervisor	**Title**
MRC Centre	
Esther Bell	Molecular mechanisms of neural induction
Juan Burrone	Synaptic physiology and plasticity
QueeLim Ch'ng	Neuroendocrine control of ageing
Jon Clarke	Morphogenesis and neurogenesis in the vertebrate CNS
Uwe Drescher	Axon guidance in the vertebrate visual system
Britta Eickholt	Signalling mechanisms in neurons
Matthew Grubb	Mechanisms of activity-dependent plasticity at the axon initial segment
Sarah Guthrie	Role of alpha2-chimaerin in axon guidance of oculomotor neurons
Corinne Houart	1) The characterisation of the coma/sfpq mutant as a model for degeneration 2) Role of nodal signalling in telencephalic arealisation
Clemens Kiecker	Secreted signals in patterning of the forebrain
Camilla Larsen	Patterning of the *Drosophila* brain
Ivor Mason	Growth factor signals in brain development
Martin Meyer	Synaptogenesis in the zebrafish visual system
Adrian Pini/Andrew Lumsden	Endogeneous neurotoxic proteins
Guy Tear	Identification of proteins necessary for axon guidance in *Drosophila*
Ian Thompson	Topographic mapping in the visual system
Darren Williams	Dendritic development in *Drosophila* sensory neurons

Wolfson/CARD	
Joe Bateman	Signal transduction in the *Drosophila* nervous system
Dave Bennett	Neurobiology of peripheral nerve injury
Stuart Bevan	Ion channels and sensory transduction in mammalian peripheral nerves
Liz Bradbury	Modifying glial scar extracellular matrix to promote regeneration and repair after spinal cord injury
Jonathan Corcoran	Expression of retinoid receptors in the adult brain and their modulation by retinoids
Reggie Docherty	Effects of anticholinesterases on the sensitivity of peripheral nerves to nicotine
Pat Doherty	Regulation of cannabinoid receptor activation in a model cell line
Paul Francis	The biochemistry of dementia
Andrew Grant	Mechanisms of TRPV4 sensitisation in inflammatory pain
Giovanna Lalli	Migration of stem cell-derived neural progenitors in the mammalian brain
Marzia Malcangio	Role of non-neuronal cells in chronic pain
Stephen McMahon	Mechanisms of persistent pain
Kevin O'Byrne	An integrative neuroscience approach to stress-induced reproductive dysfunction
Jon Robbins	Effects of potassium channel openers and blockers on firing properties in neuronal cells using a non-invasive electrophysiological approach
Dental Institute	
Albert Basson	1) Investigating the developmental mechanisms underlying brain defects in human CHARGE syndrome 2) The effects of modulating FGF signalling in adult neural stem cells in vivo
Pip Francis-West	Craniofacial development and Patterning

Jeremy Green	Cell polarity and neurogenesis
Karen Liu	Requirements for GSK-3 in the development of dorsal root ganglia
Andrea Streit	1) Eye morphogenesis 2) Specification of sense organ precursors
IOP	
Jonathan Cooper	Neurobiology of lysosomal storage disorders
Jean-Marc Gallo	RNA processing in neurodegeneration, especially in the context of Alzheimer's disease and amyotrophic lateral sclerosis.
Sylvane Desrivieres	Role of the transcription factor MYT1L in neuron differentiation and brain development
Peter Giese	Mechanisms underlying learning and memory in health and disease
Frank Hirth	Mechanisms and molecules underlying neurodegenerative diseases in the fruitfly
Mike Modo	Neurobiology of brain damage and repair
Brenda Williams	Division and differentiation of neural stem cells

Timetable and workload

There are no fixed days or times for this project. During the first semester (4th Oct - 18th Dec), you can spend time being introduced to techniques and learning about the scientific background to the project. The main lab work takes place in Semester 2 (10th Jan - 25th March 2011). As this is a 45 Credit project, it is considered that the project should entail 450 hours of work, *including* independent study. In terms of the time recommended to spend in the laboratory, the guideline of 30 days full-time has been suggested. Given that the project is carried out in one semester (approximately 10 - 11 weeks) this would equate with 3 days per week spent in the lab, leaving a couple of weeks after the end of the project for data analysis and writing up, before the submission deadline.

However, the nature of laboratory work is unpredictable, and the timetable of experiments for each project will be dictated by the subject, experimental system and the techniques involved. Some projects may involve a heavier workload than is indicated above to achieve a good grade, or may demand that you are available at the lab at set dates/times, with the workload varying from week to week. It is a good idea to discuss the expected workload with prospective supervisors before you make your project choices. Any successful project will require dedication and flexibility.

Once you have been allocated a project, you should liaise with their supervisor to agree a timetable of work. From the outset you should keep a detailed log of your schedule of experiments and the time you spend in the laboratory. It is important to note that your supervisor or a senior postdoc should be present at all times to supervise you in the laboratory. Core working hours when you permitted to be in the laboratory are 9am to 6pm and you are not normally allowed in the laboratory outside these hours.

Indicative schedule

First Semester 4th Oct - 17th Dec 2010: Initial period of going to laboratory to gain background in the subject and grounding in techniques

Second Semester 10th Jan - 25th March: Main laboratory project, however, aim to finish lab work one week before the end of semester, i.e. by 18th March

18th March: Aim to provide supervisor with a rough draft of the project, or at least the Introduction

18th March until deadline: Supervisor to read and comment on drafts of your project

5pm Wednesday 27th April: **Deadline for submission of dissertation**

The Deadline for the dissertation is morning of the Tuesday 26th April 2010 at the Academic Centre (unbound, and the project will be bound for you) or 5pm at Prof Guthrie's office on Wednesday 27th April (bound)

Please prepare 3 copies of the write-up: 1 copy will eventually be returned to your supervisor, one copy will be returned to you, and one copy will be kept by the Department.

An important note regarding punctuality and attendance

During the project you are being hosted by a busy laboratory and a busy supervisor. Usually the laboratory also subsidises the costs associated with your project. Others cannot carry out your experiments for you, or fill in if you are not able to attend the lab for some reason. Once you have agreed a timetable of experiments and dates/times to attend the lab you must stick to it. Otherwise important samples/material and much time may be lost.

Please be punctual at the laboratory. You should put your supervisor's office phone number into your mobile, so that if you are delayed getting to the lab, or you are ill, you can phone. Keeping in touch by email is generally OK, but you must let your supervisor immediately if you are delayed or unable to attend the lab, and this means a phonecall/text.

Health and Safety

All students must complete an induction in health and safety and be made aware of possible risks in the laboratory before commencing their project work. Your supervisor should also complete a risk assessment for your project. This will be organised by the Laboratory Manager in your Research Centre. You should pay attention to safe working practice at all times during your project.

Seeking help

Your supervisor should be able to help with most issues directly concerned with the project. Please contact Professor Guthrie for advice on other, more general or administrative matters. For non-academic problems you can also contact your personal tutor. If you do not know who your personal tutor is, or think you do not have one, contact the Academic Centre (Tel: 020 7848 6400). Please try to keep in touch with your personal tutor throughout the year.

What to do if your project is disrupted by health problems or other personal problems

If illness or other factors affect your ability to carry out the project, you must let your project supervisor, the course organiser *and* the Academic Centre know as soon as possible. If you are absent for more than a week you should inform these individuals and send medical certificate to the Academic Centre. There are three types of forms which can be submitted if these problems arise, and the Academic Centre or the personal tutor/course organiser can advise you about which is most appropriate. You may need to attach documentation of the problem (e.g. a doctor's note if the problem is medical).

1. Use a Mitigating Circumstances Form (MCF) to withdraw from an examination/assessment or apply for retrospective withdrawal (and in the case of exams, request a replacement examination).

2. Use an Extension Request Form (ERF) to apply for an extension to a course work deadline

3. Use a Disruption of Studies Form (DOS) if your studies have been disrupted for a period of more than one week.

The information you submit can be taken into account when there is discussion of your progression from year to year, or to decide your final degree classification. You will not be awarded higher marks for assessments based on submission of these forms. However, it is better to submit these forms *sooner rather than later* even if your problems are quickly resolved.

The forms can be obtained via the following link:

http://virtual campus.kcl.ac.uk/vc/bsc/forms

Organised sessions

Friday 18th March 2011

Time and Venue TBA

How to prepare a presentation on your lab project using Powerpoint *(Sarah Guthrie)*

You will receive advice about technical aspects of preparing a seminar presentation in Powerpoint, as well as advice specific to the subject matter and style required for this presentation. **Please note** that it is important to come to this session - you will gain higher marks for the presentation if you do!

Thursday 28th and Friday 29th April 2011

10am - 1pm and 2pm - 5pm - *Venue TBA*

Seminar Presentation on the Neuroscience Laboratory Project
(Assessors: Sarah Guthrie, Uwe Drescher, Britta Eickholt, Richard Wingate)

One of the external examiners for the Neuroscience BSc programme will also be present at your talk. Please note that all students are expected to attend both sessions.

Assessed seminar guidelines

You should prepare a 15 minute talk on your project using Powerpoint. The secret of a good talk is to keep it as simple and succinct as possible. Divide the talk into sections as follow:

Introduction
Aims
Experimental Methods
Results
Conclusions

Introduce the topic and mention any previous work important to understanding your project. Explain the hypothesis you are testing and the experimental strategy and system you have used. Do not spend too much time discussing methodology, unless the development of experimental methods was central to the project. Then present your results, using a few pictures/tables/graphs and simple diagrams for clarification. Draw conclusions and put your results in the context of existing work.

Some students will have fewer results than others, but this in itself should not lead to a lower mark. The quality of the talk will be judged based on your knowledge and logical presentation of the subject, more than the amount of data. Talk to your project supervisor to get more advice about the best way to devise your presentation. You should also be ready to answer questions from the assessors and other members of the audience. Further advice will be given at the session in late March, so *please make the effort to attend this session.*

Some suggested reading

1. *Principles of Neural Science* ed. Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, 4th edition, Appleton & Lange, 2000.
2. *Fundamental Neuroscience* ed. Michael J. Zigmond, London: Academic Press, 1999.
3. *Development of the Nervous System*, Dan H. Sanes, Thomas A. Reh, William A. Harris, San Diego; London: Academic Press, 2nd Edition, 2006.*Molecular and Cellular Approaches to Neural Development* ed. W.Maxwell. Cowan, Thomas.M. Jessell, S. Lawrence Zipursky, New York; Oxford: Oxford University Press, 1997.
4. *Principles of Neural Development*, Dale Purves and Jeff Lichtman, Sunderland, Mass: Sinauer Associates, 1985.
5. *Molecular Embryology, methods and protocols*, ed. Paul T. Sharpe and Ivor Mason, Totowa, New Jersey: Humana Press, 1999.
6. *Neural cell culture: a practical approach*, ed. James Cohen and Graham P. Wilkin, Oxford: IRL Press at Oxford University Press, 1995.
7. *Scientific Papers and Presentations*, ed. Martha Davis, San Diego; London: Academic Press, 1997.

Detailed guidance notes

The laboratory-based project is a chance for you to undertake an original piece of research, and to become part of a research laboratory. Although research is challenging, and sometimes frustrating, it is the part of the course which students have consistently found most enjoyable and interesting. The work you will be doing has not been done before, and offers the prospect that you may discover something completely new. During the course of the project you will discover that research is hard work, and requires both initiative and dedication. Also, research is often unpredictable. Many repetitions of the same experiment will be required in order to obtain results, and even then they may not be clear-cut. You will have many discussions with your supervisor and other lab members about what experiments to plan next, and how to solve problems. No guarantee can be provided that you will be successful in the stated aims of your research; nevertheless, you are likely to make some interesting discoveries along the way.

Don't worry if things don't go exactly according to plan during your project. Assessment will be made finally not on how many results you got, or whether you answered the scientific question chosen, but on how well you performed in all aspects of the conduct of the research. This will include the strategy and planning of the experiments, the performance of the experiments and the amount of work you put into them, and the analysis and interpretation of results. In your thesis write-up you will be expected to give an introductory literature survey, to write a good account of what you did in the project, describing the results using Figures and Tables, and to cite probable causes of technical problems, suggesting future experiments that might solve these problems. Finally you will be expected to describe and discuss other relevant studies and place your research in a more general context. Examiners who read your write-up will expect a professional account, similar to a long scientific paper. You should write in the scientific style, including extensive referencing of the relevant literature.

How to get started

Reading

During the first semester of the course, before you start lab work, you should talk to your supervisor about the scientific question you have chosen to work on, and the experimental techniques involved. Your supervisor will recommend a selection of papers and review articles relevant to the project, which you should read and reread as the project progresses. This literature will overlap with reading material given out on the lecture courses, but you will also become an expert in your particular area. You are not expected to understand everything instantly; your understanding should grow as you progress in the laboratory and during the lecture courses. You will become accustomed to scanning recent journals available in the Centre, the library or via PubMed, for new papers relevant to your project. You will also learn about the literature and your subject by talking to other students and post-docs, going to lab meetings, seminars, and generally participating in the life of the lab.

Practical

Beginning in the first semester if you have time, or in the second semester (Jan 2011), your supervisor or an experienced lab member will teach you all the techniques necessary for your project and show you how to operate relevant equipment. You should not hesitate to ask if you do not understand anything. Initially your supervisor or another lab member will be likely to supervise each step of a protocol you are carrying out. Eventually, though, you will become more capable of planning and performing and experiments without direct help.

Important note about safe working

Before you start work you should be informed of the safety regulations, and about any specific noxious reagents in your laboratory or your experiments. It is particularly important that you do not work alone in the laboratory. Your supervisor or a designated post-doc should be either in the laboratory or in an adjacent office where they can be contacted. *Working outside normal working hours (i.e. after 6pm or at*

weekends) is not permitted unless such a person is present.

Doing the work

Initially you will be uncertain about how to plan your time, and how to fit this around lectures, reading, etc. Talk to your supervisor about time management and write a plan for the experiments you will carry out during the first few weeks. Apart from the times when you are attending taught sessions, it is likely that you will spend most of your time in the lab. Research is not an activity that can be easily compartmentalised and will probably take longer than you think. However, there are often periods during your experiments when you are waiting for something to happen that you can use for reading, analysis of data and planning of future experiments.

During the project you will be expected to become a member of the research team and to participate fully in the life of the lab. This means that as well as benefiting from the help and advice of other lab members, you will be expected to be responsible for all aspects of your work. You will learn to make up your own reagents, as well as helping with the general tasks required for running the lab. You must also clean up your own lab bench or common areas when you have finished working.

Keeping a lab notebook

Note about obtaining lab books: When you arrive in the lab, you should obtain a practical notebook in which to log your experiments. The course organiser does not provide these books - they should be obtained from stores using your supervisor's grant code, and then the money claimed back at the end of the project.

You should record the progress of your experiments in your lab book on a daily basis. Write out your experimental protocols and record any changes you made. Then record the results of your experiments as you obtain them, with any comments. It's a good idea to spent a little time at the end of each day writing in your lab book and reflecting on what went well or badly, and why. This period of reflection will help you to improve and optimise your experimental techniques and to develop as a scientist. Ask your supervisor if you have any doubts about the level of detail that is required, since these notes will serve as the basis of your dissertation. Record images of your experimental results as you obtain them, for later inclusion in Figures.

Meeting your supervisor

Students should expect to have regular meetings with their supervisor. These meetings may occur more often during the early part of the project, but you should plan to discuss your progress with your supervisor at least once a week. Please remember that your supervisor may be very busy, and so you will often need to make appointments to meet her/him. Don't be put off even if your supervisor appears very busy - supervisors are keen to help their students, but sometimes they need reminders!

Other aspects of laboratory life

If your group has lab meetings, then it is important that you attend these. This is a place for you to discuss your research findings/any problems, as well as finding out what the rest of the group is doing. In particular, during these sessions you will learn about the background to your research subject. You should also try to go to some of the wide variety of Neuroscience research seminars taking place on the campus. The topics will be relevant to the material in your taught modules and understanding the research background of these topics will help you with exam revision. as well as with your dissertation. Have a look on the website of your research Centre and the posters advertising various events which are posted around the campus.

The dissertation

Dissertations should be word-processed and printed on a good quality printer, typed using 1.5 spacing. The word limit is 7,000 - 10,000.

Timing of writing up

Try to get started on the Introduction in January, so that your supervisor has a chance to look at it, and you are not in a last minute panic about the write-up. Start by mapping out subheadings for the Introduction, and showing these to your supervisor, to see if you are on the right lines. The Materials and Methods can also be written before your final write-up, as they are unlikely to change dramatically. If you have documented results properly as you go along, writing the Results section and constructing Figures should not be too onerous.

Approximate schedule for writing up

January:	draft your Introduction and show to your supervisor
February:	write your Materials and Methods and make necessary revisions to the Introduction
March:	write your Results, leaving time for any last minute experiments. Show a draft of everything you have done to your supervisor and get comments towards the end of March.
April:	revise Results and write your Discussion
May:	exam revision - exams will take place at the end of May/beginning of June

Structure:

A coversheet for coursework should be attached to the front of your project, which is available at http://virtual campus.kcl.ac.uk/vc/bsc/forms
This should include the following information.

- School of Biomedical and Health Science
- 6BBA3012 Laboratory-based Project in Neuroscience
- Your student number
- Your name
- Your email address
- Due date for submission
- Plagiarism statement

Your dissertation proper should be divided into the following sections.

1. *Title page*

- PROJECT TITLE
- Your name

2. *Acknowledgements*

3. *Table of Contents*

4. *Abstract (½ to 1 page)*

Give a concise summary of the major findings of your project

5. *Abbreviations*

Keep these to a minimum. In the text define them in the first use, but not thereafter.

6. *Introduction (approx. 10 pages)*

Give an account of the background literature, and how previous experiments have led up to the work you

have undertaken. End up with a short statement on the ***Aims*** of your project and the question you sought to answer.

7. Materials and Methods (approx 5 - 8 pages)
Describe the techniques used, under a separate subheading for each. The description should be sufficiently detailed for someone to repeat your experiments. Where you mention reagents, give the supplier and country e.g. "diaminobenzidine (Sigma, UK)". Often some of the experimental procedures involve the help of other members of the laboratory. It is important that the examiners know which parts of the work were carried out by you, so please make sure that you acknowledge any assistance or provision of materials in the Methods section. If experiments required a Home Office Licence, you should specify the name of the person holding the licence, and that the work was carried out in accordance with Home Office regulations.

8. Results, including Figures (approx 10-20 pages)
Describe the results of your experiments under subheadings. Most of the work you present should be substantiated with Figures, and you should describe clearly and concisely the contents of each Figure. Document the results you obtained even if they were negative. It is important to include the numbers of experiments that were done and to analyse any numerical data statistically. If techniques did not work, explain the possible causes and what you would change in order to get a successful result.

Figures may either be spaced throughout the text, or can be included in a separate section. The Figures in the Results section should be chosen so as to demonstrate clearly the points you make in the text. Employ simple graphs, tables, diagrams and clear images. As with the text, it is the quality rather than the number of these that is important. You can assemble several images into a composite on the computer, remembering to include letters to label each panel, and a scale bar for each Figure. You will need three copies of each Figure. Ask your supervisor to advise the best paper, print quality and resolution for the printer you are using (and see note below on Figures).

Further notes on the Figures
N.B. Each Figure must be accompanied by a legend, which explains what is in each Figure panel, and defines any abbreviations, gives a scale bar, and explains what any labelling (arrows, arrowheads etc) are pointing to.

Throughout your dissertation, the Figures and diagrams should be relevant to the point you are trying to make. It is often useful to incorporate a couple of diagrams into your Introduction and use a summary diagram in the Discussion. If you derive diagrams from other publications, however, you should quote the source, even if you have redrawn or adapted them. It is not acceptable to bulk out your write-up with large numbers of diagrams down-loaded from the Internet.

Figures should be of adequate quality that they can be judged by the examiners and provide a good record of your work for yourself, and for those in your laboratory. The most convenient way of presenting pictures is often with the Figure legends (describing the contents of the Figures) on a facing page. Figures can either be presented as a continuous series, in the middle of the Results section, or interspersed throughout the Results section at relevant points. The best way to produce your Figures, including photographs, graphs or diagrams, is to use a good quality inkjet printer with the print quality set to "Normal" or "Best". Ask your supervisor or the course organiser for high quality (matt or glossy) inkjet paper or photographic paper when you come to print the final figures. Do a test run to see what your figures look like can be done on the paper that is available.

9. Discussion (approx. 5 pages)
You should include a discussion of the technical aspects of the project, the strategy and experiments

chosen, as well as a consideration of the significance of your results for the field in general. If your results are in disagreement with previous work, explain the possible causes. Lastly, mention future experiments to be done and the direction in which you would take the work if you had the opportunity to continue it.

10. References (approx. 5 pages)

Quote publications in the text when you mention someone's work. Include references at the end of a sentence or a clause, in brackets, and in a format depending on the number of authors, e.g. (Bloggs, 1992) or (Bloggs and Briggs, 1992). Where there are more than two authors use the format (Bloggs et al., 1992). If you quote more than one paper then place them in chronological order as follows (Bloggs et al., 1992; Brown and Briggs, 1994; Briggs et al., 1997). All the references you quote should be collected together in a reference list organised in alphabetical order according to the first author. Where a first author published two papers in the same year, organise alphabetically according to the name of the second author and identify in the text using (Bloggs et al., 1999a) and (Bloggs et al., 1999b).

Standard format is Author names, Year, Title, Journal, Volume number, Page number.

Example:

Gutman, C. and Levine, M. (2001). A novel family of axon guidance molecules with a trendy name but no known function. Cell 75, 8601-8618.

It is acceptable to use either the entire journal title, or standard abbreviations, which can be found by looking in Index Medicus or the back of published papers. Programmes such as EndNote or Reference Manager can be used to generate your reference list and will produce a range of formats. For books or book chapters you should include the publisher, the city and the year.

Style

The dissertation must be typed, with lines double-spaced and with suitable margins to permit binding, which is done by the academic centre. Each major section should begin on a new page. Paragraphs should be made visible by indenting the first line or by leaving a blank line between them. The required style should be similar to that of a scientific paper. Present your facts and arguments in a logical sequence and avoid flowery language. Try to be conservative and avoid the temptation to over-interpret your data. The thesis must be written in your own words - if you plagiarise, lifting passage from reviews or papers, this is likely to be marked down severely.

More advice about your dissertation

More advice about the dissertation will be available from the course co-ordinator and tutors nearer the submission date. The best dissertation are those that arise due to good communication between the supervisor and student. You should discuss the dissertation with your supervisor at all stages, and be prepared sufficiently in advance so that your supervisor can see several drafts. Many supervisors are very busy around the submission date, so it is a good idea to check ahead of time exactly when your supervisor will be around. Do not be surprised if your initial attempts need extensive modification, since it is difficult to write in a scientific style when you are inexperienced. Discuss the interpretation of your experiments and how you will handle the discussion of your experimental results with your supervisor. Dissertations from previous years are available from the course organiser's office - these are the best guide to the level of detail and style that are required.

Plagiarism

Please note that plagiarism is not tolerated and the course organiser will arrange to have your write-up electronically scanned using TURNITIN software if she suspects that you have plagiarised other texts.

Guidance for Project Supervisors

The specific guidance on the number of hours expected to constitute a 45 credit laboratory project is 450 hours, including time for private study. As the practical component of this project runs over one semester (term dates are 10th January until 25th March for 2011), it is recommended that the student spends the equivalent of 3 days per week in the laboratory.

This limit is not set in stone, and clearly there needs to be discretion and flexibility depending on the experimental system/question. There have been concerns voiced about disparate workload in some of the Neuroscience projects, and students' exam results are sometimes suffering as a result of excessive time investment in the project. Therefore we should bear this guideline in mind whilst devising and supervising projects.

Students who undertake a laboratory-based project are often highly motivated, fascinated by the idea of carrying out research, and capable of producing excellent work. However, few of them will have undertaken laboratory work before, and most find the organisation of time in the laboratory initially difficult. It is often better to propose as a topic for a project something relatively simple, with established techniques, rather than being too ambitious as to what you hope the student can achieve. It is worth noting that the lab project constitutes only 45 credits of a total of 120 credits undertaken during the year. Therefore, students have to learn to balance the demands of project work with reading the literature relevant to the project, getting started on their write-up, and thinking about revision for taught courses.

The last minute rush to produce results while trying to write-up should also be discouraged. I am now proposing that students try to finish all lab work by the 18th March 2011 (one week before the end of term). The aim of the project is to give students a flavour of scientific research, and to allow them to complete a piece of scientific work, from the formulation of a hypothesis to benchwork, to final analysis and write-up of results. It is more important that they pay adequate attention to the interpretation and analysis of their experiments than that they struggle to produce data at the end of the project, potentially compromising the quality of the dissertation and the exam preparation.

Note about collecting expenses for laboratory project
KCL will reimburse £600 to each supervisor towards the costs of each laboratory project. The procedure for claiming the money is to fill in a claim form and submit it to the relevant person in your School (BHS, DI or IOP). On the claim form, list consumable items used in the student's research totalling £600. These forms are usually submitted at the end of the project. *NB. Together with this form you also need to submit a risk assessment for the project/techniques carried out by the student, signed by the student.*

For BHS, the claim for can be found at http://virtualcampus.kcl.ac.uk/vc/academic-centre/bhs/staff.aspx and scroll down to 'Undergraduate Project Claim Form" and should be emailed to Clive Daws (clive.daws@kcl.ac.uk).
For IOP, the claim form can be obtained from Victoria Vasquez and emailed to her (victoria.vasquez@kcl.ac.uk) or taken to her office at IOP Main Bldg room W1.18
For DI, the calim form can be obtained from Richard Barnard and emailed to him (richard.barnard@kcl.ac.uk)

Sarah Guthrie
September 2010