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**UNIVERSITY OF  
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*Notes for those reading for Part II of the  
Natural Sciences Tripos in Biochemistry, 2009-2010*

**The course co-ordinator is Dr Nancy Standart**  
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On behalf of the Department I want to welcome you to Biochemistry. A document of this type can appear forbidding at the outset of a new academic year and can be dull to read. However, we hope that you will find it useful to have on hand throughout the year, since it makes a number of general points about the Part II course in Biochemistry and highlights some matters and dates of particular significance.

### **The aims of the course**

A fundamental aim of the Part II course in Biochemistry is to inform, to stimulate, to place new findings into the context of molecular and cell biology, and to emphasise how new information is obtained and what limitations there are on this process. Because Biochemistry is developing very rapidly, even the best textbooks in this subject are inevitably out of date and the course is intended to encourage reading of original research papers and reviews. We hope to provide familiarity with biochemical ideas and methods, and to induce a critical attitude to the interpretation of experimental results and to their relationship with the theoretical background. Project work is therefore an important aspect of the course.

We do not set out to cover the whole subject, and those who complete the course will not necessarily be ready to take up research in a particular branch of the subject without further experience under supervision. By the time you graduate, you should be equipped to assess new discoveries in Biochemistry and related areas as they arise, and be in a position to adapt as the subject develops in the future.

### **The relation of the courses to graduation and degrees**

We sometimes find that even by their 3rd year, students are not clear about the relationship between the courses they study at Cambridge and the degrees that they receive on successful completion. So, please look at this - you may have some misconceptions dispelled!

If you signed up for the Biochemistry Part II - the 3-year course - you will obtain your Bachelor of Arts (B.A.) degree in June 2010 after taking (and passing!) the NST Part II Biochemistry examination in May/June 2010. This will be an honours degree (except in the extremely unlikely event that you don't reach the honours standard). The results of candidates who obtain honours in Part II are divided into Classes I, II.1, II.2 and III - narrow failure to get into the 3rd class can result in an Ordinary B.A. rather than no degree at all). The B.A. itself is simply an honours degree (or an Ordinary B.A.) and is not divided into classes. When you get your degree certificate there will be no mention of the subjects that you studied or the classes that you were awarded in any of the Tripos Examinations that contributed to the degree.

If you signed up for the Biochemistry Part III - the 4-year course - you will take the NST Part II Biochemistry examination in May/June 2010 and be awarded a class in the usual way.

**This will qualify you for the B.A. degree but you will not receive the B.A. and therefore you will not graduate until you have taken the NST Part III Biochemistry examination in May 2011.** Therefore, while you are reading for Part III you remain an undergraduate student. The results of candidates who obtain honours in Part III are divided into Classes I, II.1, II.2 and III in the same way as for Part II. Obtaining honours in Part III means that you then graduate not only with a B.A. but also with a M.Sci. Degree (**Master of Natural Sciences** - NOT Master of Science, which is a post-graduate degree and abbreviated M.Sc.)

There is no “carry-over” of marks from one year to the next in the Natural Sciences Tripos.

## General plan of the course

There are three main strands to the teaching: lectures, research work and supervisions.

### *Lectures*

Lectures start at the beginning of the Michaelmas Term and continue throughout the Lent term. There are no lectures during the Easter Term, i.e. after the Easter Vacation: the early part of that term is available for general reading and revision.

The lectures during the Michaelmas Term constitute a Core, containing basic material that all aspiring biochemists should know. There are around 80 lectures in this part of the course. In addition there are ‘refresher’ lectures on “Thermodynamics for biochemists” and “Chemistry for biochemists.” During the Lent term, option courses, usually of 15 lectures each, are available. Topics may vary, but typically they are (ignore the idiosyncratic numbering!):

2. Proteins, nucleic acids & their interactions (Dr R W Broadhurst)
3. Mitochondria and bioenergetics (Dr J Hirst)
4. Plant cell and molecular biology (Professor C J Howe)
5. Control of gene expression in eukaryotes (Professor C W J Smith)
6. Medical biochemistry (Professor K Siddle)
7. Enzyme mechanisms and chemical biology (Professor P F Leadlay)
9. Oncogenes, tumour suppressor genes, apoptosis & carcinogenesis (Dr T R Hesketh)
11. Biotechnology (Dr K Lilley)
12. Regulation of the eukaryotic cell cycle (Dr M Carrington)

You should attend three of these courses.

The lectures are intended to illustrate general principles in terms of special topics, and many of them, especially those during the Options, may reflect the special interests of the lecturer concerned. Lectures in the core course take place at 9.00 am and 10.30 am. Lectures in the Options Courses are given at various times during the day - in order to ensure a clash-free choice, some have to be scheduled in the afternoon. The Lecture timetable for the Michaelmas Term is included in your introductory pack. **Note that this is more up to date than previous versions you have received, so follow this one.** The Lent term timetable will be delivered to you later in the Michaelmas Term.

Also in the Lent term at about the time that you begin to write up your research project (March), Dr Martin Welch will give a short course (2 Lectures non examinable) on “**How to write a scientific report.**” Background for these lectures is contained in “How To Write & Publish a Scientific Paper: 5th Edition by Robert A. Day (2 copies in Library). Also in the Lent term, Dr Jules Griffin will give two lectures to ‘refresh’ you on “**Basic statistics**”. These are important preparation for data handling questions in the exam, as well as for analysing data generated in your research projects.

### **Research Work**

There is an eight-week project during the Lent term (**commencing on the first day of Full Term**) that can be laboratory-, literature-, or computer-based. These projects will be carried out under the supervision of a member of the teaching staff or senior research staff. A selection list for Part II projects is included in this introductory pack. You will have to make your choice of projects no later than **Friday, 30 October 2009**, and the project allocation will be published shortly afterwards. An information sheet of past projects is included in this pack together with a copy of the Departmental Brochure, which describes the research interests of members of the Department. At **10.30 am on Tuesday, 6 October 2009** in the Hopkins Building Lecture Theatre **Dr Nancy Standart** will explain **supervision and other general course arrangements**. In the same room at **11.00 am** Dr Tony Jackson will brief you on the **Part III waiting list**. Following this at **11.30 am**, Dr Robin Hesketh (Projects Organiser) will explain the **arrangements for research projects**. An essential element in your research project is attention to safety. **On Thursday, 8 October 2009 at 10.30 am in the Lecture Room (Hopkins Building)**, Mrs P A Haynes and colleagues will talk about Departmental **Safety Matters**.

### *Departmental Seminar*

There is a Departmental Seminar each Tuesday lunchtime, held in the Lecture Theatre of the New (Sanger) Building. The talks are usually given by an outside speaker and consist of a paper on original research followed by a general discussion. Members of the Part II class are **expected** to attend and, as many of you will be the next generation of researchers, are strongly encouraged to take part in the discussion. A list of the Department Seminars is posted on the notice board each Term and can be found on the Departmental web site at <http://www.bioc.cam.ac.uk/seminars/index.html>.

### *Supervision*

**Group supervisions** in Part II and Part III Biochemistry are arranged for you by the Department. At the beginning of the course, Part II and Part III students will be organised into mixed groups (students and staff members from the same college will be grouped together). A list of supervision groups and supervisors is included in this pack. **Each Group will have a designated senior member as Leader, who will be responsible for structuring the Group Supervisions. At the first Group meeting of each Term the group should plan the programme for the Term. The Group leader will then circulate the Group with the timetable and topics.** Groups will normally meet once a week. **Group supervisions are an essential part of the taught course and their structure and relationship to the examination will be explained to you.** For example, there are Journal Clubs embedded in the group supervisions during which students will report on their analysis of research papers selected by members of staff. Meetings can also be devoted to reviewing particular experimental techniques or selected areas of research, providing guidance on choosing projects and guidance on structuring essays, etc. Also these groups are used to learn the skills needed to tackle the **Part II examination prepared essay topics dealing with 'Science that affects Society'**. **This can take the form of a supervision exercise structured and moderated by the staff members, where designated student discussants research the topic and lead off a debate. The remaining students in the group then input their comments and responses.** Because these groups contain **both** Part II and Part III students, some time will be devoted to **rehearsing the skills needed to tackle the Part III Paper 1 examination including both the critical evaluation of data in Section I and II and the examination essay topics in section B dealing with 'Science that affects Society' or 'Integrative Science'**. Part II students will benefit from participating in this exercise.

These group supervisions also provide an excellent forum for the development of presentational skills and each student will be given the opportunity to make two presentations, one in each of the Michaelmas and Lent Terms and a third at the beginning of the Lent term in which you report orally on the results of the Michaelmas term problem-based learning bioinformatics exercise.

In addition to the group supervisions, students are **expected to arrange specialist supervisions** on topics that particularly interest them with Core or Options lecturers. These are an important part of the course. These are usually conducted in small groups (3-5 students; larger ones may be appropriate in some situations), but individual sessions can also be arranged if needed. If you want a specialist supervision, get a group together and then contact the lecturer concerned to fix a date. This should be sufficiently in advance to allow you to have read and digested your lecture notes and key references. You should also submit an essay or detailed essay plan to the lecturer well in advance, so that the supervision is specifically focused on the science and how to present it. Essay topics can be chosen from past papers or simply devised yourself on the basis of the lecture material presented; there is no need to request additional essay questions from the lecturer. **It is important that the essay writing skills you acquired in Part I are maintained and developed in the more advanced Part II course**, where three of the examination papers require you to write a total of nine 1-hour long essays. Whatever you go on and do after your degree you will have to write reports of one form or another and these supervisions represent a way of improving that skill. We have produced some guidelines for essay writing, which are included in this pack. **You should notify your college of the names of the lecturers who give you these specialist supervisions so they can be remunerated by the college.**

If you have difficulty in contacting lecturers to book specialist supervisions, feel free to email the course organizer, Dr Nancy Standart (nms@mole.bio.cam.ac.uk), for help.

## Reading

You will have already received a letter giving advice on preliminary reading material. **At the Part II and Part III level do not expect to receive the type of comprehensive lecture handouts that you were given in Part I of the Tripos.** In Part II and III, lecturers will provide at the start of their lectures short lists of references to the relevant literature with titles. **Members of the class are not necessarily expected to read all the papers included in these lists.** With this in mind, the lecturers are asked to give an indication of their contents, and annotate the list to indicate which references they regard as the more important; they and everybody else in the Department are aware that the literature of Biochemistry is so large that nobody can effectively cover the whole subject. The references provided will allow individual members of the class to pursue different topics down to basic publications, and thus to read in detail about an aspect that may particularly interest them. In this connection it is essential to acquire the ability to source, read and evaluate original papers; reliance should not be placed on review articles alone. The Journal Clubs will help you to develop these skills. Lecturers have been asked to make their reference lists and any Powerpoint presentation/handout sheets available on the CamTools website. They have also been asked to give Hazel Zheng in the library details of any papers that are not available electronically, so she can make them available.

## Contact

When necessary, the Department will contact you by e-mail, so please **check your e-mail and 'prune' your mailbox regularly.** **Pigeonholes for Part II and Part III students are in the Hopkins Building**, near the entrance hall and the **Part II/Part III notice board** is on the wall that leads to the back door of the Department. Members of Staff based in the Sanger Building have pigeon holes in that building; other staff members' pigeon holes are located in the Hopkins Building. There is a mail shuttle service between the buildings, with an in-tray located in the entrance hall of the Hopkins Building.

**The librarian (Hazel Zheng)** normally carries out the day-to-day assistance/instruction in the Departmental library (the Colman Library). **She will give an introduction to the library on 5 October 2009 at 11.40 am in the Hopkins Building Lecture Theatre after your first lecture. She will also give a talk on bibliographic resources on 7 October at 11.00 am.**

## Examination

In the Part II Examination there will be **two written papers on the Core course and one written paper on the Options course**; each paper is divided into sections covering different topics. **The fourth paper deals mainly with the handling and analysis of biochemical data. Copies of past examination papers are included in your introductory pack.**

Students are required to submit a **dissertation** of not more than 5000 words in length (**excluding footnotes and bibliography**) describing their work on the project. Students are also required to hand in a **prepared essay** of not more than 3000 words in length (**excluding footnotes and bibliography**) selected from titles proposed by the examiners. **The topics offered for the prepared essay will concern 'Science that affects Society' and the Examiners will announce titles to students in the Michaelmas Term. Group Supervisions in the Michaelmas Term may be used to prepare students for this task by way of discussion and debate of selected past themes. For this purpose, examples of previous essay titles are included in your introductory pack.** There are strict deadlines for **submission of the prepared essay (19 January 2010) and project dissertations (28 April 2010)** with penalties for late submission. These penalties are regulated by the University, and getting permission to submit things late is now much more difficult than in previous years, so you **must** meet those deadlines. In common with other universities, Cambridge treats **plagiarism** very seriously and software for its detection may be used on any material you submit.

Two elements in the course are designed to teach the **skills needed for Paper 4. Journal Clubs** are embedded in the group supervisions. In these sessions students will report on their analysis of research papers selected by members of staff. **For this purpose, an example of a previous exercise is included in your introductory pack.** Notice that the exercise contains **3 elements**: a research paper accompanied by a set of questions and a set of answers (provided after the class discussion).

In the second training exercise, practice in data handling and consideration of questions set in recent years' paper 4 of the Part II examination will be provided in **six special data handling classes during the Michaelmas and Lent Terms (consult your timetable.)** In advance of these classes, you have been given copies of the past three years' data handling papers. You should read these and try to produce your own answers. Each of the examiners who set specific sections on the papers will then provide a single 'question and answer' session at one of six timetabled afternoon slots. **Model answers** to the questions will be made available at the end of these 'question and answer' sessions. Points arising from the sessions can of course be discussed in supervision groups.

The Senior Part II examiner **Professor K M Brindle** will meet with the class on **Wednesday, 28 October 2009 at 11.45 in the Lecture Theatre in the Hopkins Building** to explain the structure of the examination, how it relates to different parts of the course and the **distribution of marks between written papers, prepared essay and project.** You will also be told about the **structure and significance of the viva voce examination.** This is a very important briefing meeting and you should make every effort to attend. An additional meeting may be held subsequently if any queries arise.

**Following the Senior Examiner's introductory talk, all queries about the format of the examination should be addressed by consulting the written information provided in the Introductory packs (also available on CamTools) via the group supervisions, via the PartII/PartIII Examinations Secretary (Mrs Christine Thulborn, examtchg@mole.bio.cam.ac.uk) or via the Part II course co-ordinator, Dr Standart.**

## Staff-Student discussions and consultation

The course is run by the Part II/Part III Management Committee, chaired by Dr Standart. This committee meets each Term and its meetings are preceded by a meeting of the Part II/III Consultative Committee which comprises the members of the Management Committee plus student representatives from the Part II and Part III courses. At the beginning of term you will be asked for 'volunteers' to serve on the Consultative Committee. There are also many opportunities for informal discussion with members of staff - in the common room at coffee, lunch and teatime as well as after lectures or supervisions and during projects. More formally, questionnaires are provided on the various components of the course, and the responses are considered in the first instance by the Part II and Part III course Management Committee. The staff attaches considerable importance to your views and several modifications to the course have originated as student suggestions. The Examinations/Teaching Secretary, Mrs Christine Thulborn (examtchg@mole.bio.cam.ac.uk) is available to answer routine queries about the course, examinations, etc. Any other concerns should be taken up with Dr Standart (nms@mole.bio.cam.ac.uk).

## Careers

If you wish to hear about career opportunities, the kind of choices biochemists have made in recent years, where to look for jobs/studentships and what employers/supervisors want to see in applications, Sally Todd (University Careers Service) will talk about this on **Monday, 12 October 2009 at 10.30 am in the Hopkins Building Lecture Theatre**. The Careers Service provides (free) seminars and workshops on career choice, interviews, CVs, and particular career options, as well as one-to-one consultations. The complete list of activities and dates is on <http://www.careers.cam.ac.uk> Tel: (3)38283. E-mail: enquiries@careers.cam.ac.uk.

## Postgraduate courses in the Department of Biochemistry

**Biochemistry is one of the major departments in the Graduate School of Biological, Medical and Veterinary Sciences.** Each year we accept 20-40 new graduate students, of which the vast majority will carry out research for a PhD. Graduate students each have a Supervisor - the member of staff in whose laboratory the project will be carried out - and also an Advisor. The Advisor is also a member of staff, but is not directly involved in the research project. Advisors and graduate students meet at least twice a year to review progress on the project. As well as the research project, graduate students give research seminars - in the first year to an audience composed of first year graduate students and in the third year to the whole Department - and a poster presentation at the end of the second year. They are expected to attend the weekly Departmental research seminars given by prominent visiting speakers and also to attend courses. **The Graduate School provides a number of courses on various generic research skills, transferable skills and career opportunities.** In addition to these activities, most research groups have their own weekly laboratory meetings and Journal Clubs in which the graduate students actively participate. New research students in this Department are not initially registered for a degree. However, in June of the first year they are examined by two members of staff upon a report (up to 6,000 words) that summarises the purpose and background of their research project, the progress made during the first year and future plans. Satisfactory performance in the oral examination and a positive recommendation by the student's supervisor leads to registration for the PhD. degree. The first year dissertation provides practice at writing and defending a thesis and is a useful mechanism for making sure that the project is proceeding satisfactorily. Perhaps most importantly, it also provides an opportunity to evaluate objectively whether the student should pursue a research career.

## Information about further study or employment in Biochemistry

Publicity about a variety of opportunities for the graduate Biochemist is displayed on the **Part II/Part III notice board**, which is in the Hopkins Building. The Department Web site carries

information about current research and post-graduate research opportunities. Its address is <http://www.bio.cam.ac.uk/dept/biochem/>. Students apply for such posts themselves, but members of staff will be pleased to advise.

### **Proximity Cards and Photographs**

Access to the Department buildings will require your proximity card. Please go to the Sanger Building Reception at 12.30 pm on **Monday, 5 October 2009** to get your card programmed. You will then be directed to the Photography Section to have your photograph taken.

### **Welcoming Drinks Party**

You will have the opportunity to meet the 4th year Part III students, the lecturers, and members of the assistant staff associated with the course, at **5.00 pm on Monday, 5 October 2009 in the Common Room of the Sanger Building**.

### **Christmas Pantomime**

There is a long and distinguished tradition of a Christmas pantomime produced by the Part II class, followed by a party at the end of the Michaelmas Term. Rumour has it that the quality of the wit is directly proportional to the class performance in June. **Videos of previous year's spectacular pantomimes are available for consultation.** Please contact Mrs Julie Boucher for access to the videos, previous scripts and details of Departmental support of this event.

### **Concluding Remarks**

We are in the process of restructuring the Part II and Part III courses. That doesn't affect you greatly this year, but note that next year's Part III will be significantly different from this year's Part III. Details of this were given in the brochure and briefing sessions earlier in the year, and we will give you more information during the current year.

Teaching in Biochemistry is continually being modified as a result of discussion amongst the staff and students. We hope that you will feel free to contribute to these discussions, either directly or through representatives of the class.

We believe that modern Biochemistry is exciting and stimulating - and it should also be fun. We very much hope you will enjoy the course.

Dr Nancy Standart - on behalf of Professor Gerard Evan  
October 2009