NST 1B PHYSIOLOGY

Course Prospectus

Featuring new course content for 2017-18!
NST 1B Physiology

Why read Physiology?

NST 1B Physiology is arguably the core option for second year bionatscis: falling between the cellular and the whole-organism levels, physiology occupies a central position within the biological sciences.

Apart from being a fascinating subject in its own right, 1B Physiology is an excellent partner to almost any other biological course, be it molecular, para-medical or whole animal. In this document, we will describe our physiology course and spell out the main reasons why you should consider taking it.

But isn't 1B Physiology just the same as 1A PoO?

No, not at all.

Much of the 1B course relates to topics that are not touched in 1A Physiology of Organisms, including reproductive physiology, exercise physiology and physiology in extreme environments.

When we do look at familiar organ systems, we carry on where PoO left off, generally looking at different aspects of physiological function. Most students find the in-depth 1B treatment, focusing entirely on animal (mainly human) physiology and with a perspective which is more medical than comparative, to be much more interesting and rewarding than the necessarily superficial overview presented in 1A.

Leave out the Physiological sciences from your curriculum, and you launch the student into the world, undisciplined in that science whose subject-matter would best develop his powers of observation; ignorant of facts of the deepest importance for his own and others’ welfare; blind to the richest sources of beauty in God’s creation; and unprovided with that belief in a living law, and an order manifesting itself in and through endless change and variety, which might serve to check and moderate that phase of despair through which, if he take an earnest interest in social problems, he will assuredly sooner or later pass.

Thomas Henry Huxley, 1854.
Frequently-Asked Questions

Here are some answers to several of the most common questions regarding the 1B Physiology course:

- This course represents the University’s 1B course in human/animal physiology, i.e. it is the natural continuation of the “animals” strand of PoO.

- There is **no plant science** in 1B Physiology. It is entirely animal physiology, mainly concentrating on humans but looking at other mammals too where interesting differences occur. Rather than being a comparative course like 1A Physiology of Organisms, 1B Physiology is more focused and in-depth: more like the course that the medical students get.

- There is **no neurobiology** in 1B Physiology – that’s taken as a separate option.

- The level of mathematics/physics needed for this course is **no more advanced** than that required for 1A PoO.

- There are some **exciting practicals** associated with this course: they follow a similar format to those run in the Physiological Laboratory in 1A PoO.

- You can take it **without having taken 1A PoO**, although you will certainly enjoy a big advantage if you have that background.

- Part 2 Physiology, Development & Neuroscience (PDN), our third-year course, allows you either to concentrate on one of P, D or N, or to combine if you prefer...you don’t have to take modules in all three subjects.

Sheep: they have physiology too.
1B Physiology Course Outline

In the first term and part of the second term, we cover some familiar physiological systems in more detail and from a different perspective. We tend to focus more on human physiology, and there is more of a medical emphasis. New subjects such as physiology of blood and lymph, pH control, breathing mechanics, stress physiology and symbiotic gut microbes are discussed, very often in the context of health and disease. New lectures have been introduced for 2017-18!

Most of the second term is spent looking at the mammalian reproductive system. Topics include sex, embryonic and fetal development, birth and lactation, from a comparative mammalian perspective as well as in humans.

Easter lectures consider how we react when our physiological systems are put under the stress of extreme situations. Beginning with exercise physiology, we move to considering altitude, desert, Arctic and even space!

Provisional lecture list for 2017-18

<table>
<thead>
<tr>
<th>Michaelmas</th>
<th>Lent</th>
<th>Easter</th>
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<tbody>
<tr>
<td>Human cardiovascular physiology (5 lectures, James Fraser)</td>
<td>Reproduction (6 lectures, Bill Colledge)</td>
<td>Exercise and training (2 lectures, Christof Schwiening)</td>
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<tr>
<td>Clinical cardiovascular physiology (1 lecture, James Fraser)</td>
<td>Early pregnancy (2 lectures, Erica Watson)</td>
<td>Detraining (1 lecture, Andrew Murray)</td>
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<tr>
<td>Human respiration (6 lectures, Mike Mason)</td>
<td>Placental function (1 lecture, David Bainbridge)</td>
<td>Man in the mountains (2 lectures, Andrew Murray)</td>
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<td>Physiology of blood and lymph (1 lecture, T.B.A.)</td>
<td>Pregnancy and the fetus (4 lectures, Wendi Bacon)</td>
<td>Man and other vertebrates in Arctic &amp; desert (4 lectures, Matt Mason)</td>
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<td>Human endocrinology (3 lectures, Matt Mason)</td>
<td>The neonate (1 lecture, Emily Camm)</td>
<td>Man in space (1 lecture, Mike Mason)</td>
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<tr>
<td>Human renal physiology (5 lectures, Stewart Sage)</td>
<td>Lactation (1 lecture, David Bainbridge)</td>
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<tr>
<td>Physiology of pH regulation (2 lectures, Stewart Sage)</td>
<td>Digestive physiology (7 lectures, Matt Mason)</td>
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<tr>
<td>Use of animal models in physiology (1 lecture, T.B.A.)</td>
<td>Weight regulation &amp; nutrition (2 lectures, Matt Mason)</td>
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The course also includes some exciting experimental practicals, which take a similar format to those in 1A but tend to be a bit more ambitious in their scope. There are also histology classes in which you are encouraged to integrate structure and function (they also include some dissection):

- Frog heart electrophysiology
- Measurement of human cardiac output
- Metabolic changes following a meal
- Physiology of rabbit gut
- Exercise and training (2 classes)
- Histology methods, and investigation of organ systems (7 classes)
- Medical ethics (seminar).

Find detailed descriptions of course content on the 1B Physiology website: [http://www.pdn.cam.ac.uk/teaching/part1b/Lectures_and_practicals.html](http://www.pdn.cam.ac.uk/teaching/part1b/Lectures_and_practicals.html)

Less frequently-asked questions, answered in the course:

- How did one man survive for over a year without food?
- Why do premature babies struggle to breathe?
- Why is excess spinach bad for Popeye?
- How can you climb Everest without oxygen?
- What are the differences between Usain Bolt and Mo Farah?
- What are the consequences of the Atkins diet?
- What are they actually doing to the patient on ER and House?
- How can some frogs freeze solid and survive?
- How would I induce labour in a pig?
- What is the composition of rectal gas?
New for 2017-18: Extension sessions and office hours

We wanted to involve the students more in our department and give them more choice and variety in their learning, as well as more personalised support. We have therefore decided to run **Extension Sessions** every second week throughout the Michaelmas and Lent terms (at least).

These Extension Sessions will be completely optional and not assessed. We will liaise with the students to decide when would be the most appropriate time to hold them (maybe Thursday lunchtimes?), and we would ask the students to decide what they might like to do. Ideas currently include:

- Visits to research laboratories within our department, to see what really goes on.
- Lectures from visiting academics from outside the department, hopefully including some big names.
- Informal seminars with examiners, to brainstorm essay questions and consider how to improve essay structure.
- Opportunities to meet our part II students and learn about their research projects.
- Journal clubs, in which we would collectively discuss a recent article relevant to the course.

In the weeks in-between these extension sessions, we plan to hold “**Office Hours**” in the same time-slot. Here, a designated lecturer will be available in his/her office, ready to answer any questions you might have about the course. This might be the person giving the current lecture series, or an experienced supervisor who is also a lecturer within PDN. You can use these opportunities just to ask a quick question, or as supplemental supervision sessions – whatever you like!

*These supplementary sessions are a brand new concept for us here in PDN. We have no idea yet how many students would be interested in attending, or what they would prefer to do. We intend to be as flexible as possible and we are open to suggestions about what you would most value!*
What 1B Physiology goes well with

It is important to choose three 1B subjects which go well together, giving you a strong subject base from which to progress into the third year. Our course is the ideal complement to practically any sensible subject combination. In fact, 1B Physiology helps to bridge the gap between many other 1B subjects, rendering many combinations coherent.

Cell biologists will find it useful to know about the functions of the organs from whence their cells came! Funding bodies are increasingly recognising that the current trend for cellular and molecular biology would benefit from a wider, systems physiology, perspective, and they are trying to encourage this. Many companies, for example in the pharmaceutical industry, are seeking to employ graduates with this kind of background.

A good zoologist, even on the behavioural or ecological side, needs a thorough understanding of how animals work. The 1B Physiology courses on reproduction and endocrinology obviously underpin a lot of interesting zoology, and you will also be taught about comparative digestion, desert and Arctic ecological physiology, as well as many other zoologically-related areas not covered in 1B Animal Biology.

Students interested in medical sciences, perhaps with a view towards post-graduate medicine, will probably want to take 1B Physiology: physiology is, after all, the basis of medicine. Our course complements other "para-medical" 1B options such as Path, Neuro and Pharm very well indeed. Many students combine these options to give a really strong and coherent set of subjects.
What about the future?

In part 2 Physiology, Development & Neuroscience (PDN) you can choose modules from any of these three areas (you don’t have to do all three, but you can combine P, D and N if you wish). This gives you a wide choice of specialisms within physiological and related disciplines. Part 2 PDN is ideal for those interested in postgraduate medicine, biomedical research, a PhD in physiological sciences and many other careers. It includes the opportunity to do an extended research project, many of which lead to publications in leading research journals.

If you are thinking about taking 1B Physiology to support and strengthen your other courses, you will find it particularly useful for part 2 Zoology, Pharmacology, Psychology, Neuroscience & Behaviour (PNB) or Pathology, but it will provide a good background for most other part 2 options.

For more information

Please feel free to e-mail Dr. Matt Mason (mjm68@cam.ac.uk) or the course organiser for 1B Physiology, Dr. Andrew Murray (ajm267@cam.ac.uk), if you have questions about the course which are not answered here.

You should also consult the 1B website, where you can find the course guide together with more information: http://teaching.pdn.cam.ac.uk/1b-physiology.shtml

You should always consult widely when making this kind of decision. Your Director of Studies is best-placed to advise you, but you should also consider talking to your supervisors, and to current 1B physiologists in your College.

MJM, 17/5/17