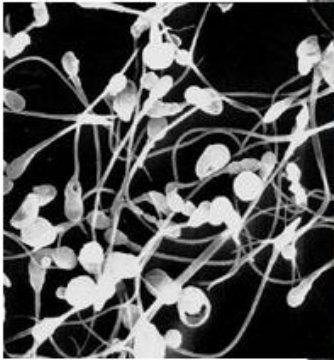
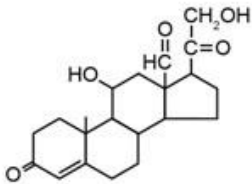


NST 1B PHYSIOLOGY



Course Prospectus 2022-3

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.

1B Physiology is a coherent course. We have a clear syllabus, and the material you have learned about different physiological systems is pulled together in the Easter term, when you look at the coordinated responses of the human body to a number of environmental challenges. By the end of the course, you will feel that you really understand how we work – and how we sometimes go wrong!

1B Physiology and 1A PoO

You can take 1B Physiology without having taken 1A PoO, although you will certainly enjoy a big advantage if you do have that background.

Although the 1B course retains the flavour of the PDN-based PoO lectures you had in Michaelmas and early Lent terms, much of the 1B course relates to topics that are not touched on in PoO, 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 more medical than comparative focus, gets much more interesting than the overview presented in 1A.

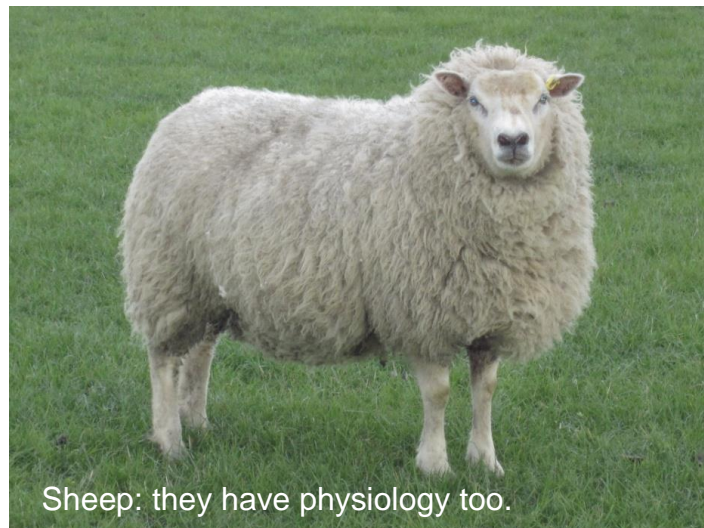
Leave out the Physiological sciences from your curriculum, and you launch the student into the world, undisciplined in that science whose subject-matter would best develop his powers of observation; ignorant of facts of the deepest importance for his own and others' welfare; blind to the richest sources 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 is the second year course on animal physiology, i.e. it is the natural continuation of the 'PDN' strand of PoO.
- There is **no plant science** in 1B Physiology. It is entirely animal physiology, mainly concentrating on humans. Rather than being a comparative course like 1A Physiology of Organisms, 1B Physiology has more of a **medical perspective**.
- There is **only a little neurobiology** in 1B Physiology – neuro is covered in a separate 1B module, although the two subjects are obviously complementary.
- The level of mathematics/physics needed for this course is **no more advanced** than that required for 1A PoO.
- It comes with a series of **exciting practicals**, which follow a similar format to those run in the Physiological Laboratory in 1A PoO.
- 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 1B 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 from a different perspective. We focus on human physiology, and there is more of a medical emphasis. New subjects such as **physiology of blood, lymph & inflammation, pH control, breathing mechanics, stress physiology** and **symbiotic gut microbes** are discussed, often in the context of health and disease.

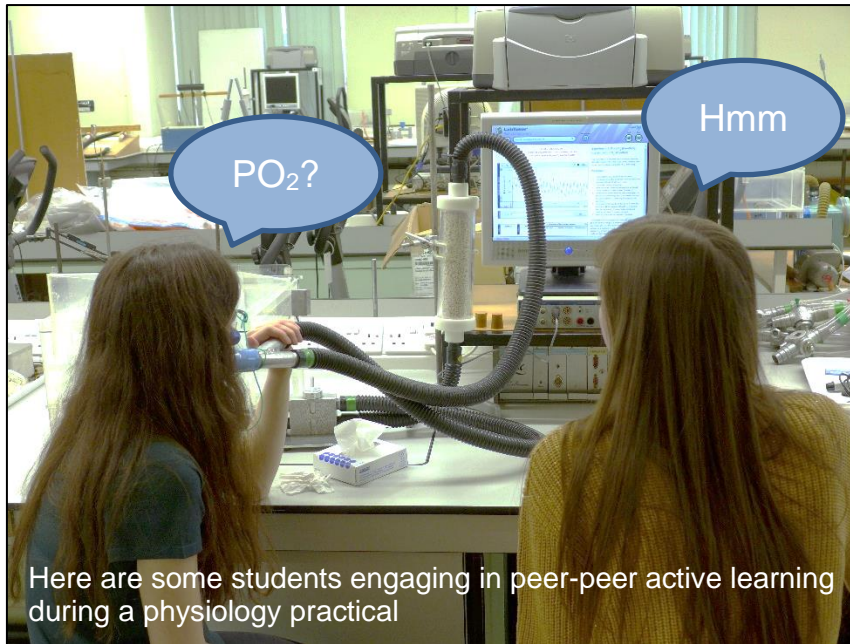
Most of the second term is spent looking at the **mammalian reproductive system**. Topics include **sex, embryonic and fetal development, birth and lactation**, from a comparative mammalian perspective as well as in humans.



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 2022-3

Michaelmas	Lent	Easter
Cardiovascular physiology (5 lectures, James Fraser)	Reproduction (6 lectures, Bill Colledge)	Exercise and training (1 lecture, Christof Schwiening)
Clinical cardiovascular physiology (1 lecture, James Fraser)	Early pregnancy (2 lectures, Erica Watson)	High altitude physiology (2 lectures, Andrew Murray)
Human endocrinology (3 lectures, Matt Mason)	Placental and fetal physiology (4 lectures, David Bainbridge)	Arctic & desert physiology (2 lectures, Matt Mason)
Human respiration (6 lectures, Mike Mason)	Birth & Lactation (2 lectures, David Bainbridge)	Physiology of microgravity (1 lecture, Andrew Murray)
Human renal physiology (5 lectures, Stewart Sage)	Neonatal physiology (1 lecture, Emma Rawlins)	
Physiology of pH regulation (2 lectures, Stewart Sage)	Digestive physiology (7 lectures, Matt Mason)	
Blood, lymph and inflammation (2 lectures, Milka Sarris)	Weight regulation & nutrition (2 lectures, Matt Mason)	



The course also includes some exciting **experimental practicals**, which take a similar format to those in 1A but are a bit more ambitious in their scope. There are also **histology classes** in which you are encouraged to integrate structure and function. We expect to run the following classes:

- Frog heart electrophysiology
- Measurement of human cardiac output
- Metabolic changes following a meal
- Physiology of gut smooth muscle
- Exercise and training (2 practicals)
- Male and female reproductive tracts (2 practicals)
- Mother and fetus
- Functional histology and microscopy of other organ systems (5 practicals)

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 in those medical shows?
- How would I induce labour in a pig?
- What is the composition of rectal gas?

Innovative teaching in NST 1B Physiology

NST 1B Physiology has a proud history of innovative teaching. For several years pre-pandemic we worked to give our students more choice and variety in their learning, as well as more personalised support.

We introduced '**flipped classroom**' teaching into one of our courses, whereby students were given material to assimilate online, and then that material was discussed in an interactive way in live presentation sessions. This has proved very popular with our students, who liked the opportunity to participate more actively.

We hope to run **Extension Sessions** every second week throughout the Michaelmas and Lent terms. These Extension Sessions are completely optional and not assessed. They will likely be held on Thursday lunchtimes. Previous year's sessions included:

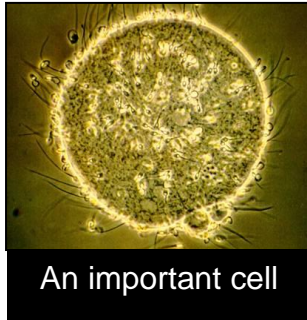
- Visits to research laboratories within our department (including the Centre for Trophoblast Research), to see what really goes on.
- A seminar with a very experienced physiology supervisor and former Senior Tutor (Dr Richard Barnes), to consider how to improve essay structure.
- A session on assisted reproductive technologies, to give you an idea about how you might use what you learn in the future.
- A dissection of the rabbit gut to examine features of comparative interest.
- An opportunity to meet our part II PDN students and learn about their research projects.
- And this year we hope to add a Q&A session on scientific career opportunities outside of the university system.

In the weeks in-between these extension sessions, we hope to hold **Office Hours** in the same time-slot. Here, an experienced lecturer who has been giving the recent course would be available in their office, ready to answer any questions you might have. Students could use these opportunities just to pop in to ask a quick question, or as supplemental supervision sessions – whatever they needed!

While we hope to be able to return to these things in 2022-3, this will clearly be subject to how the covid situation evolves. We are always open to suggestions from you!

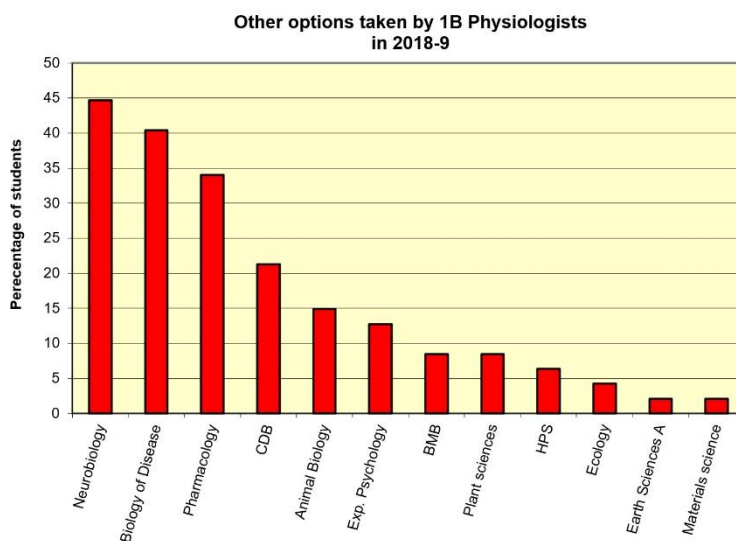
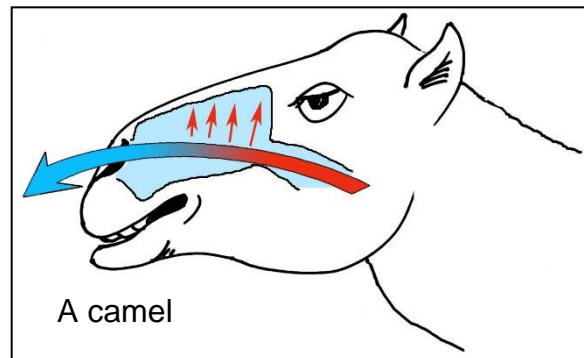
What 1B Physiology goes well with

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 physiology, as well as many other zoologically-related areas not covered in other 1B modules.

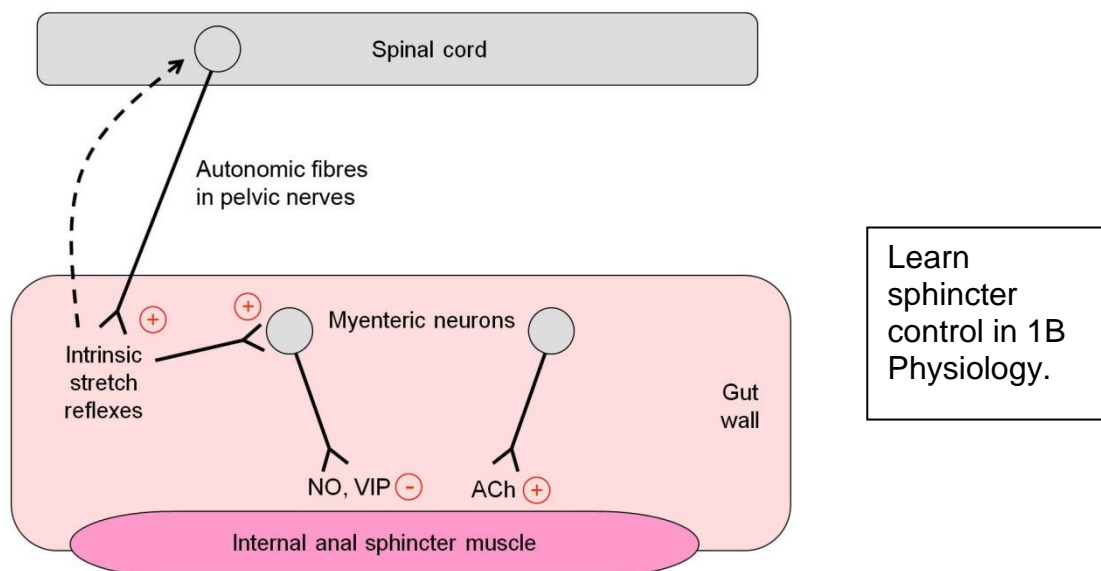


Students interested in **medical sciences**, perhaps with a view towards post-graduate medicine, will probably want to take 1B Physiology: physiology is, after all, the basis of medicine. Our course complements other 'para-medical' 1B options such as Path, Neuro and Pharm very well indeed. Many students 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 choose four modules from a wide selection within these three areas of basic science. You can focus on P, D or N streams (this means that you do *not* need to cover all three areas in NST 1B), or combine modules from different streams if you prefer. It normally includes the opportunity to do an extended **research project**, many of which lead to publications in leading research journals. Part 2 PDN is ideal for those interested in post-graduate medicine, biomedical research, a PhD in physiological sciences and many other careers.

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 biology options.



For more information

The Course Organiser for 1B Physiology is Prof. Andrew Murray (ajm267@cam.ac.uk). Both he and Prof. Matt Mason (mjm68@cam.ac.uk) are happy to advise you further about the 1B course.

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, 20/6/22