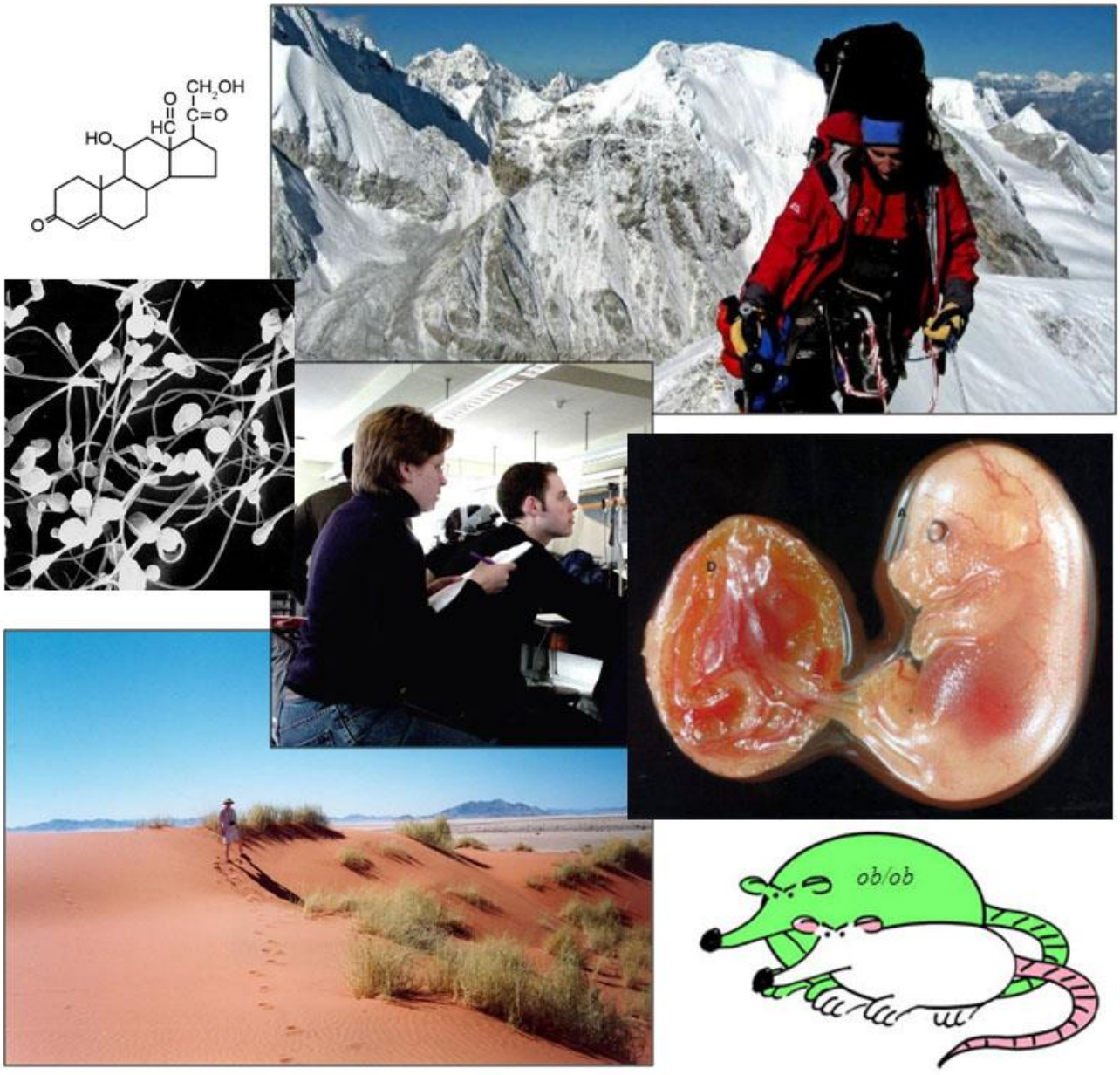
NST 1B PHYSIOLOGY



Course Prospectus 2025-6

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, biomedical 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 technically take 1B Physiology without having taken 1A PoO, although you will certainly enjoy a very substantial advantage if you do have that background.

The 1B course is mainly focused on human physiology, from a more medical than comparative perspective. 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 to be much more interesting than the overview presented in 1A, especially students who are more biomedically-focused.

Having used molecular biology to break a person down into their tiniest components - their genes, their proteins and all the other molecules - we need to understand how to put all those pieces back together again. This is precisely what physiology is about.

Adapted from a quote by Prof. Denis Noble, Former President of the International Union of Physiological Sciences

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.

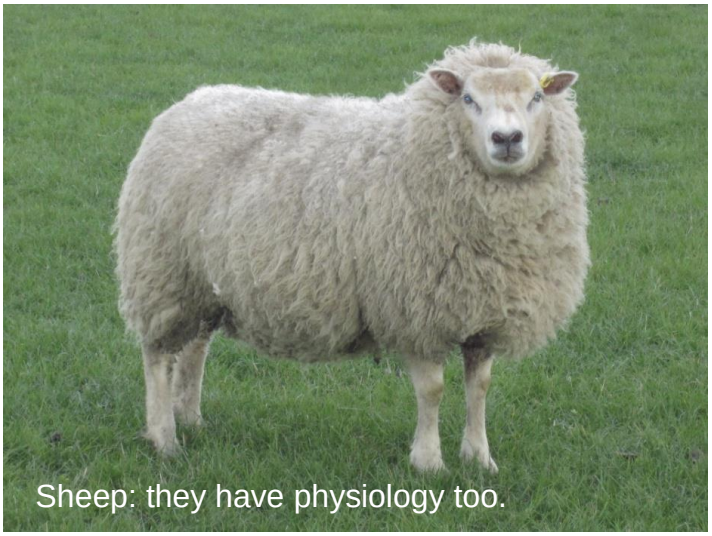
- There is **no plant science** in 1B Physiology. It is entirely animal physiology, mainly concentrating on humans. Rather than being a comparative course like 1A Physiology of Organisms, 1B Physiology has more of a **biomedical perspective**.

- 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 modules in all three subjects.



Sheep: they have physiology too.

Innovative teaching in 1B Physiology

Our Digestive Physiology course uses **'flipped classroom' teaching**, whereby students are given material to assimilate online, and then that material is discussed in an interactive way in live presentation sessions. This has proved very popular with our students, who like the opportunity to participate more actively.

1B Physiology Course Outline

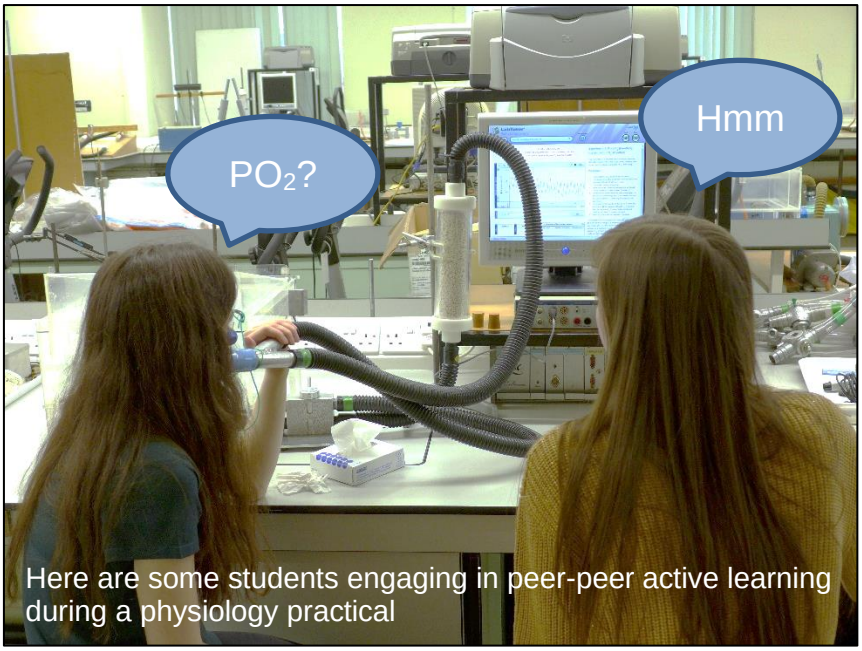
In the first term and part of the second term, we cover some familiar physiological systems from a different perspective. We focus on human physiology, and there is more of a biomedical emphasis. New subjects such as **physiology of blood, lymph & inflammation**, **pH control**, **breathing mechanics**, **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 **reproductive physiology**, a very popular and new topic for most students (see later).

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 2025-6

Michaelmas	**Lent**	**Easter**
Cardiovascular physiology (5 lectures, James Fraser)	Reproduction (6 lectures, TBC)	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, TBC)
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, Michael Mason)	Birth & Lactation (2 lectures, David Bainbridge)	Physiology of microgravity (1 lecture, TBC)
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)	



Here are some students engaging in peer-peer active learning during a physiology practical

The course also includes some exciting **experimental practicals**, which take a similar format to those in 1A but are 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:

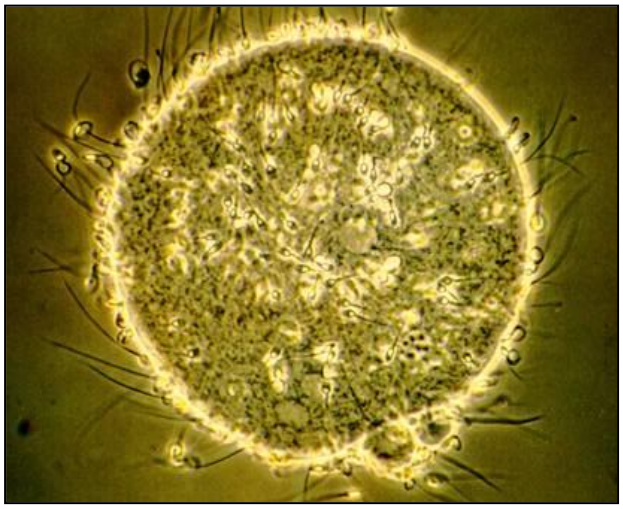
- How did one man survive for over a year without food?
- Why do premature babies struggle to breathe?
- Why is excess spinach bad for Popeye?
- How can you climb Everest without oxygen?
- What are the differences between Usain Bolt and Mo Farah?
- What are the consequences of the Atkins diet?
- What 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?

Reproductive Physiology

Reproductive Physiology occupies the first five weeks of the Lent term. For many, it is a completely new topic since it is not covered in Physiology of Organisms.

Topics covered include **sex determination, production of sperm and eggs, fertilization, pregnancy, embryonic and fetal development, the birth process** and **neonatal physiology**.

Some of this course is co-taught with the veterinary students, so it retains the biomedical feel of the rest of the 1B Physiology course, but takes a more comparative perspective. We do of course consider human reproduction too though!



We take you from this…

To this…

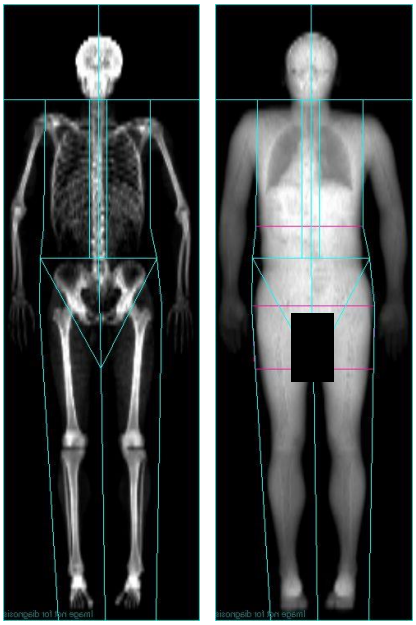
Our reproduction course is very popular with our students, many of whom go on to take reproduction-based modules in Part 2 PDN (see later).

Studying reproductive physiology can lead to many interesting discussions in lectures, practicals and supervisions, including the multiple components of 'biological sex', questions about why humans exhibit menstruation and menopause when most other mammals do not, and why reproductive systems are so much more diverse than other physiological systems.

The Physiological Society

To learn more about the opportunities available in physiological research and to join the wider physiological community, you might consider joining the Physiological Society! Click on the logo for more.

What 1B Physiology goes well with



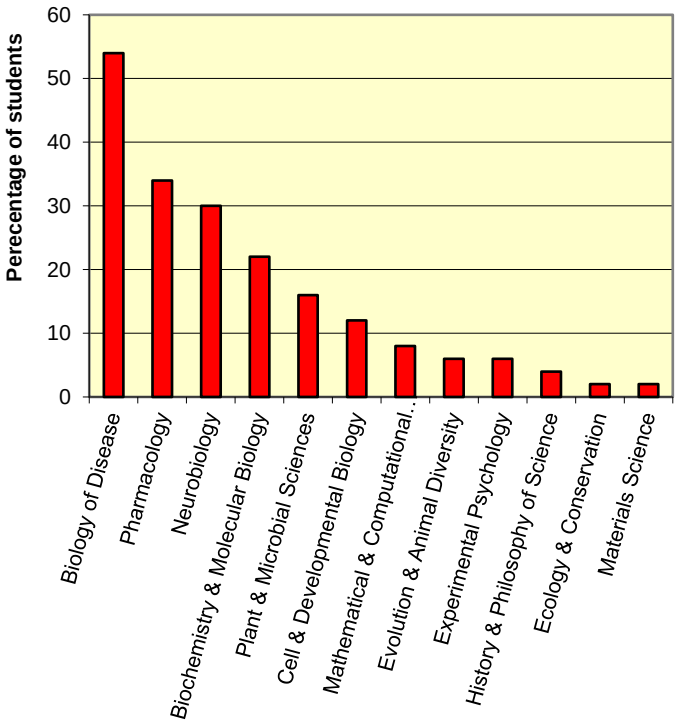
It is important to choose three 1B subjects which go well together, giving you a strong subject base from which to progress into the third year. Our course is the ideal complement to practically any sensible subject combination. In fact, 1B Physiology helps to bridge the gap between many other 1B subjects,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

Students interested in **biomedical sciences**, including those who are considering post-graduate medicine, will almost certainly want to take 1B Physiology: physiology is, after all, the basis of medicine. Our course complements other biomedical 1B options such as BoD, Pharmacology and Neurobiology very well indeed. Many students combine these options to give a really strong and coherent set of subjects.

Molecular biologists will find it useful to know about the functions of the tissues from whence their molecules 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, endocrinology and weight control obviously underpin a lot of interesting animal (and human!) behaviour. While mainly biomedically focused, some of our lectures in 1B do have a comparative mammalian perspective.

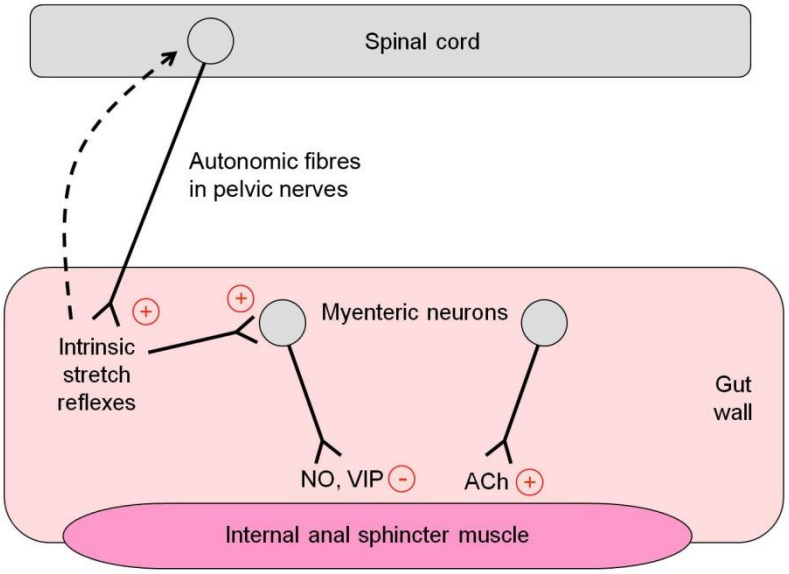
Other options taken by 1B Physiologists in 2023-4



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 biomedical research, a PhD in physiological sciences, postgraduate medicine 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 Pharmacology, Pathology** or **Zoology**, but it will provide a good background for most other Part 2 biology options.



Learn sphincter control in 1B Physiology.

For more information

The Course Organiser for 1B Physiology is Prof. Stewart Sage (sos10@cam.ac.uk). Both he and Prof. Matt Mason (mjm68@cam.ac.uk) are happy to advise you further about the 1B Physiology 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, 10/2/25