

Course Syllabus

BIO-413 Planetary Health (Autumn semester, 2025)

1. Course Overview and Structure

This course provides an overview of global environmental change through the perspective of the planetary boundaries and examines how human health is interlinked with social and ecological contexts.

Students will explore key global problems such as climate change and biodiversity and their links to planetary health, including an in-depth examination of cancer. The course will give an overview of bioengineering strategies to reduce environmental impacts, the effect of environmental factors as risk factor in cancer development, and the role of metabolic engineering in planetary health. From week three students will work on a group project based on a real-world planetary health challenge to identify potential solutions to this challenge.

The course is structured in **four modules***, each led by a different expert:

1. Introduction to planetary health and sustainability (Lecturer: Dr. Nicola Banwell)
2. Global metabolism and food industry impact on Planet Health (Lecturer: Giovanni D'Angelo)
3. Bioengineering strategies to reduce environmental impacts (Lecturer: John McKinney)
4. Impact of environmental factors in cancer development and economic sustainability in anti-cancer drug development (Lecturer: Elisa Oricchio)

Please refer to the **Course Book** for information regarding learning outcomes, prerequisites and expected activities: <https://staging-edu.epfl.ch/coursebook/en/planetary-health-BIO-413>

**Please note that the order of the modules has changed from the version presented in the coursebook.*

2. Moodle

Moodle Link: <https://moodle.epfl.ch/course/view.php?id=18250>

3. Communication

Please ask questions directly to the teachers during and after class. You can also ask questions via Moodle to the teaching assistants.

Module 1: Dr. Nicola Banwell

Module 2: Prof. Giovanni D'Angelo; Gary Domeniconi (teaching assistant)

Module 3: Prof. John McKinney

Module 4: Prof. Elisa Oricchio

4. Mode of Delivery

The course will be delivered face-to-face on **Tuesdays** from **09h15-11h00 and 11h15-13h00** in the room **BC04**, starting on Tuesday 9th September.

5. Assessment methods

1. Continue controlled exams: 60% (individual, during the semester)

- Content from each module will be assessed by written exams
- The exams will be carried out in two sessions, taken together, the two exams will count for 60% of the overall grade (content from each module corresponds to 15% of the overall grade)

2. Oral presentation of group project: 40% (group, end of the semester)

- Students work in groups on a real-world planetary health challenge to define the problem and propose a potential solution to this challenge.
- Groups will be established & topics assigned in class week 3 (23.09.2025)

Presentations will be held during class time on the 16th December. Slides should then be uploaded to Moodle.

6. Guidelines for exams

The details for each exam will be communicated by the teacher at the beginning of each Module.

Exams will be carried out in person in the assigned room (BC04) during class time.

The dates of the written exams are the following:

Exam 1: 14.10.2025, 09:15-11:00 (Modules 1 & 2)

Exam 2: 02.12.2025, 09:15-11:00 (Modules 3 & 4)

7. Guidelines for Group Project

In this group project, you will have the opportunity to learn, in-depth, about a planetary health challenge. Your task is to explore a specific planetary health challenge and propose possible responses to it.

The group project will contribute to **40% of the final grade**. The oral presentation will be carried out **during class time on the 16th December (Week 14)**.

Groups will work autonomously in BC04 during the dedicated times for group work indicated in the class schedule.

Forming your groups

Groups will be formed on the **23rd of September** via a sign-up sheet during class time. Each group will be composed of approximately 4 to 5 students (depending on the size of the class).

Topics

Topics are provided by the teaching team and will be made available on the Moodle. Topics will be **randomly assigned** to the groups.

In the case of broad topics, the specific scope of the project will need to be discussed with, and approved by, the respective teacher.

Groups are permitted to swap topics if you arrange this swap between your groups and inform Nicola Banwell via email by the 26th September.

Each group will be required to answer the following questions

- What is the problem?
- Why is it a problem?
- What needs to be done about the problem?
- What are the potential negative consequences of these responses?

Support for your group work

Teachers will provide resources relating to each topic at the beginning of group work.

Specific periods of class time will be dedicated for groups to work autonomously on their projects (refer to the class schedule).

Each group can access 2 hours of coaching and feedback during the semester from the teacher or teaching assistant responsible for the assigned topic.

- The format and timing of this support is to be determined in discussion with the teacher concerned based on their availability (e.g. 2 sessions of 1 hour face to face or online)
- Please be prepared for these sessions with a list of questions.
- These sessions can be scheduled in direct contact with the teacher concerned.

Presentation format and requirements

- Group presentation of 15 minutes presentation, followed by 5-10 minutes of questions and answers.
- All group members are required to speak for the same amount of time during the presentation.
- Accompanied by a visual aid (PowerPoint presentation or another format).

Grading will be carried out by the teaching team during the presentations. Your presentations will be assessment on the quality, depth, and creativity of both the content and the presentation.

Code of conduct

Learning to work effectively in groups is an important transversal skill for your future professional career. **Please be fair:** We know that you are all busy, but please commit to maintaining the ethical norms and the principles of fair play with regards to your individual contributions to the group. If the group encounters difficulties with the contributions of certain members, we expect you to discuss this together as a group and come up with a plan to address the problem. In groups where there is a strong disproportional effort between members of the group, students should come forward and inform the class lecturers so that measures can be taken to correct the problem.

8. Mandatory and recommended reading

Each teacher will make the mandatory and recommended reading available on the course Moodle at the beginning of each Module.

9. Class schedule with key dates

Wk	Date	Module	Teacher	Topic
1	09.09	1	Banwell	Introduction to course & planetary health
2	16.09	1	Banwell	Climate change, biodiversity loss & health
3	23.10	1	Banwell	Sustainability solutions: a critical reflection
4	30.09	2	D'Angelo	Global Metabolism the impact of Food Systems on Planetary health
5	07.10	2	D'Angelo	Global Metabolism the Impact of Food Systems on Human Health
6	14.10	1 & 2	Banwell & D'Angelo	Exam 1 (09:15-11:00) & project work (11:15-13:00)
-	21.10	-	-Semester break-	-
7	28.10	3	McKinney	Sustainable agriculture: the future of food
8	04.11	3	McKinney	Sustainable environments: bioremediation
9	11.11	3	McKinney	Sustainable energy: biofuels (T.B.C)
10	18.11	4	Oricchio	Environmental factors and the increased risk of cancer development
11	25.11	4	Oricchio	Sustainable drug development challenges and opportunity
12	02.12	3 & 4	McKinney & Oricchio	Exam 2 (09:15-11:00) & project work (11:15-13:00)
13	09.12	-	-	Independent work to finalize group projects
14	16.12	-	All	Project Presentations