

# Computational Methods for Sustainability

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## 1. Learning Outcomes

- Understand the conceptual basis of the science of complex systems as related to sustainability
- Have knowledge of the functioning and application of computational methods in simulation, datascience and visualisation to understanding sustainability in complex systems
- Been introduced to examples of multilevel interacting systems in the areas of geosciences (climate), biological and medical sciences (ecosystems and public health), social sciences (socioeconomic systems), and the use of computational methods in understanding these systems.
- Worked with other students to apply the computational methods studied to a real-world sustainability problem that involves multiple interacting systems.

## 2. Likely style of course and whether interdisciplinary and/or external stakeholders involved

20 point 2 semester course. The first semester will involve introductory material (lectures, tutorials, lab sessions) in the intellectual and practical aspects of the topics covered – this will need input from the application areas (geoscience, biology, sociology, medicine, possibly economics), probably as guest lectures and associated readings/media. The computational aspects should be delivered by the course lecturers. The second semester will be a small group project involving the use of computational methods to understand a real-world sustainability problem. This will need input from the application areas to suggest/form projects, and most likely will need supervision from those areas (e.g., PhD student teaching support).

## 3. Target audience:

UG4/5, possibly MSc. A prerequisite (for non-Informatics) would be an ability to program for the project phase, unless we allowed projects that were just written reports, but I'm not sure how to do that and still have a computational focus.

## 4. What would be a feasible size to support, and what type of support? would make sense, especially to make the course robust (co-lecturer? Uni Teacher? Tas?)

I suggest starting relatively small, and as the course structure and deliver evolve over some years then scaling up if possible and assuming there is increasing demand. To start with I'd suggest a minimum of 20 and maximum of 40 students, and project groups of 3-4 (so 5-13 groups). Over time I imagine it could be scaled up with sufficient teaching support 100 or more. The limiting factors would be external application area guest lecturers (lecture+media materials+project ideas), and external application area support for projects (PhD students?). It should be co-taught by Informatics staff for resilience.

## 5. Are there others who would want to be involved in either development or delivery (incl U Teachers or staff from other schools)?

Oisin Mac Aodha is interested but we have not discussed this much yet. I think it would be good to explore interest more widely in Informatics – I suspect there may well be others. It may be desirable to look at co-organising by application area faculty, beyond just being a guest lecturer), depending on interest and how that works from a resourcing perspective.

6. Feasible timeline for development

I won't be able to put much time into development until around April/May 2022 as I'm teaching IAML-DL in S2. If there were others who could do some of the development, I think we could possibly run it in small scale in 22/23, but given the necessary extensive interaction with and commitment from other Schools its much safer to develop for first delivery in 23/24. The S2 projects could perhaps be piloted by running some UG4 projects in 22/23, but these would need to be developed now for the Feb 2022 allocation round.