

BRINGING COMPUTATION INTO THE CLASSROOM

Tristram Alexander^a and Helen Johnston^a

Presenting Authors: Tristram Alexander (tristram.alexander@sydney.edu.au) and Helen Johnston (h.johnston@sydney.edu.au)

^aSchool of Physics, The University of Sydney, Sydney NSW 2006, Australia

ABSTRACT

The use of computation in the physics classroom has the potential to revolutionise the teaching of many topics in the Physics curriculum. By allowing teachers to move beyond problems that can be solved by hand in the limited time available in a lecture, students can be given a much more authentic experience of the topic. With carefully scaffolded tasks, either in a lecture or in a dedicated computational lab, students can explore a much wider range of problems, in a more meaningful way.

We will discuss our experience of using computational physics at Sydney, with emphasis on how to think about introducing it into your own teaching. We will discuss the types of problems that can be tackled, which tools to use, and how to deal with students with different background experience.

Participants are asked to install the Anaconda python distribution before the workshop <https://www.anaconda.com/products/distribution> and bring along suggestions for parts of the curriculum you would be interested in exploring.

Intended Audience: University physics educators

PRESENTERS



Associate Professor Tristram Alexander is a theoretical physicist working on nonlinear systems, with interests ranging from heat flow to social dynamics. With regards to the latter, he is using his physics skills within a multidisciplinary team to investigate community formation, ideological polarization and language dynamics. He has made use of his computational skills to reinvigorate 'computational modelling' courses within the School of Physics at The University of Sydney.



Associate Professor Helen Johnston is an astronomer conducting research in many exciting frontline areas including stellar astrophysics, black-hole binaries, and active galactic nuclei. With a long standing interest and engagement with education and outreach, sharing physics beyond those, she has taken on leadership roles within physics teaching. Helen is the Director of First Year Physics Studies at the University of Sydney. She has been instrumental to the effective transfer of courses to online mode during COVID-19, and continues to contribute to innovations in teaching and learning within the School.

Proceedings of the IUPAP International Conference on Physics Education, ICPE 2022 5-9 December 2022, page 30, ISBN: 978-1-74210-532-1.