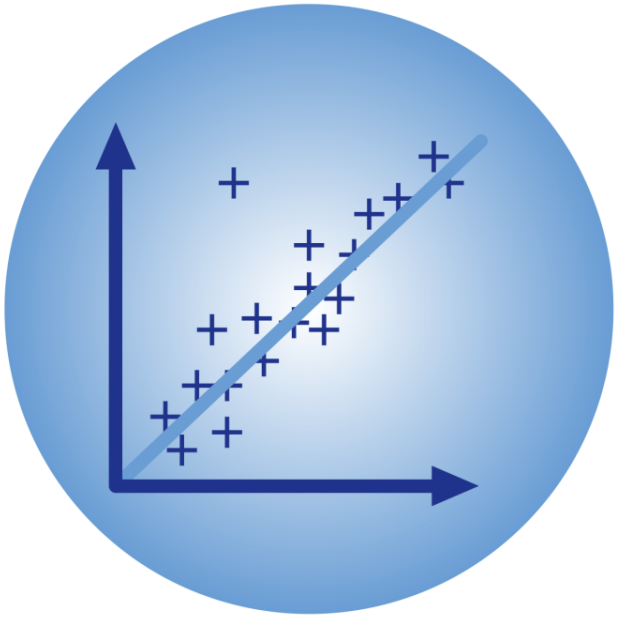


BPhO Computational Challenge

Introduction

Dr Andrew French.
December 2023.

BPhO
British Physics Olympiad

WHAT & HOW

- Register via https://www.bpho.org.uk/
- **10 x 1 hour weekly seminars** Jan-April via Zoom, delivered live. Course content available at the BPhO website and via Dr French's Eclecticon.
- Annual ***Challenge*** to be set after April-Sept. **Bronze**, **Silver** and **Gold** standard problems, so you can choose your level.
- The ***Challenge*** can be attempted individually or in pairs, and you are free to use any appropriate spreadsheets or programming languages. In the course, students will have direct experience of Microsoft Excel, MATLAB and Python.
- Submit your ***Challenge*** entry via a hyperlink to a ***two-minute unlisted YouTube video***, i.e. a 'screen-cast' which describes your solution(s) to the Challenge tasks. The Chrome browser add-on Screencastify is a recommended tool.

BPhO British Physics Olympiad

Screencastify

BPhO Computational Challenge

Why are we doing this?

Think of a modern profession that *does not* involve the use of computers to create, record and store information, control machinery .... I'm not sure I can.

I have a quill, some paper and a sand timer – what more could be useful? Perhaps some central heating…

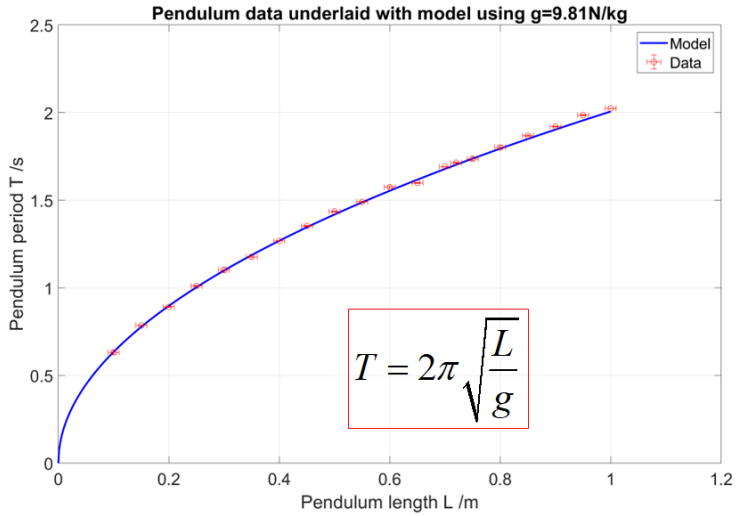
The bookkeeper by Philip van Dijk (1683-1753)
https://commons.wikimedia.org/wiki/File:The_bookkeeper_by_van_Dijk.jpg

BPhO Computational Challenge

Why are we doing this?

BPhO Computational Challenge

Experience of **data flow, data processing** and **information presentation** is a particularly vital element of scientific craft. But at the moment your science experience is probably mostly theoretical problem solving, taking notes and performing lab experiments.



Why are we doing this?

Real Scientists will spend most of their time on data flow, data processing and information presentation. **So start learning these skills and you are more likely to get a job.** The likes of Amazon, Google, Uber, Meta, Tesla, Netflix.. will continue to 'disrupt' traditional industries. **If you don't have these skills, you will not have much to offer to the higher paid sectors of the economies of the future.**

Why are we doing this?

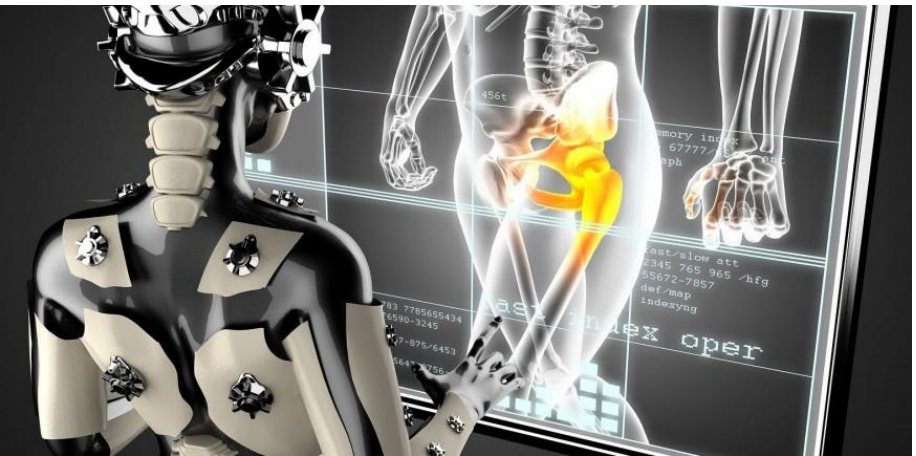
But even if your horizon is merely *“how can I get a Distinction at A-Level and get into a top flight University?”* skills in Scientific Computing are a great way to consolidate your subject, especially when you **begin to create projects and systems of your own design.**

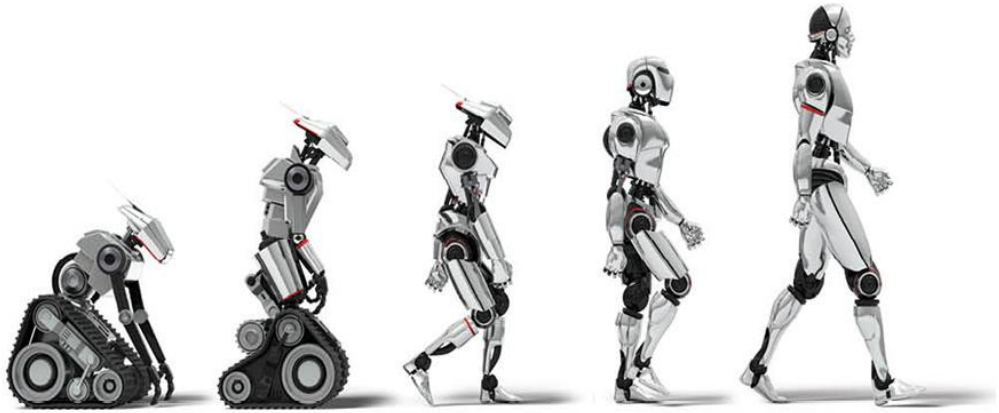
Making things yourself **(that work!) is the BEST motivator for learning**

BPhO Computational Challenge

If most future jobs currently performed by humans will be done much more efficiently and safely by robots / artificial intelligence...

*Wouldn't **you** want to be the person **programming** this technology?*





https://robohub.org/envisioning-the-future-of-robotics/

BPhO Computational Physics course content

1. Intro and modelling motion
2. Models, Experiments, data analysis
3. Gravity and astrophysics
4. Waves and Optics
5. Quantum, atoms, nuclear, radioactivity
6. Electromagnetism
7. Special Relativity
8. Thermodynamics
9. Chaos / Challenge launch
10. Epidemiology / Challenge brief

****2024 CHALLENGE****
MARCH to AUGUST

BPhO Computational Challenge

https://www.bpho.org.uk/bpho/computational-challenge/

BPhO Computational Physics Project & Competition

BPhO Computational Challenge

The Computational Challenge Competition

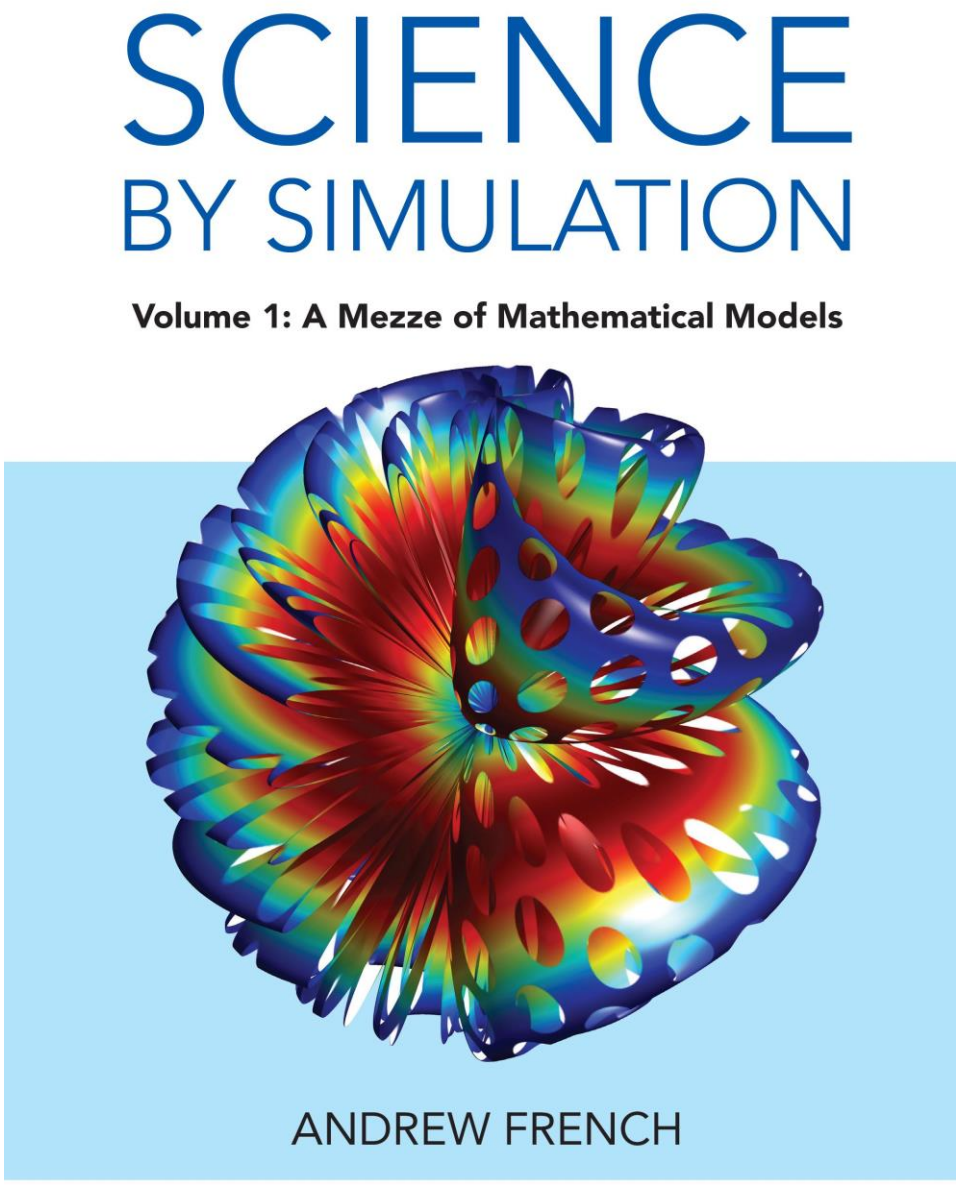
The 2023 Competition is illustrated by these two items below, and the registration form link.

1. The theory behind the competition example:
   BPhO CompPhys Challenge 2023, theory
2. A brief three page summary of the Tasks:
   BPhO CompPhys Challenge 2023

The deadline for submitting entries is midnight on Monday 14th August 2023 (UK time).

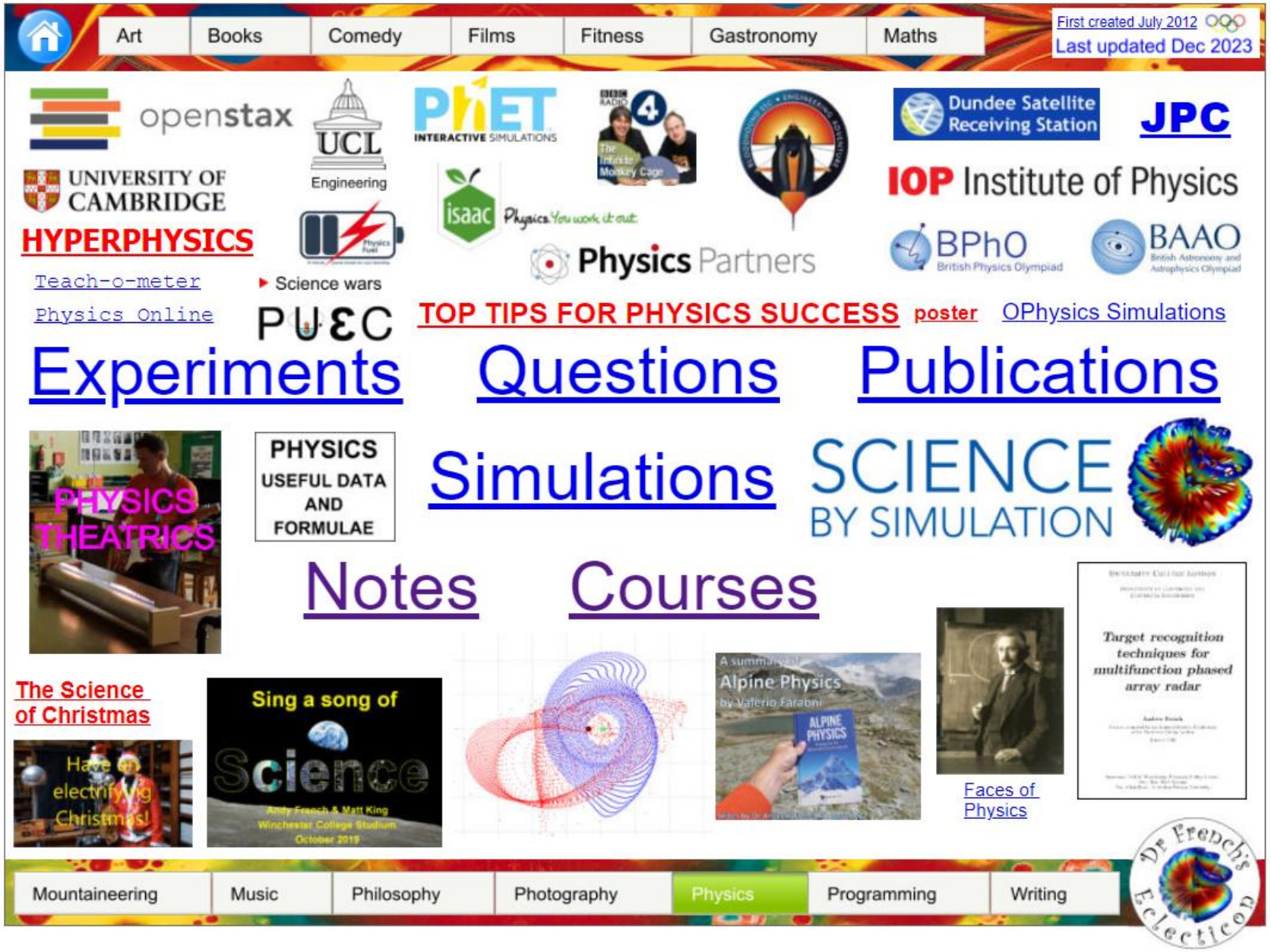
https://www.worldscientific.com/worldscibooks/10.1142/q0327

Recommended text
for the course:



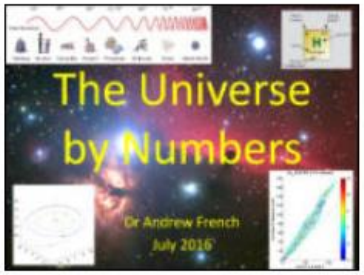
Volume 2: ***Models of Classical Physics*** is in production!

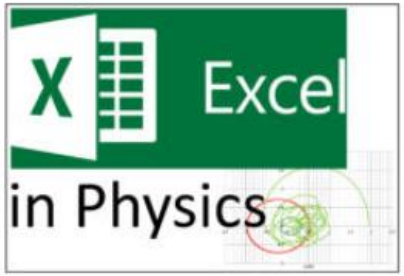
Additional online materials: **http://www.eclecticon.info/physics.htm**



http://www.eclecticon.info/physics_courses.htm

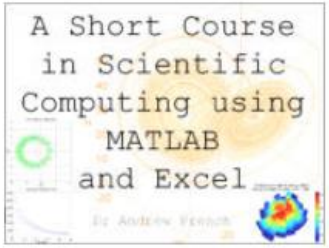
Physics courses

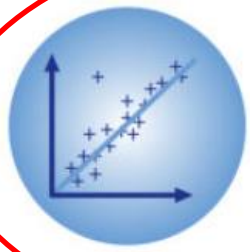




Datalogging

A Course in Coding





BPhO Computational Challenge

BPhO British Physics Olympiad