

## A relational database system and interactive website for atmospheric greenhouse gas measurements



**Note:** This internship is only available to undergraduate students studying a quantitative discipline (e.g. computing, mathematics, statistics, engineering, physics, but NOT environmental sciences). For full eligibility requirements, please see the bottom of this web page:  
<https://www.southampton.ac.uk/nexuss/programme/research-experience-placements-scheme.page>

Lead supervisor: Andrew Manning ([A.Manning@uea.ac.uk](mailto:A.Manning@uea.ac.uk)), University of East Anglia

Duration and dates: 10 week internship; start and end dates are flexible, between 03 June and 25 September 2019.

Hourly rate: 35 hours/week paid at £9/hour (UK Living Wage).

### Project summary:

The student will design and build a relational database system and interactive website for our atmospheric greenhouse gas measurement research projects. Our currently funded projects involve deploying autonomous, automated remote atmospheric measurement systems, and are global in scope, ranging from China, Germany, a container ship travelling to Argentina, and the Norfolk coast.

The student will develop a database for ~200 high pressure gas cylinders and ~500 glass flasks used in our projects, and which may be physically deployed anywhere on the planet. The database will serve multiple purposes including: recording greenhouse gas concentrations in the cylinders and flasks; comprehensive history for each cylinder and flask (e.g. when and where they were filled; laboratory analyses); current and historical whereabouts.

The project will be supervised by Andrew Manning, who leads the Carbon Related Atmospheric Measurement (CRAM) Laboratory at the School of Environmental Sciences, UEA. Alex Etchells

(Systems Specialist in ITCS and bespoke software developer in the CRAM group) will be co-supervisor.

The student will visit Weybourne Atmospheric Observatory (WAO) and our container ship, gaining an appreciation for our autonomous systems. The student will learn the science of greenhouse gas measurements, the global carbon cycle and climate change.

The student's computer programming and design skills will be enhanced by working closely with Alex Etchells, an expert in MySQL, web design and cPanel architecture. The student will design and write code for real-world applications, where end-user requirements are first priority. The student will benefit from working in a dynamic, active research group within UEA.

#### Selection criteria:

- **Essential:**
  - Knowledge of and experience working with relational databases.
  - SQL database experience.
  - Experience with a website scripting language, for example, PHP.
- **Desirable:**
  - Familiarity with a Windows-compatible high-level, general-purpose programming language such as Python or C#.
  - MySQL database experience.
  - Web page design, in particular developing intuitive, user-friendly pages for human interaction.

#### Indicative timeline:

Key tasks with a deliberately ambitious, indicative timescale are:

- **1 week:** Inductions, introduction to research group, discussing scope and deliverables of project, field excursions to WAO and container ship.
- **1 week:** Develop capability to assign, print and read in barcodes with barcode printer and scanners, utilising Seagull Scientific's '*BarTender*' software.
- **2 weeks:** Design and create MySQL relational database system to store information about the CRAM Laboratory's gas cylinders and sample flasks.
- **2 weeks:** Develop means to use barcodes in interaction with the MySQL database, either via *BarTender* or separate bespoke program, e.g. using Python or C#.
- **1 week:** Work with UEA's cPanel microsite for the CRAM Laboratory (<http://www.cramlab.uea.ac.uk/>) to import the database into cPanel architecture.
- **2 weeks:** Develop an interactive, intuitive web-based interface using SQL to interrogate and interact with the database.
- **1 week:** Final report draft; full documentation of work done, including tasks outstanding and future upgrades.

#### To apply:

You must initially follow the application procedure detailed near the bottom of this web page:

<https://www.southampton.ac.uk/nexuss/programme/research-experience-placements-scheme.page>. A full application may be required later, through the University of East Anglia.

Contact: If you have any further questions about the internship, please contact Andrew Manning ([A.Manning@uea.ac.uk](mailto:A.Manning@uea.ac.uk)).