

Non-lab: Master level research projects

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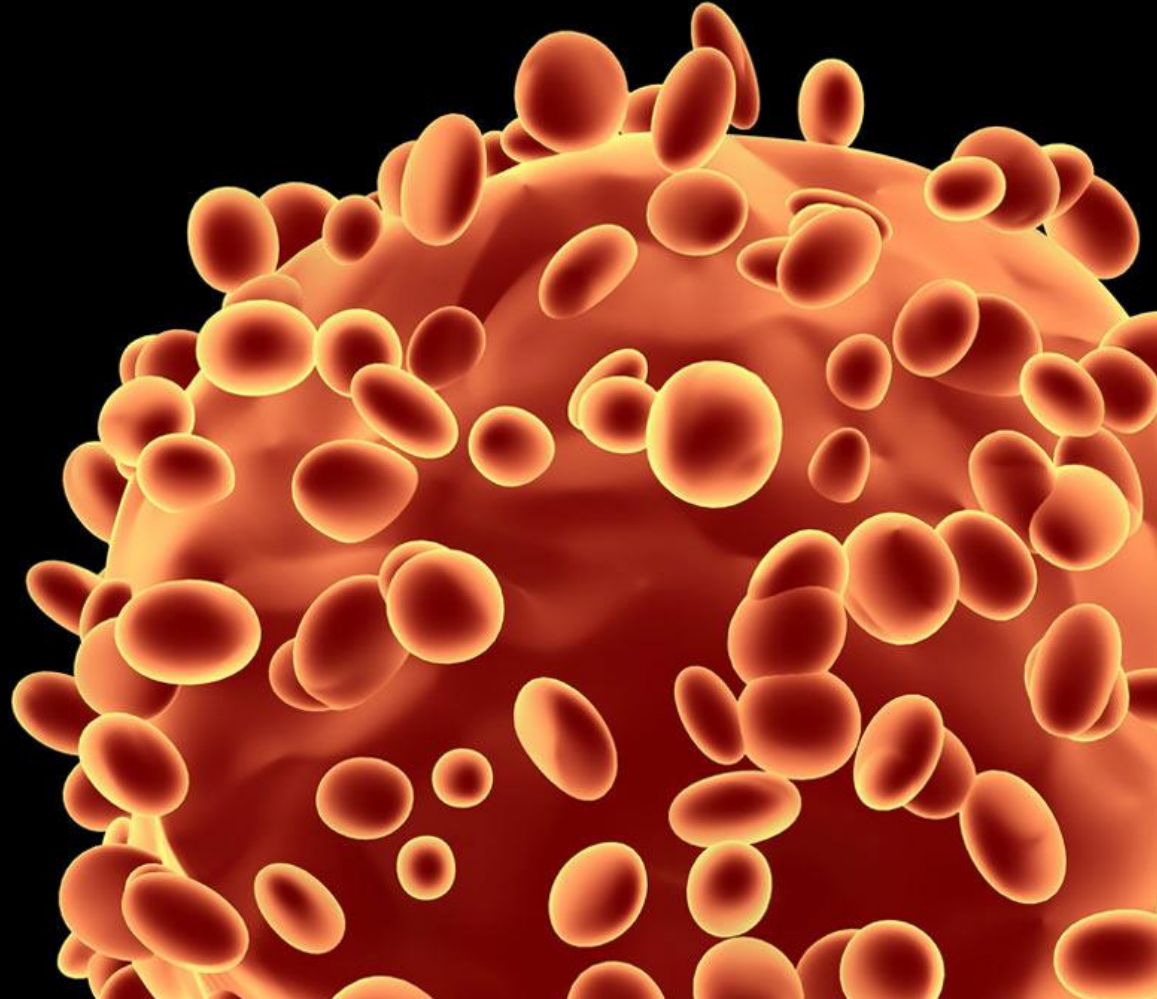
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Thanks to:

Dave Lewis University of Leeds

Keith Miller SHU

Lucy Crooks SHU



Current Position

- Predominantly **international students** (visa restrictions)
- **Student Expectations** to complete wet lab research project
- **Assessment** criteria is set
- (Research Proposals have already been written)



Limitations



Projects need to be completed at home.



Students may not have the skills to use bespoke software.



Staff may not currently have experience of delivering non-lab projects



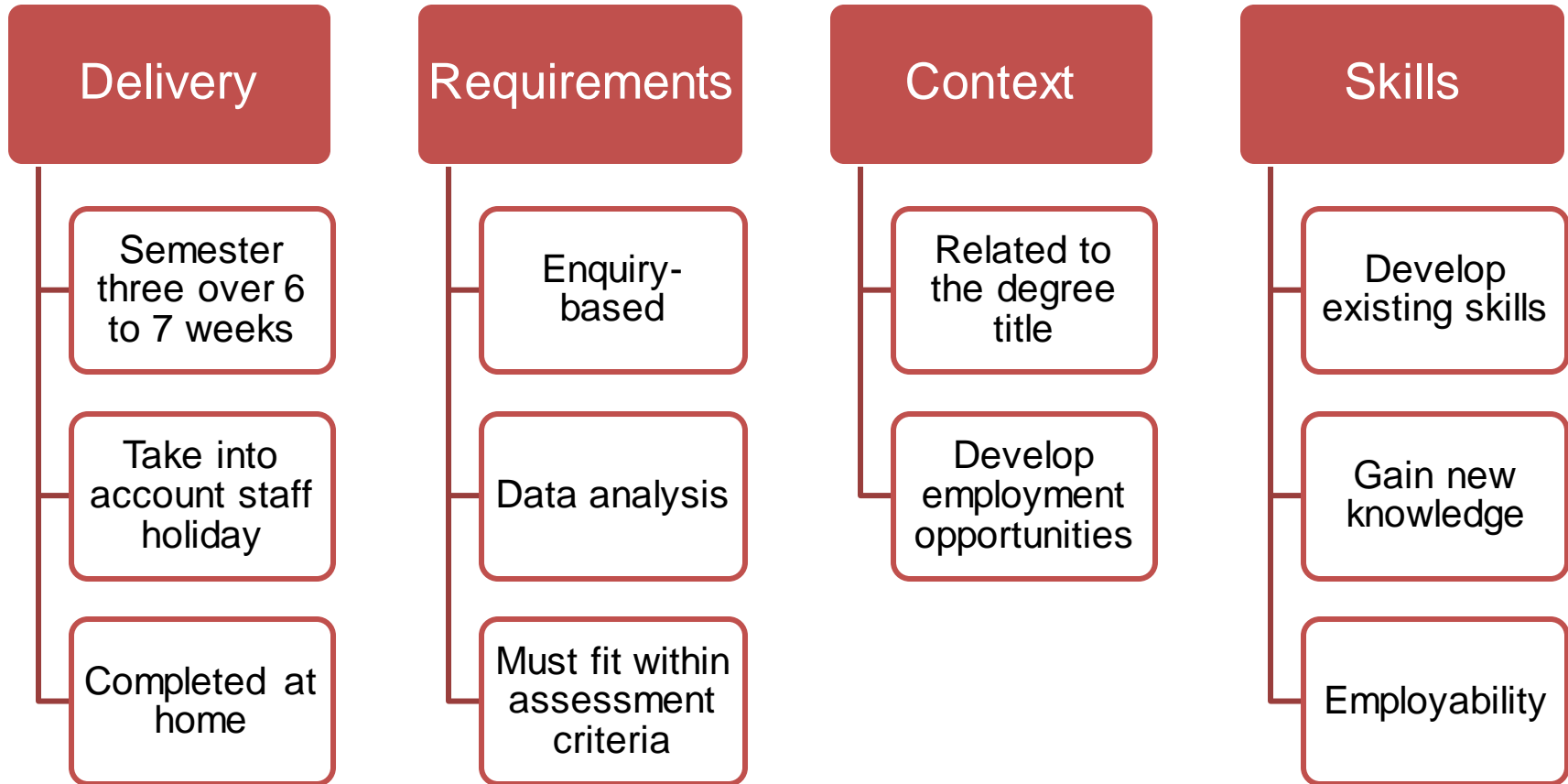
Staff need to take holiday over the summer during delivery.



Assessment via written submission

Framework

Meet student expectations



Delivery



Online delivery

Does the student have the tech?
How will you interact with them?
How will you support them?



Team Teaching

Subject groups
Research groups

Data analysis

Public Understanding of Science

Bioinformatics

Potential Project Areas



Simulations

Systematic Reviews

COVID-19

Please use the chat to share your ideas as we go.....

Data analysis

Potential Project Areas

1.
 - Existing lab data
2.
 - **Development of process**
3.
 - Analysis of data
4.
 - Write up conclusions

Data analysis: Development of process

Potential Project Areas



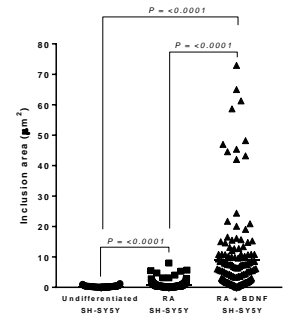
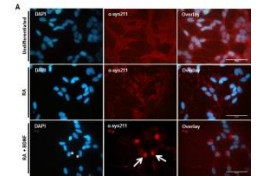
Python / R / C++ script created to analyse data sets.
(Requires coding experience)



ImageJ analysis of immunohistochemistry data.
(Can be learnt quite quickly)



Creation of MSImaging Database: find the appropriate software, import database, learn how to and then write macros to create a search engine, update the database with lit search of new peptides to add



Data analysis

Potential Project Areas

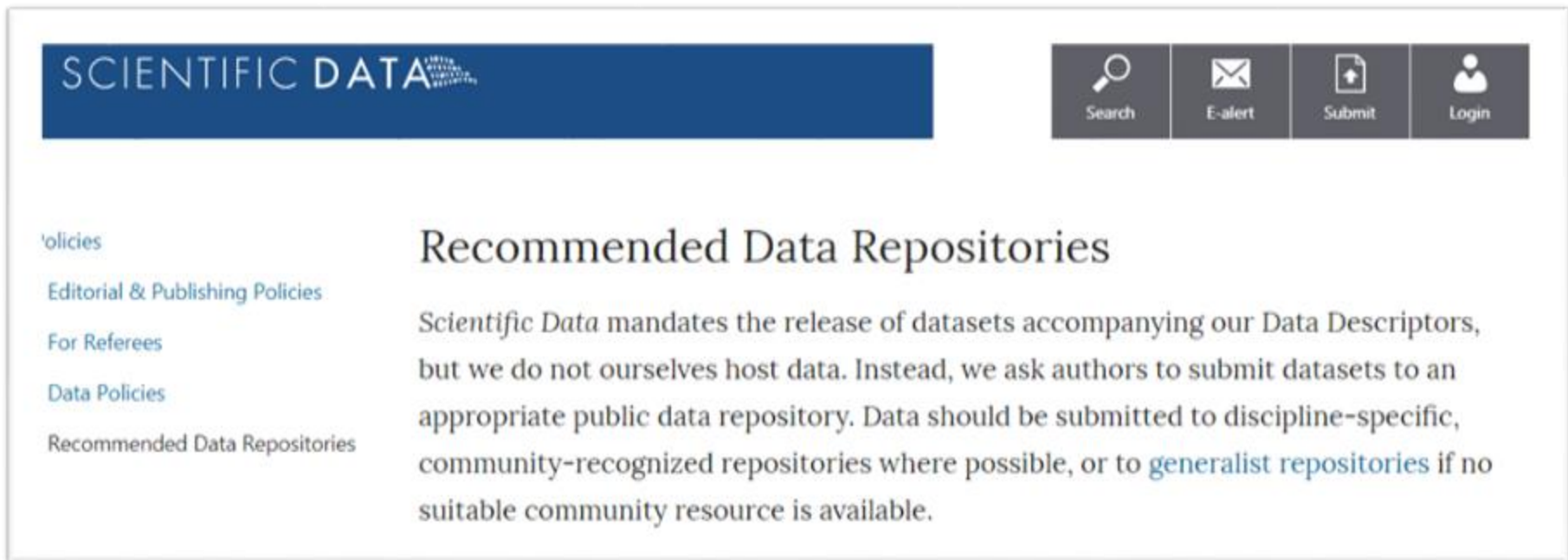
1.
 - Existing lab data
2.
 - **Analysis of data**
3.
 - **Informed literature review**
4.
 - Further research proposal

Data analysis: Getting the data

Potential Project Areas

Publically available data sets

- WHO
- Figshare <https://figshare.com/>
- Recommended Data Repositories Nature
<https://www.nature.com/sdata/policies/repositories>

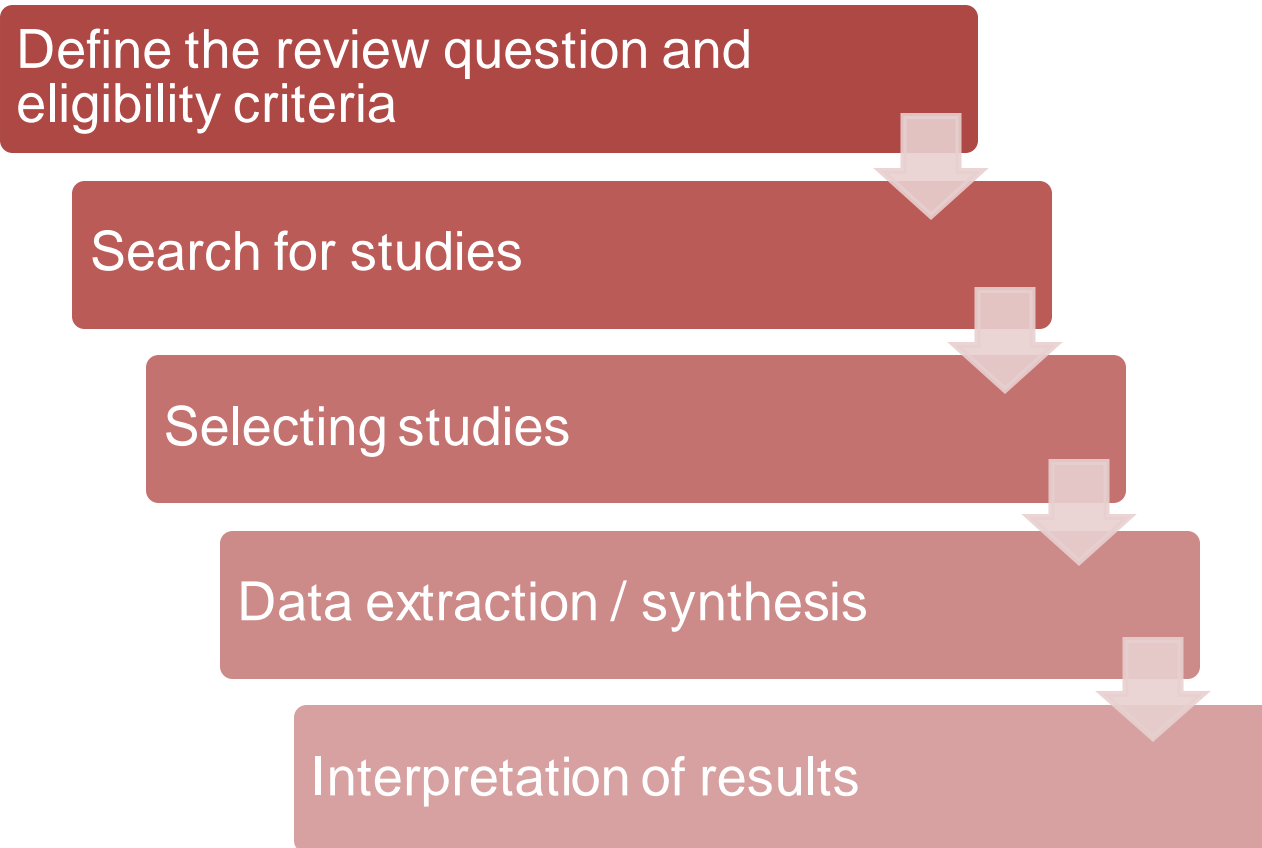


The screenshot shows the top navigation bar of the Scientific Data website. On the left is the 'SCIENTIFIC DATA' logo. On the right are four utility buttons: Search (magnifying glass icon), E-alert (envelope icon), Submit (document with plus icon), and Login (user profile icon). Below the navigation bar is a sidebar menu on the left with the following items: 'olicies, Editorial & Publishing Policies, For Referees, Data Policies, and Recommended Data Repositories. The main content area features the heading 'Recommended Data Repositories' and a paragraph of text: 'Scientific Data mandates the release of datasets accompanying our Data Descriptors, but we do not ourselves host data. Instead, we ask authors to submit datasets to an appropriate public data repository. Data should be submitted to discipline-specific, community-recognized repositories where possible, or to generalist repositories if no suitable community resource is available.'

Systematic Reviews

Potential Project Areas

"methods to collect secondary data, critically appraise research studies, and synthesize findings qualitatively or quantitatively"



Systematic Reviews

Potential Project Areas



Example project: Is there a link between metal homeostasis disease and early onset dementia?

1. META-analysis performed of clinical data sets.
2. List of potential proteins identified
3. Gene expression of linked genes mapped using transcriptomic database
<https://portal.brain-map.org>



Simulations

Potential Project Areas

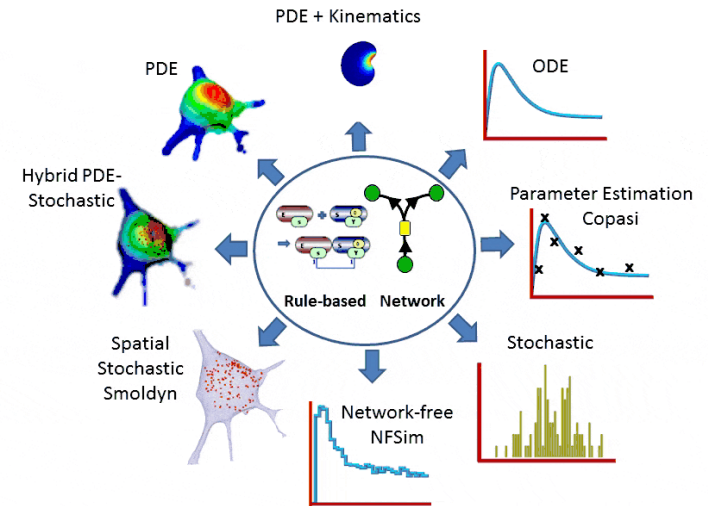
Systems biology has given us a computational and mathematical modelling of complex biological systems.

Define research question

Use computational modelling to simulate

Analyse outcomes

Propose future research directions



<https://vcell.org/>

Bioinformatics / Proteomics

Potential Project Areas

Using bioinformatics and proteomics tools to mine/interrogate (e.g. genomic) datasets. Analysis and interpretation of large publically available datasets;

PROS

- Great for students with experience in the area.
- Data and tools are online.

CONS

- Students without experience may struggle.
- Some tools require bespoke software.



<https://usegalaxy.eu/>

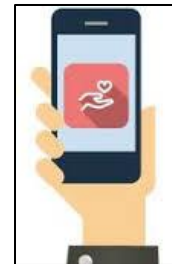
Public Understanding of Science

Potential Project Areas

"For the right student"

Surveys: Any topic/area, of students, staff or the public.

- public attitudes/knowledge of antimicrobial resistance;
- attitudes to the use of animals in education;
- interaction between developers, clinicians and patients in the development of Digital Health Apps



Examples from Leeds University

HT - Dave Lewis

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COVID-19

Potential Project Areas

Large amounts of data have been made publically available

Global by country John's Hopkins has a tracker

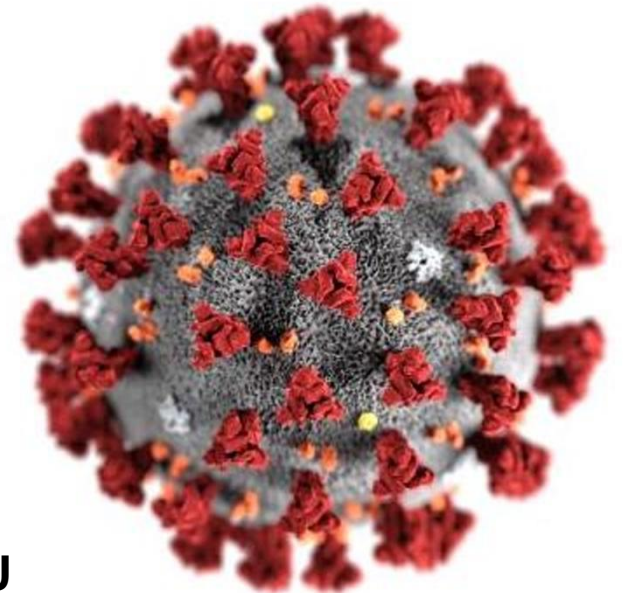
England cases from PHE (Public Health England)

UK deaths ONS (office of national statistics)

England weekly summaries of community surveillance From PHE.

Global Initiative of Sharing All Influenza Data (GISAID).

NCBI Viral Genomes



HT Lucy Crooks SHU

Summary

Silver lining "You never know some good might just come of this"

