UNIVERSITY OF WESTMINSTER

7BIOM037W SYSTEMS BIOLOGY

COURSEWORK 1 GUIDANCE

Prepare a written report on the integrative analysis of two OMICs of your choice. You should describe how the measurement of the biological molecules at different levels (DNA, RNA, Protein, Metabolite, post-translational modified protein etc...) can for instance help deciphering disease mechanisms, identify new biomarkers/functional pathways for precision medicine or in the context of your topic.

Guidance

1. Investigate TWO OMICs from the combination suggested in the table below. This is only indicative and you may choose a different combination.

OMIC 1	OMIC 2
Genomics	Transcriptomics
Genomics	Proteomics
Transcriptomics	Proteomics
Proteomics	Metabolomics
Epigenomics	Transcriptomics
Metabolomics	Genomics

2. Choose a disease or a topic that you are interested in (corresponding to your area of specialty eg. Cancer, microbiology, Biomedical Sciences....), see if the integrative analysis of 2 OMICs from the table above has been reported to be associated with the disease/topic (approach this by undertaking a PubMed search with key words, e.g. genomics, transcriptomics and cancer, transcriptomics, proteomics and microbiology).

3. Once you have identified which disease/topic and which two OMICs you are going to study then you need to start your research.

4. Find out what the two OMICs are and how the dataset of both can be integrated for the analysis of biological molecules at different functional levels in the same sample. Consider how these two OMICS are investigated in a wet lab as well as how bioinformatics might be used to integrate together the dataset from both OMICs.

5. How the dataset has been integrated. Were candidate genes or functional pathways identified?

6. Did some wet lab validation followed up the *in-silico* analysis? What types of investigation were performed afterwards (*in vitro*, *in vivo*?)

7. Based on your knowledge and own research, could you suggest some other bioinformatics tools to integrate those datasets?

You might like to start by looking at some of the bioinformatics resources at the following webpages:

http://www.bioconductor.org

http://galaxyproject.org

or FAQs: https://www.biostars.org/t/Latest/

Data Visualisation Tools:

16 network visualization tools that you should know! | by Dr. Veronica Espinoza | Medium

This list is not exhaustive and you are expected to undertake your own exploration to search if there are other tools available, similarly, these guidelines are also not exhaustive, you may find other information which is helpful when you start to investigate the OMICs and the associated disease.

Formatting and submitting your report

The report should be a maximum of 2,000 words (excluding references).

You may use figures and diagrams but please avoid excessive pasting of screen shots and make sure they are appropriately referenced.

Referencing should be in the Harvard style, as covered in the PATs tutorial scheme. A copy of the PDF guidelines can be found at this URL: https://www.westminster.ac.uk/current-students/studies/study-skills-and-training/research-skills/referencing-your-work

Upload your report to Turnitin following the guidelines for on-line submission of coursework.

Ensure that your name and student number are written in the header of the document prior to uploading your work.

Submit your report by 1.00 PM on the 11th of April 2023.