Bio326 Eukaryote report guide

In Module 2 you will have the opportunity to isolate DNA and prepare libraries for long-read sequencing using Nanopore technology, while in Module 3 you will analyse the data you generate. Together, these labs are intended to give you:

1) experience with techniques and a conceptual appreciation of what is happening in each step of the wet lab process.
2) the ability to critically assess DNA and library quality, and have some insight into the most crucial steps in lib prep,
3) experience computational workflows that allow you to describe and interpret the data output from sequencing,

Each of you must submit an <u>individual written report</u> describing wet and dry lab activities.

In the wet lab, each of you will receive and process blood from the same individual animal. Values for the whole class (qubit, gel, nanodrop etc) will be recorded and shared along with metrics describing the sequencing performance. When writing your report you might prefer to reflect on data from ALL the groups, and not just your sample or your groups samples.

In the dry lab, you will learn quality control, read filtering, and variant detection. In the report, feel free to explore any element(s) that interests you, but try to connect these three analyses into one coherent story. Make sure to **interpret** all the results you describe in the Results section in the Discussion section.

Prepare a report with no more than 5 pages written text (figures and tables do not contribute to the page limit). Use 2cm margins, 1.5 line spacing and font size 12. The report should include the following sections:

1) **Title, your name.**

2) **Introduction (ca. 0.75 page).**

   Give the readers some background to understand your experiments and analysis. Explain at a high level the theories, technical processes, and other related knowledge.

   You might begin with *"Modern genomic technologies allow us to investigate genomes in new ways, …"*
   And later in the intro you might move towards *"Analysis of this data can be used to..."* etc.

   You should provide some context by referring to scientific literature., ie. find support for your key statements. You may need to search online, don't be afraid to use google and search for "importance of DNA quality and size in nanopore sequencing" (for example) to look for info and inspiration. But be selective about what literature you refer to in your report. Top hits will often be from commercial companies, these are not always unbiased and objective, try to find relevant peer-reviewed research papers.

3) **Aim and hypothesis (ca. 0.25 page).**

In this section you should seek to clearly explain the aim(s) of the work and analysis you have performed in **both** the wet and dry labs. Explain "why have I done this?", and "what am I trying to find out?"

Do you have a hypothesis based on what you have presented in the introduction (and supported with references)?

4) Methods and Materials (1 → 1.5pgs).

a. You all followed protocols from commercial kit. Report the kits and instruments that were used for DNA extraction, DNA quality control, and sequencing.
b. You don't need to describe every step if you exactly followed a protocol, it is enough to say "performed according to manufacturers instructions". But if you **deviated** from the protocol, these deviations should be reported in the M&M section, ideally with a very brief comment as to why this deviation was used.
c. At some points you performed activities not in the kit protocols (e.g. fragmentation, normalization etc), these must be described in a way that would enable someone to repeat exactly what you did.
d. For dry lab analysis, provide some rational for the steps you took. E.g. "Bioinformatic tool X was used to …".

5) Results (1→ 1.5pgs)

This will include a combination of text, tables and figures. If you have a table or figure, it must be referred to in the text. For example, "*DNA concentrations ranged from 10 → 50ng/ul (see Table 1).*"

All tables and figures must be accompanied with a caption/legend that is concise and descriptive, includes definitions of abbreviations and superscripts (if used). For tables, the caption should be placed above, for figures the caption should be placed below.

It can be a very good idea to find one or two scientific papers and get a sense of how they report their results. The above example came from this paper :

https://bmcgenomics.biomedcentral.com/articles/10.1186/s12864-023-09537-5
https://www.microbiologyresearch.org/content/journal/mgen/10.1099/mgen.0.000816

6) Discussion (1 → 1.5pgs).

Here you can briefly restate your aims and hypothesis, then state your interpretation of your findings. Try to compare or contrast some of them with the literature. Reflect on the classes actual data and observations.

Explain or rationalise errant data or describe possible sources of error and how they may have affected the outcome.

The Discussion must answer the question "What do the results mean?" and is an argument based on the results.

We expect to see you reflect on both the wet lab operations and dry lab analysis.

7) **References (as required, does not contribute to the 5 page limit)**

This is a list of all the reference you have used. Use either the "Author date" convention (https://apastyle.apa.org/style-grammar-guidelines/citations/basic-principles/author-date) or the numeric style (https://intranet.birmingham.ac.uk/as/libraryservices/library/referencing/icite/vancouver/index.aspx).

Finally

There are many excellent guides for how to write scientific reports, here are a handful for you to look at if you need inspiration!

https://www.ncl.ac.uk/academic-skills-kit/assessment/assignment-types/structuring-a-science-report/

https://www.anu.edu.au/students/academic-skills/writing-assessment/science-reports

https://www.waikato.ac.nz/library/guidance/guides/write-scientific-reports

DEADLINE for REPORT is **Friday 27th March 23:59**