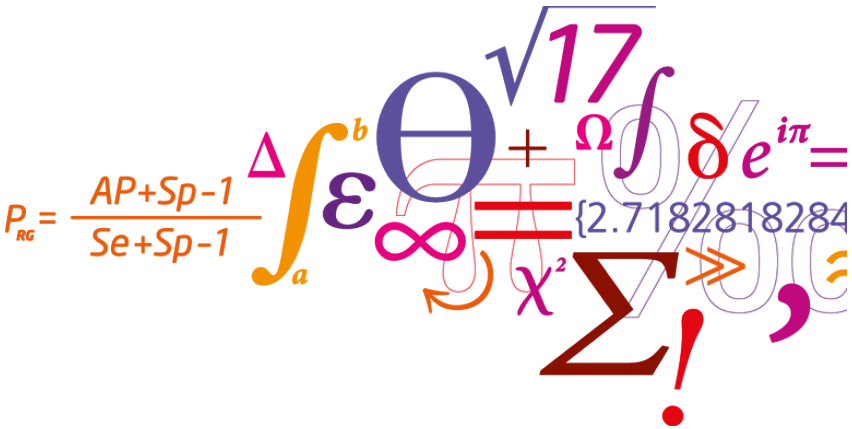
# 36685 Immunological Bioinformatics

January 2018

Introduction to Project Work




**Immunoinformatics and Machine Learning**
Department of Bio and Health Informatics

# Introduction to Project Work

- Project time frame
  - Thursday January 11th – Thursday January 18th

- Groups
  - The predefined groups of 3-4 students will work together on the project

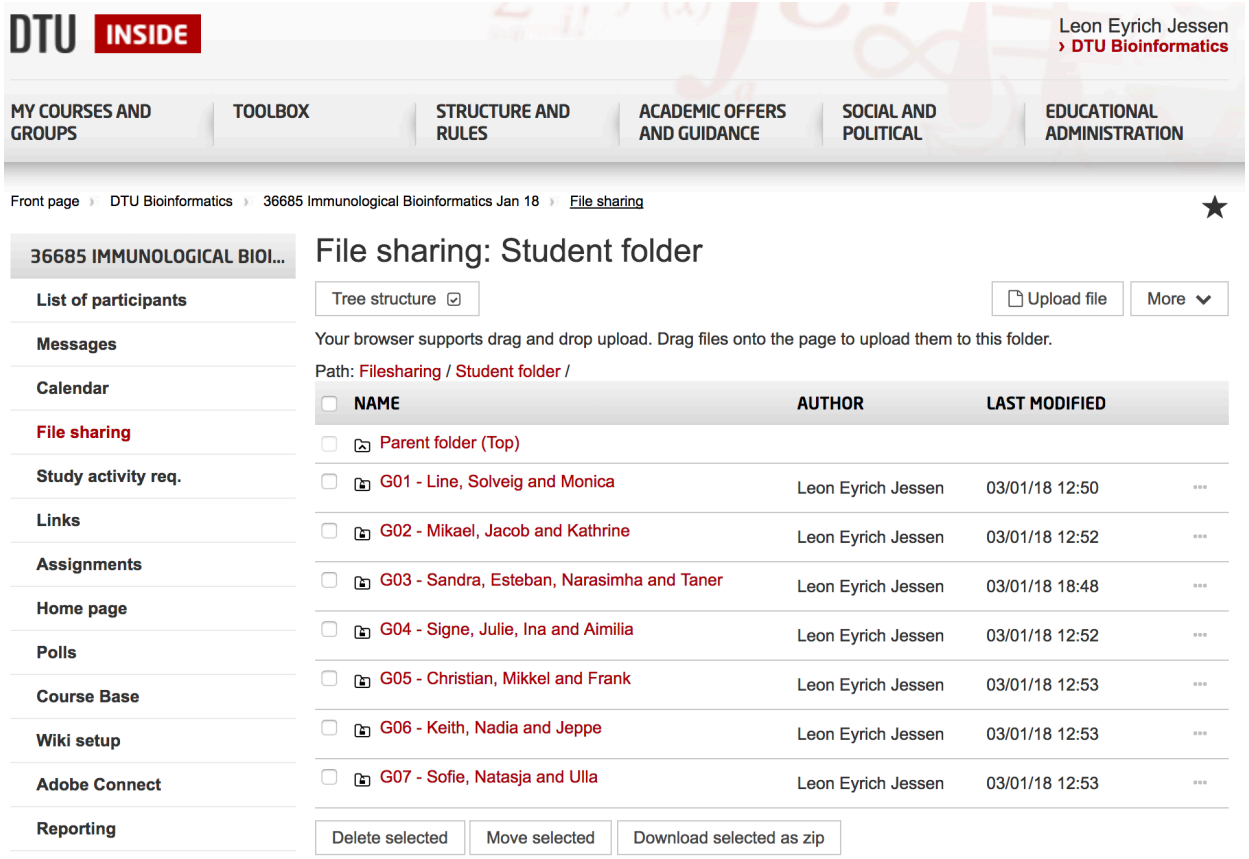
- Outcome
  - A project presentation (PowerPoint) presented at the exam January 19th

  - Note, you should *not* hand in a project report

# Groups

- G01 - Line, Solveig and Monica
- G02 - Mikael, Jacob and Kathrine
- G03 - Sandra, Esteban, Narasimha and Taner
- G04 - Signe, Julie, Ina and Aimilia
- G05 - Christian, Mikkel and Frank
- G06 - Keith, Nadia and Jeppe
- G07 - Sofie, Natasja and Ulla

# Group folders on DTU inside



# Exam

- Exam is on Friday January 19th 9 – 17 in building 208, room 062 (Where we are now)
- Examinators will be Morten and Leon
- The group will give the presentation ~10 minutes followed by 5 min of project questioning (Note, *everyone* is responsible for *every* aspect of the group project)
- Following the presentation, there will be an individual oral exam in the project *and* course curriculum, also ~15 minutes (Total time per group will be ~1 hour)
- In case you would like a specific exam time during the day (for a good reason), please contact Leon (jessen@bioinformatics.dtu.dk)

# Project Examples

- **Project I – Pathogen vaccine**

  a) Choose a single protein from a human pathogen, which would be the best suited for a vaccine considering B-cell epitopes

  b) Make a peptide based t-cell vaccine with both broad HLA* and pathogen coverage. E.g. a polytope consisting of class-I and class-II epitopes. Select from all proteins in the organism. Consider the processing of the final polytope to avoid the presence of neo-epitopes and if relevant check to similarity to self

- **You are free to limit your focus to a special population and genotypes, but should justify your choices*

# Project Examples

- **Project II – Cancer vaccine**
  - As project I, but aimed at cancer specific proteins, e.g. in testis cancer

# Project Examples

- **Project III – Cancer Immunotherapy**
  - Humanization project: CAR T-cell humanisation and de-immunisation
  - Similar to the "Anti-CD19 CAR T-cells" exercise you did
  - E.g. using the tabhu server in the context of eliminating t-cell epitopes (cd4+ class II binders)
  - (Don't just follow the questions from the exercise – Make the project your own)

# Project Examples

- **Project X**
  - Any other great ideas *that will cover several of the methods* introduced are also welcome!
  - You should however include a part about HLA immune activation

# Project Examples

- Examples of pathogens with fully sequenced genomes:
  - HIV
  - HCV
  - HPV
  - Ebola/Marburg
  - Smallpox
  - Mycobacterium tuberculosis
  - Influenza
  - Chlamydomonas reinhardtii
  - Measles virus
  - Salmonella typhii

# Guide to Presentation

- The IMRAD approach
  - Introduction
  - Materials and methods
  - Results And Discussion

- Brief and clear (limit amount of text on each slide)

- Be sure to think about the information you wish to convey with each slide

- Note, *everyone* is responsible for *every* aspect of the project

- Remember to include references, e.g.
  - **NetMHCpan-4.0: Improved Peptide–MHC Class I Interaction Predictions Integrating Eluted Ligand and Peptide Binding Affinity Data.** Jurtz, V., Paul, S., Andreatta, M., Marcatili, P., Peters, B. and Nielsen, M. J. Immunol. (2017)

# Project supervision

- There is a *very* limited time frame for the project, so you need to start the project today! (Thursday)

- If you get stuck in the project, you should as a point of reference try to solve the challenge in the group

- If this is not possible, then contact:
  - Protein structure and antibodies
    - Kamilla (kamjen@bioinformatics.dtu.dk)
    - Leon (jessen@bioinformatics.dtu.dk)
  - T-cell epitopes and HLAs
    - Leon (jessen@bioinformatics.dtu.dk)
    - Morten (mniel@bioinformatics.dtu.dk)

# Course Evaluation

- I will soon open for course evaluation
- Please spend the 5-10 minutes it takes to evaluate
- Your feedback is extremely valuable!

# Enjoy the project work! ☺