CIR702 and CBP732

These two courses are a half of the honours degree. From 2018 onwards a new approach will be taken. There will be in the order of 6-12 projects, all directly related to the research in the Bioreaction Engineering group. Some projects will be literature explorations while others will entail the analysis of experimental data, either from our own group or from open literature. The projects will run in parallel although some will be completed long before the end of the honours year.

A bi-weekly feedback session will be held to discuss progress and queries. Always have an informal presentation ready (whiteboard and pen in order) for these sessions. You will be assessed during these sessions, so you need to show your preparation. The project to be discussed at the feedback session will be decided two weeks in advance.

All students must perform all projects. All students are however not expected to spend the same amount of time on each project. Students should roughly spent 600 hours on all projects combined. This imply that you can spend more time on a favourite project and also have the favourite project count more towards the final mark.

The following 2018 projects are proposed at this stage:

In depth metabolic analysis of the crabtree effect in *Saccharomyces cerevisiae*.

We will start with published chemostat data. The initial idea is to scrutinise the energy expenditure on growth. Does it differ when ethanol overflow commences? You are supplied with literature data in the shared dropbox folder. Will share more papers once your initial calculation is completed.

Challenges for producing C4 dicarboxylic acids with *Saccharomyces cerevisiae* as host organism.

The big dream for organic acid production is to produce the undissociated acid at low pH. DSM is currently using *Saccharomyces cerevisiae* as host in a commercial process, but literature data is scarce. What can we learn from the literature efforts? See the thermodynamic considerations in dropbox.

The effect of oxygen limitation on citric acid production in *Aspergillus niger*.

The original organic acid process, citric acid. Vast amount of literature available. Andre has shown through creative calculation that the ATP yield per oxygen is higher when producing citric acid than when respiring. How relevant is this idea? Is there any evidence in literature of this idea? Note that we are studying itaconic acid production, a metabolism very similar to that of citric acid production.

Evolutionary development of *Rhizopus oryzae*: ancient biochemical adaptations to a challenging environment.

Both of you will most likely end up with *Rhozy* in your MSc. Here we pose the question what the historical reasons was for the evolutionary development of this unique metabolism. Any contribution will help, at this stage we are almost clueless.

Comparison of the carbon metabolism of *Basfia succiniciproducens* and *Actinobacillus succinogenes*.

Unpublished data already supplied in dropbox. Unlike *Succi* old *Basfia* has a complete TCA cycle, so there is another route for NADH generation. You need to perform a detailed flux analysis on the two organisms using the steady state data of the unpublished paper. Talk to Waldo and Charles to understand *Succi* better.

Development of an aerobic fermentation practical for CLB321 using *Saccharomyces cerevisiae*.

Get involved with the CSC students. We are currently investigating non-HPLC analysis methods. We want to run aerobic fermentations in the current 12 setups, but exploration is required. Get to know the CSC students and their problems.

Best projects from our C3PO meetings.

Deon's Itaconic data? In time we might include interesting C3PO problems as projects for this course.