

# Assignment – Design project

- Design a strategy for converting a host organism into a highly specialized cell factory
  - I. *Trichoderma reesei* as production platform for therapeutic proteins
  - II. A butanol producing *Saccharomyces cerevisiae*
  - III. *Saccharomyces cerevisiae* producing EtOH from waste biomass
  - IV. Upon agreement, your own convincing idea
- For each topic a starting package of information is available.

# Design project

- The project is done in groups of 3 to 4 students
  - Sign up to groups via Mycourses
- A topic can be chosen by several groups
- The design project accounts for 30% of the grade
  - Performance of each group member and the group as a whole is taken into account
- For each group a 1 hour coaching session is available during course weeks 2 and 3
- For each topic a starting package of information is available.

# Deliverables - presentation

- The presentation is aimed at a knowledgeable audience to whom you would like to sell your project idea
  - How would you sell the idea to an investor?
  - You should emphasize the rationale and the overall approach chosen to reach the goal
  - You should deemphasize technical details
- Presentation should take 10 minutes

# Deliverables - Report

- The report should include
  - Background, state-of-the-art (1 pages)
  - Rationale & Aims (1/2 page)
  - A detailed plan how to execute the project (8 to 10 pages including figures)
    - Genes introduced into or deleted from the organism
    - Sources of heterologous genes (databases used)
    - Genetic tools used (plasmids, promoters,..... )
  - References
  - A detailed statement of the individual contributions of the group members
- Deadline for the report is February 28<sup>th</sup>.

# Evaluation criteria

- Purely replicating a published cell factory is not allowed
  - You can combine existing pieces into a new entity
- Completeness
  - The presentation and the report must include all required elements
- Report: technical feasibility of the approach
  - For an expert in the field it must be possible to execute the project based on the information provided
  - Sufficient and correct literature must be cited to back-up the chosen approach
- The design project accounts for 30% of the grade
  - Contribution of each group member and overall group performance are graded

# Design project I

- *Trichoderma reesei* as production platform for therapeutic proteins
  - *T. reesei* is currently used as a production organism for many (hydrolytic) enzymes
  - It is a powerful "secretor", producing and secreting recombinant proteins at very high titers
- Task: Convert *T. reesei* in a production organisms suitable for manufacturing Erythropoietin for therapeutic purposes

# Design project II

- A butanol producing *Saccharomyces cerevisiae*
  - *S. cerevisiae* is currently used to produce EtOH as biofuel
  - Due to its superior properties, butanol is a more suitable fuel
- Task: Design a strategy which converts *S. cerevisiae* into an efficient butanol producing organism

# Design project III

- *Saccharomyces cerevisiae* producing EtOH from waste biomass (forest or agricultural residues)
  - Typically biomass has to be enzymatically hydrolyzed in order to release monosaccharides, which can be consumed
  - The complex hydrolysate contains different hexose and pentose sugars
- Task: Design a strategy which enables *S. cerevisiae* to breakdown the biomass into monosaccharides and convert them into EtOH