Fluid flow in process units, Final exam

* Based on lectures, exercises, and hand-outs. Additional distributed supporting material (in MyCourses) could be included but only if informed separately.
* There will be theory and (small) calculation questions. Pocket calculators allowed, but no other material or tools. Typically, questions are related to short explanation of terminology, and relatively small calculation questions.
* Some equations are listed in the question paper (below)
* Idea is not to memorize details, but to understand and apply.
* For the first final exam date, some additional extra feedback questions with extra points may be available
* If you have done other parts of the course in earlier years, remember to mark that in your exam paper

Equations below ->

**Some useful equations** Note! Symbols in different equations may be inconsistent

Mechanical energy balance





Colebrook equation 

Hagen-Poiseuille law 

General transport equation 

Navier-Stokes equations 

Turbulent fluctuations; energy and dissipation  

Blending time in mixing tanks 

Mixing power 

Kolmogorov scales $η=\left(\frac{μ^{3}}{ερ^{3}}\right)^{1/4}$ $τ\_{η}=\left(\frac{μ}{ερ}\right)^{1/2}$

Newton’s viscosity law 

Reynolds stresses 

Drag force 

Zwietering correlation 

Impeller flooding correlation 

Darcy’s law 

Ergun equation 

Power law and Carreau models  

Some dimensionless numbers   

    