

Chemical Engineering 04Z3 – Interfacial Engineering

Course Outline: 2017, winter term

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Schedule: Winter Term, Monday 11:30-1:20, Wednesday 11:30-12:20, all in KTH B124

Course Objectives: *To teach the students the fundamentals controlling the properties and processing of nano-structured materials. Both chemical and physical characteristics are emphasized.*

Outline of Topics:

1. General Introduction
2. Interfacial Forces
3. Pure Liquid Interfaces
4. Solutes at Liquid Interfaces
5. Surfactants
6. Solid Surfaces
7. Polymers at Interfaces
8. Self-assembling Systems
9. Nano Particles

Teaching Outcomes - Introductory knowledge of:

Electrical double layer, van der Waals forces and DLVO forces including modelling
Colloidal stability and particle characterization techniques
Surface energies, wetting, contact angles, capillary forces
Surfactant composition, phase behaviour and selection
Polymer properties at interfaces
Nanoparticle preparation including nucleation
Surface chemistry of common materials – silica, calcium carbonate, clays, plastics and metals.

Examples will include both biological and non-biological systems.

Format: *The learning experience will include lectures, some demonstrations, in-class examples and assignments.*

Assessment: ***Five assignments 10% and Final Exam 90%.*** *A final mark greater than 49% in the final exam must be achieved to pass the course. The final percentage grades will be converted to letter grades using the Registrar's recommended procedure. Statistical adjustments (such as bell curving) will not normally be used. Late (after end of lecture on due date) assignments will not be accepted.*

Calculator requirement for tests and examinations: *any calculator.*

Resources: *there is no required text – copies of the lecture notes will be provided.*

Policy Reminders:

Senate and the Faculty of Engineering require all course outlines to include the following reminders:

“The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem, that cannot be resolved by discussion among the persons concerned, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.”

“Students are reminded that they should read and comply with the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office.”