



## COURSE DATASHEET

<b>Semester:</b>	2016/17/1
<b>Course:</b>	Advanced Unit Operation
<b>Code:</b>	VEMKFMM218M
<b>Responsible department:</b>	Department of Chemical Engineering Science
<b>Department code:</b>	MKMU
<b>Responsible instructor:</b>	dr. László Hanák

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### Course objectives:

Familiarizing students with up-to-date reaction engineering processes.

### Course content:

1. Adsorption equilibrium, kinetics, pressure-swing adsorption (PSA) technics, gas separation, air separation.
2. Production of high-purity gases, gas mixtures, standards.
3. Extraction; solid-liquid extraction, equipments, supercritical extractions.
4. Membrane separation processes ; micro-, ultra-, nano-, hyperfiltration, applications.
5. Special type of distillation processes; pervaporation, extractive distillation, azeotropic distillation.
6. Crystallisation, fractional cristallisation, crystallisers.
7. Drying, special type of drying methods, equipments.
8. Adsorption, adsorption from liquids, multicomponent adsorption, equipments, regeneration.
9. Ion-exchange, characterisation of ion-exchangers, cyclic ion-exchange processes.
10. Cycling-zone ion-exchange, thermal ion-exchange parametric pumping methods.
11. Chromarographic separations, preparative, large scale chromatographic processes.
12. Simulated mowing bed (SMB) chromatography, closed-, and open-looped SMB methods.



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### Course content:

13. Bioseparations, down-stream processes, RIPP schemes.
14. TQM, future trends in up-to-date chemical engineering.

### Requirements, evaluation and grading:

2 mid-term papers, exam.

### Required and recommended readings:

1. Bioseparations; Belter, P.A., Cussler, E.L.; Wei-shou-HU (John Wiley & Sons, New York). 1988. 2. Chemical Engineering Vol.
2. Coulson, J.M., Richardson, J. F. (Pergamon Press. Oxford, 1991.)
3. Szárítási kézikönyv (szerk. Imret)