

FLUIDIZATION TECHNOLOGY (Detailed Field: 0711 Chemical engineering and processes)

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Level - 1BSC

Plan of lectures (15 hours)

No.	Topics	Number of hours
1	Introduction to multiphase flows. Types of two phase flows. Fundamentals of gas-solids fluidization. Possible application of fluidization-based processes in the industry.	1
2	Particle size distribution of solids. PDF and cumulative functions.	1
3	Regimes of fluidization. Geldart classification of solids (group A, B, C, D). Types of powders.	1
4	Minimum fluidization velocity. Bubbling fluidization. Hydrodynamics of the fluidized bed.	1
5	Types of gas distributors. Nozzles and grid designs. Fans, compressors and pumps.	1
6	Pressure profile along the fluidized bed reactor. Carryover of solids. Terminal velocity for a single solid particle. Solids inventory.	1
7	Circulating fluidized bed (CFB) reactors. Fundamental components of a CFB system.	1
8	Evolution of reactor designs. Comparison of BFB and CFB systems. Advantages and disadvantages.	1
9/10	Heat and mass transfer processes in fluidized beds. Drying, combustion and gasification.	2
11	Fundamentals of FBC combustion. Evolution of boiler designs.	1
12	Fluidized bed boilers – operational problems. Erosion and corrosion.	1
13/14	Emission of pollutants for FBC reactors. De-SO _x and de-NO _x systems. Ash removal technologies. Fluidized bed ash management and application.	2
15	Modern fluidized bed-based industrial processes.	1

Plan of laboratory meetings (30 hours)

No.	Topics	Number of hours
1	Introduction to the subject. Safety issues.	2
2	Investigation and discussion of the particle size distributions of solids materials.	2
3/4	Minimum fluidization velocity of solids. Calculation and experimental verification.	4
5/6	Investigation of the hydrodynamics of a bubbling fluidized bed system. Vertical pressure profile and solids concentration vs. gas velocity.	4
7/8	Investigation of the hydrodynamics of a model CFB boiler.	4
9	Visualization and analysis of a CFB system.	2
10/11	Cyclone operation and design. Investigation of the separation efficiency.	4
12/13	Combustion of solid fuels in a model BFB reactor.	4
14	Colloquium test.	2
15	Summary, discussion and credit.	2