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Fall 2019

CHE 714-101: Micromechanics of Particle Technology Processes

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Otto York Department of Chemical Engineering
ChE 714-101: Micromechanics of Particle Technology Processes, Fall 2019
CKB 320, Thursdays, 6:00-9:05 PM

Course Instructor: Rajesh N. Davé, YCEES 308, 973 596 5860, dave@njit.edu

Prerequisites: CHE 624 or equivalent, Corequisites: PHEN 601 or equivalent (not required but suggested)

Course Description: Presents methodologies for analyzing the macroscopic properties of particulate systems. Includes characterization and processing of particulate systems at the microlevel, predicting macroscopic properties from microlevel models, and analysis of particulate manufacturing processes involving solids processing, such as solids characterization, blending, milling, granulation, tableting, etc. Course includes laboratory demonstrations and a class project involving use of surface modification.

Lecture/Lab Schedule:

Week	Lecture	Lab/comments	Date
1	Overview of particle processing; powder properties and characterization	Laser-based PSD measurement	9/5/19
2	Powder properties, flow and testing	Sieving-based PSD measurement	9/12/19
3	Powder cohesion, flow/packing characterization	Powder testers (FT4, AoR)	9/19/19
4	Powder cohesion, flow/packing characterization	Dry coating using LabRAM	9/26/19
5	Surface energy, contact models, predictions	SEA and USP - demos only	10/3/19
6	Dry coating	Ordered mixing	10/10/19
7	Dry coating	Unit ops demo	10/17/19
8	Mid-term Exam		10/24/19
9	Property enhancements and prediction, dry coating applications	MATLAB for BD and FFC predictions	10/31/19
10	Pharma processing, Population Balance Modeling (PBM)	MATLAB PBM	11/7/19
11	Discrete Element Method (DEM) hands-on	DEM demo	11/14/19
12	DEM; hard sphere and soft sphere	Tuesday class	11/19/19
13	Unit operations - selected topics presentations	M.S. Students	11/28/19
14	Project presentations	PhD Students	12/5/19

Homework and attendance: Homework must be submitted on time at the beginning of the class electronically. Numerous assignments will be given pertaining to solving problems, reading of relevant papers and submitting a summary in form of PPT slides. Attendance is required and all absences without prior email approval will lead to loss of credit towards attendance grade.

Grading: Final grade will depend on performance on one mid-term (40 %), one final project (40 %), homework, and attendance. Homework and attendance count towards 20 % of the grade and hence are very important. Not submitting homework leads to a poorer grade.