

367a Graduate and Undergraduate Teaching of Colloid Science and Nanoscale Engineering - Combining Fundamentals with Emerging Technologies

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Colloid science has for many years been a traditional chemical engineering area and courses have been offered in many chemical engineering departments. The importance of this area has increased drastically in the last few years due to its application to the fabrication on the nanoscale. Self-assembly has been shown to be a viable alternative to making biomaterials, porous materials and photonic structures. Some electronic processes have shifted from the traditional "hard" semiconductors to the "soft" molecular assembly domain. Colloid science has a profound importance in microfluidics and bioarrays and other rapidly developing methods in biotechnology. The Department of Chemical and Biomolecular Engineering at North Carolina State University introduced in 2004 a new Nanoscience Concentration. Its goal is to prepare specialists for the emerging job market in nanoscience and nanotechnology. The new "Colloid and Nanoscale Engineering" course for undergraduates developed by the presenter is one of the three core courses in this concentration. The instructor has previously developed a graduate course in Colloid Science and Nanoscale Engineering, which has been attended by both graduate and undergraduate students. This presentation will offer an overview of the contents, instructional techniques used, and lessons learned from teaching these courses at undergraduate and graduate level. A major focus in the instructional development has been the presentation of the emerging nanotechnologies within the fundamental framework provided by the Colloid Science. These courses offer great and still only partially used potential for active learning and cooperative problem solving. Ideas for using these courses to stimulate student creativity and entrepreneurship will be discussed.