

367e Designing a Semester Long Course in Microfluidics for Advanced Undergraduate Science and Engineering Students

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This talk focuses on a microfluidics course which I have developed in the chemical and biochemical engineering program at Brown University. The course provides a concise, unifying approach for advanced undergraduate science and engineering majors toward understanding biochemistry, reaction kinetics and transport. We cover the fundamentals behind developing microchip-based applications such as enzyme assays for protein kinase A (protein phosphorylation), screening assays for lipid-modifying enzymes, continuous flow DNA amplification, measurements of cellular membrane potential, cell sorting, protein and DNA sizing, ligand binding assays and immunoassays. The course is built on my experience gained while working for a leading biotechnology company, Caliper Life Sciences. The course structure and topics will be presented along with a description of wet laboratory experimental setups. Numerical simulations and a microchip design tool will also be presented.