

237a Continuous Opportunities for Teaching Membrane Technology into the Curriculum

C. Stewart Slater, Stephanie Farrell, Robert Hesketh, Brian Lefebvre, and Mariano Savelski

The chemical engineering curriculum is full of opportunities for instruction in advanced separation processes such as membrane technology. We have done this in our unique Rowan way through a hands-on, minds-on instruction. We have sought to develop methods that are relatively easy for faculty to use, don't overburden the already crowded curriculum, and provide a unique learning experience. This paper describes some of these approaches. For example, early in the curriculum we have used a hand-held reverse osmosis system to show inductively the driving force in separation and the effect of feed concentration on system performance (flux). We have also developed course problems that can easily be incorporated into introductory material and energy balance and mass transfer separation course that show membrane processes used in green and sustainability engineering. We find that a project-based approach provides for a more in-depth understanding of design and applications. We have been quite successful in using membrane processes of ultrafiltration, microfiltration, electrodialysis, and gas permeation in real-world projects. These can be used to show applications in bio/pharmaceutical processing, specialty chemical processing and food processing. We find that exciting students early in the curriculum through some basic examples, demos and interactive experiences helps prepare them for these projects. Our next plans are to investigate how to integrate membrane processes with traditional separations and reactions in a unique experiential learning setting.