**Columbia University Department of Chemical Engineering Fall 2015 Seminar Series**

**Date:** Tuesday, September 22nd **Time:** 4:00 pm **Location:** 825 Mudd Building*

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# Role of Process Systems Engineering in Chemical Engineering


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In this talk we give a general overview of the nature of Process Systems Engineering, discuss some current major trends, and show how it fits in this Chemical Engineering and the role it might play in the future. After briefly reviewing the history of Chemical Engineering, we highlight how academic research over the last decade has had a strong push towards science, largely due to emergence of areas like nanotechnology and biotechnology, which has caused some disconnect between academia and industry. However, despite these trends, Process Systems Engineering (PSE) remains a core area in Chemical Engineering that one the one hand has expanded its scope from the process engineering level down to the molecular level, and up to the enterprise and global level. Furthermore, PSE is again regaining prominence due to the increasing importance of the areas of energy and sustainability. Traditionally, PSE has been subdivided into process design, process control and process operations. In this talk we argue why PSE is becoming broader in terms of scope due to future trends.

We describe three major trends in Process Systems Engineering that have emerged over the last decade and that can potentially help the industry to innovate and to remain competitive, especially through the use of advanced mathematical programming techniques. First, we describe efforts for simultaneous product and process design, where the emphasis lies in tying the molecular structure of the products with the processing and macroscopic properties of the product. Second, we describe work that is aimed at modeling and optimizing processes for effectively exploiting fossil fuels like shale gas and alternative sources like biomass. We also address the issue of efficiently managing natural resources such as water. Third, we describe research efforts in enterprise-wide optimization that are aimed at designing and operating supply chains for the process industry in which planning, scheduling and control can be integrated more effectively. We conclude that Process Systems Engineering is broadening its scope in order to address problems that are of current and future interest.


* Light refreshments will be served in Mudd 801 from 3:30pm-4:00pm