

Chemical Engineering: An Introduction

By *Morton M. Denn*

Cambridge University Press (2012), \$41.52 (Amazon.com)

Reviewed by

David L. Silverstein, Ph.D., P.E.

Professor Morton Denn opens *Chemical Engineering: An Introduction* with his definition of the field: “Chemical engineering is the field of applied science that employs physical, chemical, and biochemical rate processes for the betterment of humanity.” He follows these opening lines with a very brief discussion of the history of the profession, followed by short descriptions of a number of modern applications of chemical engineering along with biographical information of key practitioners and researchers.

The remaining 14 chapters reveal a different sort of introduction to chemical engineering than other introductory textbooks. Denn does not focus on developing a broad range of fundamental skills (communication, resume writing, study skills, etc.) for incoming ChE students, but instead seeks to give an overview of the profession by presenting to the student the mathematical application of chemical engineering fundamentals and then expecting students to manipulate the resulting models.

The text is best suited to students with solid mathematics and physics backgrounds that will not be overwhelmed by presentation and manipulation of differential equations. Most chapters include a set of quantitative problems, with many of them requiring calculus skills typically developed in the third course in the sequence (partial differentials). The author suggests that the only required math is Calculus 1.

Appendices for each chapter describe ancillary skills (least squares regression, dimensional analysis, etc.) in brief or provide additional detail on derivations for specific cases. Some of the appendices contain what are more frequently core course topics for an introductory engineering course, so the instructor will need to carefully evaluate the match between his or her students and the support offered by the textbook.

The book does not go as far as others targeted at beginning ChE students by placing core ChE topics in a single specific process context (*i.e.*, Solen & Harb). It does place each topic in the context of a process working with a liquid phase applied to one of a broad range of specialties ranging from traditional chemical and petroleum operations to modern bio-, pharma-, and nano- applications.

A notable strength of the text is the bibliography ending each chapter. Instead of just listing sources for examples, data, or structure, the author discusses the utility of the source and how he used it in the development of most chapters.

The 15 chapters are not organized in broad subject areas (*e.g.*, mass transfer, reactor design) but are instead organized in smaller segments building on Chapter 2, which describes fundamental modeling techniques grounded in conservation principles. Mass transfer, for example, is addressed in separate chapters on Membrane Separations, Two-phase Systems and Interfacial Mass Transfer, and Equilibrium Staged Processes.

Denn suggests one word that can be used to describe the text: rigorous. The introductory course instructor will need to consider the preparation of students entering the course. If they are well-prepared, the text provides a well-structured framework to explore the fundamentals of chemical engineering analysis and to give an overview of the breadth of opportunities that lie ahead for chemical engineers. □

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