

Careers in Chemical and Biomolecular Engineering, 1st Edition

By Victor H. Edwards and Suzanne Shelley
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In the preface to the first edition of *Careers in Chemical and Biomolecular Engineering*, authors Victor H. Edwards and Suzanne Shelley make the point that, in the books dedicated to first-year undergraduate study of engineering, attention is largely paid to fundamental calculations used to illustrate practical applications of engineering. Attention to the breadth and depth of career opportunities available to chemical and biomolecular engineers (ChBEs) is often addressed later in the undergraduate curriculum – if at all – leaving students to gain career insights from specific internships, co-ops, or anecdotes from friends, family, and faculty. Therefore, the main aim of this book is to present the scope of employment and career opportunities available to students in this major, but in such a way that can be understood by high school and early college students, as well as the adults who mentor them. The authors suggest that this book belongs in high school guidance counselors' offices, as a reference book, or as a supplement to a first-year general or chemical engineering course.

This noble aim is no small order. In addition to trying to serve a broad and diverse audience, and on top of surveying a variety of careers, the authors embed in each chapter some technical content in a largely qualitative way. The first chapters summarize some key contributions of past and present ChBEs to society. The next several chapters provide short overviews of areas of study in undergraduate programs (broadly, the topics are general conservation laws and fluid mechanics, thermodynamics and transport, separations, reactions and control, and finally design). The final chapters wrap up with discussion of the different roles that ChBEs hold and where chemical engineering as a discipline may head in the future. The technical content is delivered succinctly and peppered with diagrams and images such that no chapter takes a long time to read, though by trying to summarize one or more undergraduate courses, the content can be quite dense with a rapid-fire set of italicized vocabulary throughout. The authors punctuate each chapter with two to four profiles on professionals who studied chemical engineering in college, and in total include conversations with 25 such professionals, each discussing their pathway to their current jobs and sharing advice for prospective and current undergraduate students. These working engineers are helpfully listed in a table in the front of the book to quickly summarize their industry sector

and profile. It is not clear whether there is always a connection between a given profile and the chapter of the book in which it appears, but across the book, there is representation of careers in the traditional chemical process industries, in consulting, in professional development, in technical writing, and in law.

So, does the book achieve its lofty aim: to display the scope of careers to a broad audience of high school and undergraduate students as well as the adults who advise them? The answer is largely yes, but with room to improve in future revisions or editions. Some revisions may be cleaned up in reprints of this first edition because they are largely stylistic inconsistencies in notation from chapter to chapter. For example, chemical reactions are presented in the traditional way ($A+B \rightarrow C$) in some chapters, but as mathematical equations ($A+B=C$) in others. The short summaries of technical content all hew closely to their reference texts, so each chapter adopts notations that mirror one or more of those references. Therefore, some chapters present ideas as “word equations” (mass output is mass input less mass accumulation) while others present differential equations ($dS=dQ_{rev}/T$). Another minor inconsistency is in the labeling of career highlights in each profile. A good number of the engineers interviewed are AIChE Fellows, and some are noted to have been “elected,” another “selected,” others “named,” and in any case it is not until a profile in Chapter 8 that this honor is actually described to the reader. Inconsistencies in notation and non-technical word choices may not be a big deal, but they start to highlight gaps in bringing this content to the broad audience that the authors intend to reach.

By including profiles of 25 ChBE professionals, the authors must decide the terms of representation of identity: do they highlight professionals proportionally to their preponderance in the field, or more like the target audience of this book? It appears the authors chose somewhere in between. More than half of the profiles are of white professionals, and just under two-thirds of the profiles are of men. Almost every profile of a member from an underrepresented group includes a section devoted to advice and experience studying and working in a field whose majority is white men. A larger proportion of featured women engineers hold careers outside the traditional chemical process industries than the men, whether intentional or not, conveying an unspoken message. There also appears to be less diversity in terms of age – the majority of those profiled are from the generation of the baby boomers – which leads to rich stories of career trajectories and wisdom informed by decades of experience, but provides no perspectives from early-career professionals whose educational experiences may be remembered differently.

In summary, the book meets the authors' intentions of addressing a specific need that is not met as well by other introductory books in our discipline: it devotes over half of its material to exploring the wide variety of careers that ChBE professionals hold. I think this is a successful first edition of a book unlike any of its kind. I will use it as a reference or recommendation during advising, and I would be happy to see it in the libraries of high school guidance counselors and career counselors. □