FOREWORD

When I was a sophomore in high school, I decided that I wanted to be a chemical engineer when I grew up. I could invent all sorts of reasons for this decision that would make me sound like an unusually wise and thoughtful 15-year-old, but they would all be lies.

The truth is at the time there was a great job market for engineers, and stories of red carpets and multiple job offers and outlandishly high starting salaries were laid on us regularly by teachers and counselors—and in my case, by parents. Just about every boy who could get B or better in math and science courses decided that he was born to be an engineer, and I saw no reason to buck the trend. Why *chemical* engineering? Because—sadly, this is also the truth—I had gotten a chemistry set for my birthday, and I thought pouring one liquid into another and having it turn green was seriously cool.

Like most of my engineering-bound classmates, I knew nothing about what engineers actually did for a living, and when I enrolled in chemical engineering at the City College of New York two years later I still knew nothing. There was a freshman orientation course, but it was just the old "Sleep 101" parade of unenthusiastic professors delivering dreary 40-minute sermons about civil engineering, mechanical engineering, and so forth. It's a wonder that this course didn't drive more people away from engineering than it informed and motivated. Perhaps it did.

My ignorance persisted for pretty much the next three years as I worked through the math and physics and chemistry and thermo and transport and circuits and all those other things you have to know to graduate in engineering, but only represent a small fraction of what engineers actually do. It wasn't until I got into the unit operations lab in my fourth year and then spent a summer in industry that I started to get a clue about what engineering is really about—figuring out why things aren't working the way they're supposed to and fixing them, and designing and building other things that work better or work just as well and cost less.

And what engineers did for a living was only the tip of the iceberg of what I didn't know as a freshman. In high school I rarely cracked a textbook and still came out with nearly straight A's, but it took only one college physics exam to let me know that the game had changed. I also left high school thinking I was a great writer, but the D+ on my first

college English paper set me straight about that too. Plus, I didn't know how to take notes, summarize long reading assignments, prepare for and take tests, strike a good balance between school and the rest of my life. I could go on but you get the idea.

I eventually figured it all out, of course. If I hadn't, I wouldn't have graduated and gone on to be an engineering professor and the author of this foreword. Unfortunately, many of my classmates never did get it, and most of them were gone by the end of the second year. And I know they had the ability to succeed.

I don't think engineering school should be an academic obstacle course designed to weed out students who have the ability to succeed but lack basic study skills. If something is important for students to know, there's nothing wrong with giving them some guidance in figuring it out. We do that routinely with math and science and control and design. Why not do it with studying and learning?

That's where Ray Landis and *Studying Engineering* come in. The book is a compendium of everything I wish someone had told me in my freshman year. If I could have read it then, even if I had only absorbed a fraction of the wisdom it contains, I would have been spared the major headache of having to learn it the hard way. And if the book had been used in a first-year engineering course taught by a knowledgeable and supportive instructor, the next four years of my life would have been far less stressful, and many of my talented classmates who dropped out as freshmen and sophomores would instead have graduated with me.

Almost everything students need to know to succeed in engineering school is in *Studying Engineering*. Using a conversational tone and numerous real-world examples and anecdotes, Professor Landis paints a vivid picture of the vast range of things engineers do, the world-changing things some of them have done in the past, and the challenges to ingenuity and creativity that they routinely face. He also introduces students to the learning process—how it works, when and why it goes wrong, and how to avoid the pitfalls that have ensnared generations of engineering students including those unfortunate classmates of mine.

Moreover, *Studying Engineering* introduces its readers to themselves and to one another, providing insights into different ways people approach learning tasks and respond to instruction. Students who take this material to heart will gain a better understanding of their own strengths and weaknesses and will learn ways to capitalize on the former and overcome

the latter. Their new knowledge will also improve their ability to communicate with their classmates and teammates. These insights and skills will serve them well throughout college and in their subsequent professional careers, whether or not they remain in engineering.

If you are an engineering educator who teaches first-year students, I invite you to think about the things you wish someone had told you when you were a freshman, and then use *Studying Engineering* to help convey those messages. If you are a student, I encourage you to pay attention to the book, because it's telling you things that are important. If you're going to succeed in engineering school, you'll need to learn those things, sooner or later. My advice is, make it sooner.

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