PREFACE

Studying Engineering has been updated and expanded. Dated material has been updated and a wealth of relevant Internet sites has been added. Substantial new graphics have been added as well to improve readability. A new Prologue has been included to give students a clearer perspective on what this book has to offer and – more importantly – what steps they can take to get the most from it. New sections have been added on subjects such as fixed vs. growth mindset, reverse engineering, sustainability, life-long learning, study abroad, entrepreneurship, and teamwork and leadership.

The Prologue, "What This Book Has to Offer and How to Get It," discusses the potential of this book to make a difference in students' lives, and provides guidance on how to realize that potential.

Chapter 1 lays the foundation for the book by introducing and overviewing the process of achieving success in engineering study. Key elements of the success process – goal identification, goal clarification, and behavioral and attitudinal change – are presented. Three models that will help students understand what is meant by a quality education and how to go about getting that education are also introduced. The chapter closes with the important topic of "Structuring Your Life Situation."

Chapter 2 addresses the subject of professional development. A primary purpose of the chapter is to motivate students through an increased understanding of the engineering profession and an awareness of the rewards and opportunities that will come to them if they are successful in their engineering studies. The University of Maryland's "Gamera" human-powered helicopter project is used to bring the engineering design process to life. The National Academy of Engineering's Grand Challenges for Engineering is used to show some of the many exciting problems engineers will need to tackle in the future.

Chapter 3 provides an overview of the *teaching/learning* process. Various types of Learning modes – cognitive, psychomotor, and affective – are described. Preferred learning styles and teaching styles are also discussed. Students are given general guidelines to strengthen their learning process and a summary of the most common mistakes students make is presented, along with ways to avoid these mistakes.

Chapter 4 provides guidance on how to get the most out of the teaching process. The chapter emphasizes the importance of getting off to a good start and discusses strategies for taking full advantage of lectures – including listening skills, note-taking skills, and questioning skills. Approaches for making effective use of professors are described in detail.

Chapter 5 guides students in designing their learning process. Two important skills for learning – reading for comprehension and analytical problem solving – are covered. Approaches for organizing the learning process, such as time management skills, are also discussed. Study skills relevant to math/science/engineering coursework are emphasized. Finally, ways to make effective use of peers through collaborative learning and group study are also described.

Chapter 6 focuses on the important subject of personal growth and development. A *Student Success Model* is presented to help students understand the process of making behavioral and attitudinal changes essential to success in engineering study. Important personal development topics – understanding self, appreciating differences, personal assessment, communication skills, and health and wellness – are included as well. Finally, a section has been added on the important topic of leadership and teamwork.

Chapter 7 addresses five extracurricular activities that can greatly enhance the quality of a student's education: (1) student organizations, (2) engineering projects, (3) pre-professional employment, (4) study abroad, and (5) service to the university.

Chapter 8 provides an orientation to the engineering education system: faculty, curriculum, students, facilities, administration, and institutional commitment. Academic regulations, student ethics, and opportunities for graduate education in engineering are also covered in this chapter. We close with a discussion of engineering as a means of preparation for further education in business, law, and medicine.

Appendices are devoted to five important topics: 1) Design Project; 2) Definitions of Engineering; 3) Greatest Engineering Achievements of the 20th Century; 4) Engineers among the World's 200 Wealthiest Individuals; and 5) Description of Engineering Disciplines.

The target audience for the book is first-year engineering students; therefore, it is ideally suited for use in an *Introduction to Engineering* course that has a "student development/student success" objective. Much of what is in the book has direct application to the community college experience, and the topics that are specific to the four-year university experience can provide community college students with a preview of what they will encounter when they transfer to a four-year institution.

High school students considering engineering as their college major will find the book useful as well. Engineering faculty can turn to it as a resource for ideas they can convey to students in formal and informal advising sessions or in the classroom. Deans of engineering have indicated that the book contains material that is helpful in preparing talks they give to high school students and first-year engineering students.

This book was the outgrowth of more than 30 years of teaching *Introduction to Engineering* courses. Much of the material was developed through brainstorming exercises with students. My greatest thanks go to the many students who contributed to the evolution of the ideas in this book. Thanks also go to the many engineering professors who have used the book since the *First Edition* was published in 1995. Those who provided valuable feedback used to improve this edition include: Dom Dal Bello, Rich Bankhead, Zahir Khan, David Gray, Jack Hopper, Sami Maalouf, Bill Latto, Nick Arnold, Zanj Avery, Ali Kujoory, Julie Zhao, Artin Davidian, Jawa Mariappan, Jeff Froyd, Anthony Donaldson, Janet Meyer, Dave Kaeli, Thalia Anagnos, Herb Schroeder, Bev Louie, Marty Wood, and Kevin McLaughlin.

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Raymond B. Landis
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