*women (21-30),*

- Anxious about taking the course? *men (60%), women (76%)*

Women were more positive than men about all activities involving communication, including writing and receiving comments on the rough draft and giving the practice talk and responding to class questions. Eleven of thirteen women liked the course (regardless of benefit), but eight of twenty-eight men hated it!

## FACULTY RESPONSE

All faculty participate in and are strongly supportive of the course in its current state, although possible improvements always beckon.

## ACKNOWLEDGMENTS

I am pleased to thank George Roberts who, as department head, encouraged the formation of the founding committee for the Research Proposition course and who provided teaching recognition for it. Peter Fedkiw originally noted the very strong correlations between graduate GPA and written PhD qualifier scores, and thus the disutility of the latter. Peter, Ruben Carbonell, and Peter Kilpatrick devised the original PhD proposition requirements and evaluation criteria. Diane Beaudoin, PhD candidate, created (with Rich Felder's assistance), administered, and summarized the course evaluation questionnaire.

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**ChE** ***book review***

# *STUDYING ENGINEERING: A Road Map to a Rewarding Career*

by Raymond B. Landis

*Published by Discovery Press, Burbank CA: Distributed by Legal Books Distributing, 4247 Whiteside St., Los Angeles, CA 90063; 236 pages, $22.95 (1995)*

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There is considerable current interest in courses for first-year students in engineering. Two major approaches have been used. One approach is a design course, preferably with hands-on experience (*e.g.,* see Beaudoin and Ollis, *J. Engr. Ed.,* **84**, 279, July, 1995). The second approach is an orientation course which helps students learn how to survive and then to thrive in engineering. Ray Landis, the Dean of Engineering at California State University-Los Angeles, has written a textbook for this second approach. This book is written for a course with students who will be going into all disciplines, but it easily could be used for a course for chemical engineering students.

The introductory chapter on "Keys to Success in Engineering Study" is an important part of the book that students should not just skim over. This chapter firmly makes the point that it is up to the student to succeed—determination and effort are often more important than "smarts." Based on my experience with freshman engineers, I feel this is absolutely true. But how do we get students to believe it? Dean Landis has a very convincing argument and discussion of this point. He notes that a combination of determination, effort, and proper approach is all important.

Chapter 2, "The Engineering Profession," is supposed to explain what engineers do. Unfortunately, the descriptions of different engineering disciplines and different engineering job functions are just too short. For example, there is only one-half a page on chemical engineering, six lines on materials science engineering, and three lines on petroleum engineering. A better approach would have been to present scenarios on a typical day at work for different engineers. The general information on what is important in selecting a career will be very useful to the students. At universities where students select chemical engineering before their first year, the shortcomings of this chapter will not be critical since the professor can easily supplement the section on chemical engineering. At universities where students start in a general engineering program or a university college, however, a major function of the orientation course is to help the students select a major. Chapter 2 is inadequate for this purpose.

Chapter 3, "Academic Success Strategies," is a strong and useful chapter. Section 3.2 on structuring one's life situation is particularly critical and shows that the author has worked with many students. The guide for course loads and hours of

*Continued on page 274.*

as a programming aid for computer simulations (giving you twice the bang for your educational or research buck!). Mathematical models can be programmed with graphical displays for control and output to illustrate the salient features of many unit operations, such as the stirred tank reactor demonstrated here.

Of particular benefit to students is the ability to demonstrate unsteady-state behavior in real time. I have found that the difference between equilibrium and steady state is often a difficult concept for students to grasp. The student response to this simulation is generally favorable. The computer demonstrations are portable, inexpensive when coupled with laboratory use, and require minimal effort to customize for particular needs. National Instruments offers special academic pricing on LabVIEW as well as a low-cost student edition. Interested departments should contact National Instruments directly for more information.[10]

## NOTATION

$C_A$ = concentration of species A
$C_{A0}$ = feed concentration
$C_B$ = concentration of species B
$c_p$ = heat capacity
$H_r$ = heat of reaction per mole of species A
$E$ = activation energy for reaction rate constant
$E_e$ = activation energy for equilibrium constant
$K$ = reaction equilibrium constant
$k_1, k_{-1}$ = first-order forward and reverse reaction rate constants
$k_{10}$ = pre-exponential factor for $k_1$
$R$ = ideal gas constant
$r_A$ = reaction production rate of species A
$S$ = heat transfer area
$t$ = time
$T$ = reactor temperature
$T_\infty$ = heat exchanger fluid temperature
$U$ = overall heat transfer coefficient
$V$ = total reactor volume
$V_d$ = dead volume
$X$ = conversion of species A from an ideal reactor
$\delta$ = fraction of volume converted to dead volume
$\beta$ = fraction of feed converted to by-pass stream
$\Delta t$ = Euler step size in numerical solution
$\upsilon$ = volumetric feed flow rate
$\upsilon_b$ = by-pass volumetric flow rate

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# REVIEW: *Studying Engineering*

*Continued from page 229.*

part-time work agrees with my experience. The book encourages students to seek help and to work together in collaborative groups with an optimum size of two. His suggestions on how to get help from professors is good, but will drive professors at research universities crazy if a large number of students start to follow his suggestions. The study skills will be useful if the students practice them. The problems at the end of the chapter will be helpful here, particularly if assigned as homework.

Chapter 4, "Developing Yourself Personally," presents one major message—think positively. A section on the three steps to overcoming barriers is outstanding. These three steps (Knowledge, know what to do; Commit, want to do it; and Implement, do it) will be useful to professors as well as to students. Unfortunately, five pages on Maslow and self-esteem, two pages on the Myers (which he misspells)-Briggs Type Indicator, and four pages on brain dominance are all too short and would have to be supplemented by the instructor.

Chapter 4 seems to be a catch-all chapter. It includes sixteen pages on communication skills, with many helpful hints. But since freshman engineers typically take English and speech, why devote so much space to communication? A short section to provide motivation would have been sufficient. A section on understanding and respecting differences reflects the author's experience as director of a minority engineering program. Because of the importance of this topic, I wish it were longer and that it included role plays or scenarios. The final section on motivating yourself could be moved to Chapter 1 where it fits naturally.

Chapter 5, "Broadening Your Education," suggests that students participate in campus life, participate in engineering student projects, obtain preprofessional employment, and give something back to the school. These are all obviously useful suggestions. The sections on campus life and student projects try to be specific in areas where different schools

obviously have different resources and could result in frustration when the students find that some opportunities are not available at their school. This chapter also includes sections on resumes and interviewing techniques that are important to freshmen, but which are often not covered.

Much of the last chapter, "Orientation to the Engineering Education System," appears to go beyond the freshman's need to know. This includes information on ABET, community colleges, grading systems, and the role of research. The statement

> *The first two years of engineering study at a community college are similar in almost every regard to the first two years of engineering study at a four-year institution.*

may mislead students. In my experience, students find studying engineering at a major research institution much more intense than at a community college. The sections on advising (it is a student's responsibility to find out), the importance of grades (since it is quantitative, GPA is heavily weighted), academic dishonesty (ethics is not always clear-cut), and graduate study (never too early to think about it) are well done.

The general quality of this book is high. It is nicely printed with a pleasant soft cover. Many of the problems at the end of the chapters are well thought out and will be thought-provoking, although a few ask for too much ("write a 500- to 750-word essay . . ."). The lack of an index will unfortunately discourage browsing. The price seems reasonable.

Engineering professors teaching engineering orientation courses should obtain and read a copy of this book. I would strongly recommend it to engineering students for supplemental reading of Chapters 1, 3, and 4. ❒

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## REVIEW: *Process Heat Transfer*

*Continued from page 243.*

The book is perhaps best interpreted as an update of the book of the same name by D.Q. Kern.[2] In this regard, it is highly to be recommended. Conventional heat exchangers are described in structure and function, and their design is well illustrated by detailed examples. A few illustrative problems are included with most chapters.

The coverage and focus of the book is perhaps best indicated by the following chapter headings:

3. Basic Theory of Heat Exchangers
4. Selection of Heat Exchangers
5. Double-Pipe Heat Exchangers
6. Shell-and-Tube Heat Exchangers
7. Plate-Fin Heat Exchangers
8. Plate-and-Frame Heat Exchangers
9. Air-Cooled Heat Exchangers
10. Two-Phase Flow
11. Boiling Heat Transfer
12. Heat Exchangers with Vapor Generation
13. Steam Generators
14. Reboilers
15. Evaporators
16. Condensation
17. Heat Exchangers with Vapor Condensation
18. Shell-and-Tube Condensers
19. Air-Cooled Condensers
20. Condensation in Plate-and-Frame Plate-Fin Heat Exchangers
21. Direct Contact Heat Transfer
22. Direct Contact Condensers
23. Water Cooling Towers
24. Furnaces
25. Heat Transfer Associated with Thermodynamic Cycles
26. Process Integration
27. Fouling of Heat Exchangers
28. Enhancement of Heat Transfer
29. Regenerative Heat Exchangers
30. Electrical Heating
31. Heat Transfer in Agitated Vessels

Some topics are conspicuous by their absence or by their minimal treatment, including: flow and heat transfer in porous media and in fluidized beds; heat transfer to liquid metals, in particular in nuclear reactors; heat transfer in high-velocity (compressible) flows; heat transfer with freezing; and materials of construction. The new frontiers of heat transfer such as solid-state processing, biological processing, and atmospheric modeling are not mentioned. Most surprising is the absence of any discussion of computer simulation of design except for a brief reference in the chapter on process integration. Qualitative considerations and rules of experience are given only minimal attention. The book by Gupta[3] provides a valuable supplement in that regard.

The book uses SI units and the new international standards on nomenclature. This may prove to be a nuisance for the present generation of practitioners, but is appropriate for future use since most students are now being instructed in these terms.

Although this review has focused on the contents and particularly on the omissions, the authors are to be commended on their achievement in the practical sphere. The book is well written, relatively free of errors, and readily accessible at all points without back-referencing. It deserves to be on the shelf of every designer of heat exchangers, of every teacher of heat transfer, and of every engineering library. In this regard it is a completely successful and essential replacement for its predecessor.[1]

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