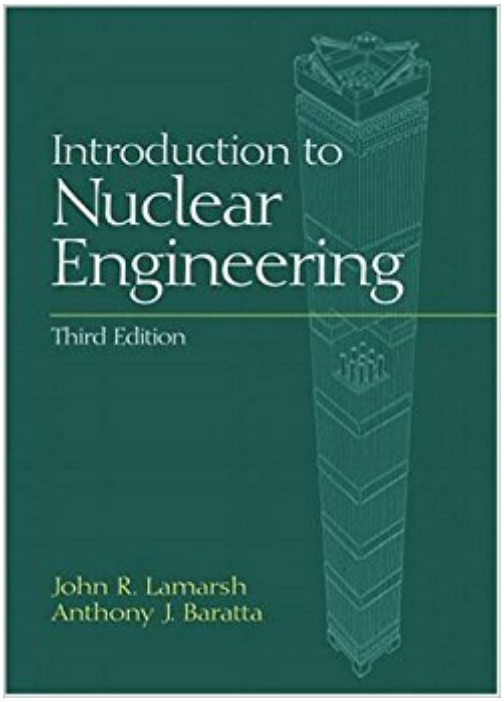
Introduction To Nuclear Engineering (3rd Edition)



Synopsis

Offering the most current and complete introduction to nuclear engineering available, this book contains new information on French, Russian, and Japanese nuclear reactors. All units have been revised to reflect current standards. Includes discussions of new reactor types including the AP600, ABWR, and SBWR as well as an extensive section on non-US design reactors; the nuclear Navy and its impact on the development of nuclear energy; binding energy and such topics as the semi-empirical mass formula and elementary quantum mechanics; and solutions to the diffusion equation and a more general derivation of the point kinetics equation. Topics in reactor safety include a complete discussion of the Chernobyl accident and an updated section on TMI and the use of computer codes in safety analysis. For nuclear engineers.

Book Information

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Customer Reviews

The third edition of this popular book is updated to include a completely revised discussion of reactor technology, an improved discussion of the reactor physics, and a more detailed discussion of basic nuclear physics and models. Introduces the basics of the shell model of the nucleus and a beginning discussion of quantum mechanics. Discusses both U.S. and non-U.S. reactor designs, as well as advanced reactors. Provides for a more detailed understanding of both reactor statics and kinetics. Includes updated information on reactor acidents and safety.

Anthony Baratta is currently a Professor of Nuclear Engineering at The Pennsylvania State

University and Director of the Nuclear Safety Center. He received the B.A/B.S. degrees in physics/applied physics from Columbia University in 1968 and the M.S. and Ph.D. degrees in physics from Brown University in 1970 and 1978, respectively. His research interests and contributions include reactor safety, reactor kinetics and physics, and the effects of radiation on materials. He has authored many scientific publications and made numerous presentations. He is an active member of the American Nuclear Society and has appeared on many network television and radio broadcasts as an authority on reactor accidents, including the accident at Three Mile Island.

First, the caveat to my review: I am probably unique among the reviewers of this book in that I am not a nuclear engineer. I have a strong educational and professional background in chemistry, physics, and math, and have been working on projects involving engineered safety systems and risk management in other technologically advanced industries. I have recently become involved in talks with representatives from the nuclear industry. For my own preparation I undertook the long hard slog through the Lamarsh-Baratta book, "Introduction to Nuclear Engineering" (Third Edition) to help me grasp background information and concepts in this field. Although I was sometimes initially unclear about the use of units (barns, dollars, etc.) and nomenclature (meat, safe shutdown earthquake, etc.) I generally found the text to eventually explain them adequately. One critique is that at some points in the text the authors use terminology freely without first defining it, only to define it much later. I found this and the relatively large number of typographical errors to be distracting.This is clearly a very complex subject, and would no doubt be helped by good classroom instruction. Nonetheless, I still found considerable value in the book. I liked chapter seven, "The Time-Dependent Reactor" particularly well, and especially found sections 7.3 and 7.5 "Control Rods and Chemical Shim" and "Fission Product Poisoning" to be enlightening. I found the commentary on reactor stability and the explanation of post-shutdown Xenon-135 buildup and reactor deadtime extremely helpful. I also found section 7.6 on incore fuel management useful.From my experience in aviation (where it is a common parameter), I enjoyed the discussion of the utility of the Reynolds number in section 8.4, and found the ensuing discussions of turbulent flow, liquid metals, and boiling heat transfer to be fascinating. My safety systems background is primarily in aviation, where it is stressed that every design is a compromise: I was pleased to see the same acknowledged on p. 455 by Bill Minkler (who now writes the "Backscatter" commentary for "Nuclear News") with his quote that reactor design is "the art of compromise."I was pleased with chapters nine ("Radiation Protection") and eleven ("Reactor Licensing, Safety, and the Environment"), which are the most

directly applicable to me. The concept of "Relative Biological Effectiveness" is well covered beginning on p. 472, and the discussions of radiation protection are helpful. I found the section dealing with deterministic versus stochastic effects of radiation on pp. 479-480 to be helpful, and thought the glossary of radiation protection on pp. 539-542 to be a valuable reference. I wanted to better understand the principles of Monte Carlo analysis, which is covered in chapter ten, and while much of the discussion was helpful, it was a bit more general than I had expected.The overview of reactor licensing in chapter eleven is quite helpful, although becoming a bit dated. The discussion of multiple barriers to prevent to escape of radiation begins on p. 623 and provides an excellent general overview to the safety systems involved at a reactor site. Section 11.4 ("Dispersion of Effluents") was excellent overall, with plume formation and diffusion of effluents well covered for all Pasquill conditions (except G). This was an area new to me, as I have minimal meteorological knowledge, and I found the qualitative explanations and illustrations to be excellent, although the mathematical reasoning was at some points a bit hard to follow.The discussion of Design Basis Accidents (and particularly LOCA scenarios) beginning on p. 681 is excellent, as is the recap of the Three Mile Island and Chernobyl accidents which follow. I was pleased to see the introduction to risk management beginning on p. 711, which discusses 10CFR50.34a requiring operators to keep radioactive materials in effluents "as low as reasonably achievable." Oddly, the book the fails to name the acronym that logically follows from this (ALARA, of course) or discuss its use in the contemporary nuclear community to any significant degree.There is a lot of great content here, and while I am sure that I missed some of the more intricate mathematical nuances of the book, I think it was helpful to me overall. The book is sometimes a bit unclear, and some of the mathematical reasoning seems a bit fuzzy. A bigger complaint is that each chapter has numerous problems at the end, yet there is no answer key to determine if you did the problem correctly.I don’t claim to have as much experience in the field as the vast majority of people who will read and review this book, but I do believe that overall the book, while not perfect, gives a good introduction to the subject, and will serve as a valuable reference in the future.

Currently using this text for my Nuclear Reactor Theory and Design course. Very informative text with clear descriptions of underlying physical principles. Highly recommend for any engineering student or anyone who is interested in the subject matter.

The best part about the book is its thorough content. Even though it has a very large scope, it’s easy to read if you’re just entering nuclear engineering.I didn’t give it five stars as there is still room

for improvement, like having better diagrams and better formatting. Despite this, I definitely recommend it.

Horrible explanations on how to do homework because there are no good examples. However, the overall content of the book is impressive. Many changes need to be made as is shown by the errata that goes with it found online.

Not as detailed as some other books but easier to read than most. Great for Undergrads and still good for a quick refresher in Grad school.

I have studied the most important chapters of the book "Introduction to Nuclear Engineering". It is more than an introduction. I found the book to be a very good one for someone with some fundamental knowledge of nuclear technology. When I started the reading of the book, I had some knowledge already. The book helped me to go deeper into the nuclear subject. I found the example problems to be very good. I really recommend this book. I did not find that many typos as other reviewers claim.

Sent this too my son. He seems happy with it.

Very informative. I recommend getting the 3rd addition as this one was written before the Chernobyl and Fukushima accidents.

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