

Life Science Physics

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In the late 1960's, students demanded relevance. In that turbulent Vietnam era time, that usually meant social and political relevance. However, for the premed students in my freshman physics class, it meant relevance for their major. I remember talking to a cute, very young-looking woman with long blond braids with her expressing such concerns. I would spend the next half century off and on dealing with this problem.

As a result, I coauthored an introductory physics text aimed at the premeds and other life sciences majors. It was notable for its extensive biological connections made explicit in examples, problems, individual chapter sections, and in a few whole chapters. We set out to show that nearly every physics concept had connections to the life sciences and other scientific fields.

I originally had two partners in writing the book, Joe Kane and Norman Ford. We developed a detailed table of contents, and we each wrote a couple of chapters that we could submit to potential publishers. That's where we ran into trouble. I tended to be too terse, and Joe was too verbose. We'd swap our drafts and produce much improved versions. Norm, however, could not tolerate anyone messing with his prose, and at some point, we agreed on his leaving the project.

We found some interest from several publishers, especially John Wiley and Sons. Ultimately the Wiley editor was unhappy with our desire for two color printing which would make our diagrams clearer. Today, of course, similar books are filled with gorgeous full colored graphics.

Instead, we signed a contract with the small, eponymously named Wirth Publishing. Norm knew someone who had signed a textbook contract, completed the manuscript, and then had it sit on the editor's desk forever. Since no advance had been paid, the editor had no pressure to publish the book or to release the rights to it. My brother-in-law later on had a similar had a similar problem despite my warnings. Accordingly, we demanded and got a significant advance on signing.

Our original intent was to include a bit of calculus, since most of the students had taken one or two terms of the subject, and some physics

material is easier to discuss that way. However, Wirth had wanted a purely algebra-based text, so that is what we wrote. Sample materials with calculus went into the filing cabinet.

This, of course, was before word processing. We typed drafts with many typos. Then we did a lot of editing and rewriting, and physically cut and taped the documents. We paid a secretary to work from this mess and type the final version on an IBM Selectric typewriter. It had symbol balls that you swapped in to get the set of Greek letters or other special characters.

Five years later we had finished the book, all 800 pages, having written it between teaching and research. By the time we were done, the executive who had originally signed with us had left, and Wirth had lost interest. We contacted several publishers, and the same John Wiley editor who had passed on the book was now eager for one with the biological applications. We got a check for our advance amount, went across town, paid Wirth, and retrieved our rights.

There were many photos and diagrams. We included a photo of my children on swings to illustrate periodic motion, and another of me at one end of a seesaw and balancing them perched on the other in a section on torques. There is a photo of Joe and me trading punches in a discussion of forces in karate. The diagrams were a challenge. We would carefully draw a diagram with everything in the right proportions. We would append a note explaining, for example, that the arrow for F_1 is three times as long as the one for F_2 . The artist's version could be totally different. It might take several iterations to get it right. They were good artists but poor physicists.

The book was published in 1978 and sold for \$18. The current text sells for about \$200. This increase is more than the overall inflation rate, but not as bad as the huge increase in college tuition. When it appeared, the book was unique in its life science applications among texts for its intended audience. We named it Life Science Physics initially but got some flak from professors interested in adopting the book for their non-calculus classes that included other majors and were put off by the title. We changed the title to Physics in the next printing, which offended no one. Of course, the new title also conveyed no hint of its special character.

Physics was sold in an International English paper-backed version. I actually saw it in an Oxford bookstore, and a friend saw it in Australia.

There were several translated editions. My favorite was the Japanese. In the midst of all the Japanese characters, the words Newton or Sternheim would suddenly stand out. Translations were created when Wiley contracted with a publisher in that language who paid an initial fee, hired translators, and remitted a percentage of the sales revenue. Wiley gave half of that money to the authors, Joe and me. Wiley and we had no responsibility for the translation, printing, or marketing.

I learned the problem with this arrangement when a visiting Japanese physicist reluctantly told me that there were places where the original version was clear, but the translation was not. I resolved to make sure that we had oversight of any English variant. Wiley suggest doing a version in English for an advanced Canadian high school course. It would involve some additions and deletions, which was not a problem. However, it would require a Canadian author; Canadians were apparently chauvinistic about that. The man they had in mind had already written a lower-level physics textbook, and they sent me a copy. I was appalled at the large number of mistakes I found. Eventually the project died.

The editor received enough feedback about a possible calculus-light version to ask us for the book we originally proposed. By now it was in the early eighties, and an IBM PC and word processing software made the work go much faster and easier, with clean copy at every stage. Joe was no longer in academia, so I did the bulk of the converting the existing book to General Physics.

Textbooks get revised every few years in order to update the contents and not incidentally cancel out the increasing number of used copies in circulation. We produced a second and eventually a third edition of the original book, Physics. In the first edition everything was included in the body of the chapters. We realized later that this made the amount of material seem overwhelming for the usual two semester course and in the second edition moved some of the applications to supplementary materials at the end of the chapter. In third we added more applications not related to the life sciences, making the book even fatter.

At some point in the nineties, Wiley decided without telling us that they were putting Physics out of print. It remains out of print in English although some translations are still sold. The second edition of General Physics was published in 1991 and is, remarkably, still in print three decades later and selling a few copies. I attended its launch at the December 1990 meeting of the National Science Teaching Association in

San Antonio, Texas. The hotel was located near the charming river walk, a part of the city's urban renewal efforts.

A highlight of the meeting for me was a long conversation with the brilliant physicist, Freeman Dyson. He was there to receive an award. I knew Dyson decades earlier when he was a visiting professor during the second semester of my doctoral studies at Columbia University. He would spend days in the library carefully studying the latest papers and then summarize them in a 50-minute lecture. I think one postdoc could actually absorb the information. We talked about the then current Gulf War. I recalled reading about his work as a young analyst during WWII. The British flyers were less likely to survive when their bombers were hit than American flyers. He found that was because their escape hatches were too small once they wore parachutes. He said that they had ignored him and made no changes.

By 2000 General Physics was a decade old and overdue for a new edition. At the editor's request I produced a few revised chapters. The reviews were underwhelming, and the revision was dropped. I was not too disappointed since I was busy managing the very ambitious 21 college STEMTEC project, an NSF funded program intended to produce more and better prepared and diverse science and math teachers.

Ten years ago, 20 plus years after General Physics second publication, Wiley created a special two-volume one-color lower price paperback version for the large University of Minnesota class. Subsequently Michigan requested a similar version. At that time Wiley realized that by then many photos had to be repurchased to avoid possible lawsuits like one that had cost Yale over a million dollars. This was a challenge since some of the sources no longer appeared to exist, and we had to find alternatives. We worked with the editors to find suitable replacements. We even went into a lab, set up a microwave experiment, and took a photo we sent to the editor.

Two years ago, Wiley had rearranged its divisions, and I got an email from the current physics editor, a man based in Heidelberg, Germany. He proposed creating a third edition of General Physics and renaming it to Physics for Science Majors. Joe and I were both in our eighties and were not interested or able in playing more than minor editing roles. The editor agreed that we needed a younger partner, and I recruited my colleague, Shubha Tewari. The editor invited twenty or so physics instructors to convey their interest in the book and ideas for revisions

and got no response. The project was effectively dead at that time, although he encouraged Shubha to think about what she might do in a revision.

Now what I call the Curse of Physics began. Last year Joe died after a short bout with prostate cancer, I developed heart problems, and Shubha broke a leg. We have not heard from the editor in a long time, and I don't even know if he is still alive. But a book whose origins trace back over a half century from the 1960's and a young woman with long blond braids lives on.