



ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT HEADS ASSOCIATION

March 2018

Featured Article



Free Electrical Engineering Textbook Initiative

By: Fawwaz Ulaby, University of Michigan

Textbook Price Spiral

According to the U.S. Bureau of Labor Statistics, over the 15-year period between 1998 and 2013, the composite (all items) consumer price index (CPI) increased by 44%. Over the same time period, the CPI for college textbooks increased by more than threefold, to 142.5% (Figure 1). This large deviation between the composite rate of inflation and the rate of inflation for textbooks started in the early 1980s: 240% over the past 30 years for all items, compared with 800% for textbooks. A student who paid \$30 for a typical college textbook in 1988 now pays \$240 for it.

The high cost of textbooks has not only changed students' attitude towards their textbooks, but it also led to a different business model in the textbook publishing and selling world. Students could no longer afford to keep their textbooks as part of their future professional library, so they sold them as soon as the academic semester was over. This, in turn, created a thriving used-book market that cut into the profits of publishers, prompting them to further increase the prices of their books. The most recent manifestation of the cost spiral is the relatively recent introduction of PDFs for rent. For \$60-100, a student can "rent" the use of a book's PDF, hosted on the publisher's website, for a specific duration, such as six months. Bottom line: whether in hardcopy print or as a PDF, new or used, college textbooks are highly expensive, and out of line with the cost of most other items.

New Initiative

Four electrical engineering faculty members—two from the University of Michigan (Ulaby and Yagle), one from UC Berkeley (Maharbiz) and one from the University of Utah (Furse)—have recently decided to introduce a new initiative aimed at reducing the cost of textbooks to students by offering PDFs of three books totally free. The three books cover the material typically contained in five undergraduate EE courses: two in circuits courses, two in signals and systems/signal processing courses, and one in image processing. Two of the books use National Instruments software, which can be downloaded for a nominal fee. Also, for faculty and/or students who prefer to use a printed hardcopy, they can order print-on-demand copies for a nominal price (\$60-75). See Figure 2 for more details.



Andrew Yagle,
University of Michigan



Cynthia Furse,
University of Utah



Fawwaz Ulaby,
University of Michigan



Michel Maharbiz,
UC Berkeley

Book Quality

The three textbooks were written by authors with extensive experience in academic publishing; their books are currently used at over 100 U.S. universities. Additionally, each book has a publicly available companion website with extensive tools to help the student learn the subject matter. These websites are at:

- (1) **Circuit Analysis and Design** <http://cad.eecs.umich.edu/>
- (2) **Signals and Systems: Theory and Applications** <http://ss2.eecs.umich.edu/>
- (3) **Image Processing For Engineers** <http://ip.eecs.umich.edu/>

Cost Savings

Some readers of this article may ask the following question of the authors: *Why are you doing this? Are you giving up your book royalties?* The simple answer is: Yes, we are giving up our book royalties, and part of the reason for doing it is the large multiplier. Using a model that estimates the number of copies of each book that we could sell (through a publisher), the number of times a book copy is reused (through the used-book market), and other financial factors associated with the process, we came to two important conclusions:

- (1) For every \$1 we give up in book royalties, students save \$25 in textbook costs.
- (2) For 2018-2019, we estimate that the Free Textbook Initiative will result in a total savings for students on the order of \$2.5 million. Our hope is that this amount will grow going forward as more textbooks get added to the initiative.

Invitation To Colleagues

We invite colleagues from all institutions across the country to consider publishing electrical engineering textbooks under this initiative. To insure that the books published under the initiative are of the highest possible caliber, all submitted book manuscripts will undergo a thorough review process.



ECE MEDIA Corner

ECE Source

View the latest issue!

>> [February 2018](#)

ECE Webinar

On Demand Webinars

Rethinking Electronics Fundamentals

Sponsored by National Instruments

Oscilloscopes for the Classroom

Sponsored by Keysight Technologies

The Global Impact of ECE - Spotlight on Latin America

In Partnership with National Instruments, ISTE, LACCEI, and Tecnológico de Monterrey

Modeling Capacitive Devices with COMSOL Multiphysics®

Sponsored by COMSOL

The Opportunity for the Electrical Engineering Class of 2022

Sponsored by National Instruments

IoT - It's Everywhere! Preparing Students for Tomorrow's Design and Test Challenges

Sponsored by Keysight Technologies

Calendar of Events

E-mail the event date, name and link to information@ecedha.org to be added to the calendar.

March 16-20, 2018: 2018 ECEDHA Annual Conference and ECExp0 Hyatt Monterey - Monterey, CA

Support ECE education!

Become an ECEDHA Corporate Sponsor

Exhibit and sponsorship opportunities for 2018 are now available!

>> [View Sponsorship Prospectus](#)

Contact Kim Simpao for more information
+1-773-315-7779 (mobile)
ksimpao@ecedha.org

Corporate Members

