



“Physics in Canada”
Book Review

“La Physique au Canada”
Critique de livre

“**Learning the Art of Electronics: A Hands-On Lab Course**”, by T.C. Hayes and P. Horowitz, Cambridge University Press, 2016, pp: 1150, ISBN 978-0-521-17723-8, price 91.95

Approximately 40 years ago Paul Horowitz started an electronics course at Harvard from which the infamous book **The Art of Electronics** (AoE) by Horowitz and Hill was born. For the past 25 years, Hayes has been teaching this course with Horowitz. The book **Learning the Art of Electronics: A Hands-On Lab Course** is based on this course with a large emphasis on practical circuit design, construction, and testing. The book is intended to be a stand-alone text, rather than a supplement to Horowitz’s original text.

The book is divided into 26 chapters with each chapter covering the material required to complete a hands-on lab described at the end of the chapter. The end-of-chapter labs correspond to the weekly labs that students would complete in the university course. Of course, to complete the lab exercises, one must have access to the required circuit components and standard test equipment (oscilloscope, function generator, power supplies, breadboard, etc.).

There is very little math in Learning the AoE. Instead, Hayes attempts to develop the reader’s practical skills and intuitive understanding of electronics. I teach a second-year electronics course and one of the things I like most about the course is that it introduces students to new mathematical techniques (solving differential equations and complex algebra, for example). Learning the AoE takes a completely different approach and makes no apologies!

The lab projects that are described at the end of each chapter are truly impressive. Some of my favourites include the AM radio, a working op-amp built from transistors, using infrared light to wirelessly transmit an audio signal (the audio signal is encoded onto the infrared light using frequency modulation), and digital-to-analog converters designed using resistor ladders. I also found the qualitative discussions of the Nyquist sampling theorem and aliasing particularly illuminating.

As a final remark, I think it would require a major investment of time for someone with no prior electronics experience to really benefit from studying Learning the AoE. For example, Part VI of the book covers microcontrollers, a topic with which I have no prior experience. I was not doing the lab exercises and, as a result, I found that I did not really gain much knowledge and/or insight from reading this part of the book. To get the most value from this text, one would have to do the suggested lab exercises. In a university setting, students typically always have an expert (lab instructor or TA) on hand to help them get through difficult laboratory tasks in a timely manner. You may not have that luxury if you’re using this book as a self-study guide!

Jake Bobowski
University of British Columbia Okanagan

