

# Teaching L<sup>A</sup>T<sub>E</sub>X at a Liberal Arts College

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**Abstract** This brief report describes a course I developed for teaching L<sup>A</sup>T<sub>E</sub>X to a diverse undergraduate audience. Of special note are the changes and improvements I made to this class after the first time it was taught.

## 1 Introduction

Finding a place in the standard curriculum to teach L<sup>A</sup>T<sub>E</sub>X at a small, liberal arts college is a challenging task. In some cases, the demand for this training is small or non-existent. In other cases, the relevant departments are stretched thin with service course obligations and no one is available to staff such a class. I teach in the Mathematics Department at Washington & Jefferson College, located in southwestern Pennsylvania. Like a good number of schools, we have a January term (we call ours “Intersession”) in which students take and faculty teach just one class. This term is usually 3.5 weeks long, and everyone has only one topic on which to focus. Even better, our faculty are encouraged to offer non-catalog courses and to be creative in the classes they teach. This was a perfect venue for me to offer a course I called “Introduction to Scientific Typesetting.” In other words, this was my way to teach an introduction to L<sup>A</sup>T<sub>E</sub>X.

I first taught this course in January of 2009. As with most classes I’ve developed, this one was significantly better the second time I offered it. While the topics were virtually the same, the class flowed much better in January 2010, and I believe the students learned more as well. In this article I will explain the improved structure of my course as well as the lessons I’ve learned along the way.

## 2 Goal

An obvious goal for this class was to help students become comfortable with L<sup>A</sup>T<sub>E</sub>X. By the end of the class, I wanted them to be able to use L<sup>A</sup>T<sub>E</sub>X to create any sort of document they could imagine. But I was not only concerned with technical skill—I wanted my students to see that documents (especially scientific documents) created with L<sup>A</sup>T<sub>E</sub>X were both easier to produce and more attractive than similar documents produced by a word processor. In general, L<sup>A</sup>T<sub>E</sub>X automatically makes better decisions about layout and formatting than does the average Microsoft Word user, and I wanted my students to see this. But I also wanted them to get a small taste of some of the stylistic issues in the scientific typesetting world: When should formulas, equations, and symbols be displayed (as opposed to written in-line)? How important is the font choice for the mathematical symbols? Would this document be easier to read in a two-column layout?

## 3 Audience

The audience for this class has been mixed. I have tried to persuade mathematics majors to enroll with little success. My class doesn't satisfy any general education requirements for graduation (which students like to complete during Intersession), and most of our mathematics majors are either content to muck around in Microsoft Word's equation editor (gasp!) or to use Scientific Notebook (or Scientific Workplace). Consequently, in a class of 15 students, there may be at most 2 or 3 current or potential mathematics majors. I have recruited a few students from other scientific disciplines, such as chemistry, physics, and computer science, who could benefit from learning L<sup>A</sup>T<sub>E</sub>X. Also, a portion of the students are first-year students who registered late enough that they were unable to find a better Intersession option. Predictably, this last group of students is the most difficult to persuade of the usefulness of the class.

Most pleasantly, my course is currently affiliated with the Professional Writing concentration at my school, and as such it is starting to draw some students from outside the science divisions. The students who enroll as part of this concentration typically finish near the top of the class.

## 4 Content

Throughout the class, I argue that L<sup>A</sup>T<sub>E</sub>X can make one's work beautiful. So, in addition to completing exercises and assignments where they practice using L<sup>A</sup>T<sub>E</sub>X, my students must dig through the library for examples of beautiful and ugly books and articles of all types. They need to confront what affects their assessment of the aesthetic value of a document. My students must also take their work from previous semesters and improve its appearance using L<sup>A</sup>T<sub>E</sub>X. They usually find that their presentations, papers (with bibliographies), and even foreign-language assignments look much better the second time around.

In the first few days of class we cover all of the usual topics. After an introduction to T<sub>E</sub>X, L<sup>A</sup>T<sub>E</sub>X, and the free software we will be using (MiK<sub>T</sub>E<sub>X</sub> and TeXnicCenter), the students learn about typing text, lists and tables, and typing formulas. We then spend time on the bigger picture with investigations into document structure, counters, and cross-references. We move on to graphics and floats and then Bib<sub>T</sub>E<sub>X</sub>. Since most electronic documents are viewed in PDF form these days, we spend one class studying the hyperref package. We learn how to construct slides in L<sup>A</sup>T<sub>E</sub>X using the beamer and powerdot document classes. We end the class by spending two days on pstricks, a day on fonts, and other time on small miscellaneous topics. (By visiting my web page [1], you can view the complete list of lessons for my class.)

## 5 Techniques

The structure of the class changed dramatically the second time I offered it. The first time, in 2009, we met twice a day for 1.5 hours at a time. I would nervously deliver a 30-minute, slide-filled lecture on some feature of L<sup>A</sup>T<sub>E</sub>X and then give an assignment which was due the following day. And though I would stay to answer questions and help the students as they began to work on that assignment, the class time was unbalanced and inefficiently used.

The second time the class was offered, in 2010, I decided that we would meet just once each day for 2.5 hours and that I would emphasize in-class work to a much greater degree. I generally covered one topic per day but found two or three stopping points throughout the class where students could immediately get their hands dirty. (It now seems unthinkable to me to teach students L<sup>A</sup>T<sub>E</sub>X with-

out insisting that they practice typing and compiling frequently throughout the class.) My class was small enough that I could walk through the classroom and give suggestions on problems or check to see that everyone was ready to move on. Most of these small exercises were of the “reproduce this” variety: I either projected a document on the screen or passed out a hard copy to all the students and asked them to duplicate it. Usually I would supply my students with some example code or a template that I use for such a task, but they occasionally needed to create the document from scratch. This in-class practice technique had several advantages: the students were engaged throughout the class; students were confronted with all of the newest material in a concrete way; and I knew almost instantly how effective my explanations had been and which of the concepts and techniques were most difficult.

The final assignment for my class was such a success during the 2009 class that I repeated it with only slight modifications in 2010. Each student chose a  $\text{\LaTeX}$  package to investigate and reported on its use and usefulness. Students needed my approval for the package they researched, but they enjoyed the freedom to explore a  $\text{\LaTeX}$  package related to an area of their interest. The final paper and presentation brought together most of the topics that we covered during the class, and students enjoyed learning about some of the more obscure, niche uses of  $\text{\LaTeX}$ . Some examples of packages on which students have completed final projects include: `cwpuzzle` for making crossword puzzles, `mhchem` for chemical formulas and equations, and `cuisine` for typing recipes.

## 6 Conclusion

Since I plan to offer this course in the future, I have been pondering other improvements. I cannot think of additional  $\text{\LaTeX}$  material that will be of interest to a general audience, but I do hope to recruit more aggressively in the other science departments. One aspect of the class that I could improve is an increased emphasis on digital typography. Perhaps in the future we will read some selections from a collection of articles of Donald Knuth ([2]).

I have been adding to and improving my material each time I teach this class, and I have posted all of the lectures, examples, assignments and resources on [my web page](#). Any interested reader should feel free to use these materials and pass them along to other interested parties, provided the appropriate attribution is included.

## References

- [1] Ryan Higginbottom, *Introduction to LaTeX*, <http://www.washjeff.edu/users/rhigginbottom/latex/main.html>, accessed on 05/19/2011.
- [2] D.E. Knuth, *Digital Typography*, CSLI Publications, 1999.