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Experiences and Lessons Learned Teaching LaTeX to a Group of University Students

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Rationale for Teaching a LaTeX Course

- We require all of the students (grad and undergrad) we supervise to write in LaTeX;
- We have created a PSU Thesis LaTeX class for our students and have offered to the Penn State LaTeX community at large: this has generated a non-negligible demand for "tech support;"
- When distributing hand-outs in courses, we are often asked what writing tools we use to make things to look "so good." This has created a bit of interest on the part of some students.

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TEX Resources at PSU

At the time of the course, Penn State facilities had not been upgraded to Mac OS X. Hence, considered LATEX solutions available under both Mac OS X and Mac OS 9. We considered:

- CMacTEX by Thomas R. Kiffe; and
- OzTEX by Andrew Trevorrow.

CMacTEX was chosen and was installed on all the machines in our computer classroom. Class demonstrations were done using TEXShop.

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Course Information

- One-credit course.
- One 75 min period/week.
- Each student had a laptop computer with TEX/LATEX and with access to the web.
- Text (required): Kopka and Daly, 3rd ed. (1999). We also suggested that each student had access to a copy of Grätzer's *Math into LATEX*, 3rd ed. (2000).
- The course met 7 weeks out of a 15 week semester.

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Administrative Details

- Objectives:
  - Write a professional-looking dissertation, conference paper, and/or journal paper;
  - Create a professional-looking presentation.
- Weekly homework (a necessary evil).
- Prerequisites:
  - File transfer know-how;
  - Downloding & installing know-how;
  - Familiarity with a text editor.

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Course Syllabus

1. Introduction & Basic LaTeX
2. Displayed Text
3. Typing Mathematics in LaTeX
4. Multiline Equations in $\mathcal{AMS}$-LaTeX
5. Graphics & Floats
6. User Customization & Bibliographies
7. The PSU Thesis Package

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LaTeX Basics

- the overall structure of a LaTeX document;
- the general structure of LaTeX commands;
- environments and declarations;
- characters, words, sentences, and paragraphs;
- quotes, hyphens, and dashes;
- classes, class options, and packages;
- page layout (e.g., headers, footers, margins).

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Displayed Text

- font characteristics (i.e., `\emph`, font sizing, families, shapes, and series);
- centering and quoting text;
- lists;
- typewriter-like tabs and the tabbing environment;
- boxes (i.e., how TEX defines boxes, `\parbox`, `\rule`);
- tables (we will cover the very nice `booktabs` package in the future).

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Mathematics in LaTeX

We had the students always load:

```
\usepackage{amsmath}
\usepackage{amssymb}
\usepackage{exscale}
\usepackage[mathscr]{eucal}
```

We devoted:

- a whole lecture to single-line displayed math; and
- a separate lecture to multiline equation environments and subsidiary environments.

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Mathematics in LaTeX (cont.)

First lecture (among other things):

- numbering;
- superscripts and subscripts
- text within mathematics
- operators and spacing in mathematics.

Second lecture:

- primary vs. subsidiary multiline math environments;
- alignment and indentation “etiquette” (as suggested in Swanson’s *Mathematics into Type*, (1999).

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Graphics & Floats

We focused on:

- `graphicx` package;
- `includegraphics` command and options;
- `lscape` package;
- `color` package;
- the `figure` and `table` environments.

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User Customization

- Counters: how to define, set and reset them.
- Lengths: how to define and set them and how/when to use `\addtolength`.
- The creation of user-defined commands as well as the redefinition of commands.
- The use of the `\input` command.
- The scope of commands and environments defined in the preamble versus the scope of those defined within environments.

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Bibliographies

- The `thebibliography` environment.
- The "standard" `thebibliography` environment vs. using BibTeX.
- The `natbib` package for author-year citations.
- The use of EndNote™ (Thomson ISI ResearchSoft) with BibTeX.

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Student Response

At Penn State, students anonymously evaluate the course they are about to complete. To the numerical rankings are added the following questions:

Q1. What did you like best about this course?

Q2. What did you like least about this course?

Q3. What suggestions do you have for improving this course?

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Students Liked

- the utility of the web site;
- the teaching of LaTeX through examples;
- the course assumed no prior knowledge of LaTeX;
- that LaTeX provided an alternative to MS Word; and
- that they were learning a skill that would be useful in their careers.

Students Disliked

- there was no instruction on how to use particular software packages for LaTeX;
- there was too much work for a 1-credit course;
- some of the homework took them much too long;
- there were numerous problems with PSU computer labs; and
- the course felt rushed.

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Improving the Course

We *overwhelmingly* heard that:

- spread the course out for at least 12 weeks, if not the entire semester;
- homework should be graded more leniently;
- class should meet more often so that each lecture is shorter;
- homework should be shorter or spread out more;
- we should provide help to people with Windows machines.

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… we concluded that

- Too much was taught in too little time and the course should be spread out over a larger part of the semester.
- Classes should be shorter and meet more often (this would also allow us to make each homework assignment shorter).
- We should provide additional support for those students who are having trouble getting TEX to work on either their own computer or a public computer.

… however

It has been our experience, that in all courses that involve computers and programming, students almost *invariably* find them to be more time-consuming than they would like.

At the same time, we do agree that the course could and should be spread out throughout more of the semester. Also, we will more strongly encourage students to seek our assistance rather than beating their heads against the wall.

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Food for Thought

This all begs the question:

> *Despite the potential of TEX/LATEX in the preparation of scholarly work, is there a place for a course like this in the university curriculum?*

- Students clearly thought that it was too much work!
- In a recent follow-up survey we found that more than half the students in the course continue to use what they learned about LATEX on a regular basis.
- Our department had some reservations: more of "club" activity and not an academic pursuit.

We welcome the thoughts of university faculty *and* TEX gurus.