

How to Put your Course on the Web

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Abstract: This paper describes the use of web oriented tools in the design of an instructional web site, along with techniques for preparing technical content and administrative information for on-line viewing, printing in standard notes format, and slide projection. The example used is based on the author's experience delivering courses in electric machines and power circuits over the past four years.

Introduction

In this paper, you will learn how to use the world wide web for storing all course content and administrative details so that the material can be accessed by students for studying and by the instructor for presentation in class.

Putting everything on the web is a major commitment in time and effort. It is helpful if you already have much of your course content in electronic format so that you can focus on the instructional design and the mechanics of the conversion process.

Courses in electrical and computer engineering tend to contain a mixture of text, equations, and many kinds of diagrams, so we begin by considering the format that will be most suitable for on-line viewing using a web browser and printing on readily available printers. Some students will want only on-line access but most (at present) prefer to have printed notes available as well as on-line access.

Course content is best prepared using PDF (portable document format) files so we can control the relative size of text and graphics (equations and drawings) - web browsers allow the user to change the size of HTML (Hypertext Markup Language) text but not graphics. Administrative information - schedules, news items, etc can be either HTML or PDF.

The issue of copyright protection, for both the instructor and the authors of any textbooks used, is addressed using password-protected directories.

We begin by looking at the end product - a well designed web site, and then we look at how to get there - the tools and techniques we need to use.

The Instructional Web Site

Our web site has two parts; a public access (open to all) directory and a restricted access directory (limited to registered students to read and/or download the instructor's notes).

The example used in this paper is the web site I developed (over a four-year period) for a course called EE3PI4 Power Devices and Systems, one of four instructional web sites I have developed.

The Home Page. The public access directory contains the course description, news, schedules of lectures, tutorials, laboratory experiments, computer simulation sessions, tests, and so on - and the link to the restricted access area. All of this information is contained on files linked from the course home page (itself an HTML file), illustrated in Fig. 1.

EE 3PI4 1999-2000 COURSE HOME PAGE

Instructor's Notes - for students currently registered in my course
Copies of these notes are available as Courseware from the bookstore
News about the Course - look here for special items - updated anytime.
Class Schedule . . . Lab Schedule . . . Lab Groups . . . Teaching Assistants
Objectives and Evaluation of Laboratory Work and Tutorials
Course Description , Grading System , and Administrative Introduction
Why study this subject. Books to read. Chapman Textbook Web Site
Related Web Sites: Links to Equipment Manufacturers' web sites
To view or print PDF files, install the free Adobe Acrobat Reader .

Last update: April 5, 2000. Send comments to alden@mcmaster.ca

Fig. 1: Abbreviated Course Home Page

The News Page is my main electronic communication with my students - while I create a majordomo-based mailing list for the entire class, I deliberately minimize its use. The news page is where I post the results of class discussions and decisions, schedule changes, other significant web postings. The printed courseware is static, the web site is dynamic.

Password Protection. The restricted access directory contains all lecture notes, presentation slides, problem sets, prior term tests, tables of reference material, etc. Each student, and anyone else who needs access (instructors, teaching assistants, secretaries, technicians, etc.) is given a unique name and password to be used to access this directory. I use, as many instructors do, each student's e-mail name and ID number for their access name and password because they are unique and available in a file from our Registrar's office.

The Notes Index Page. The index to the files stored in our protected directory is a set of links contained in an HTML file - illustrated in an abbreviated form as Fig. 2. Below the title block is a set of links to other index pages that contain information about the laboratory and other aspects of the course. By compressing these details, the remainder of the index page is an organized overview of the course. The first two of seven sections are shown in Fig. 2.

Each lecture is identified by a letter and a number. This identification scheme is used in the course timetable page. In general, each lecture (line) contains two links; the first is to the printable set of notes (typically 5 to 10 pages), the second is to the accompanying presentation version (15 to 30 pages). Both are PDF files, the second being produced from the first (at the wordprocessor stage).

The notes can be viewed or printed on-line, or purchased from our bookstore as a courseware package. The courseware link in Fig. 1 enables students (and me) to check the price and inventory on-line. Most students opt to purchase the courseware package and avoid a lot of downloading - but the choice is theirs. I print the set of originals for the courseware by printing the current version on the web just before the start of term.

I use the presentation version to project an appropriate set of "slides" using a laptop computer with a cordless mouse and an SVGA projector in the lecture room. I normally use an Internet connection via the university ethernet network but I can use a copy of the files that I ftp to my laptop at the start of term. I regard the laptop file set as backup in case I experience a network problem.

You will note that there is an extra file in the middle of the D2 line. Occasionally I discover an error, or the need to add a segment, to my notes. When this happens, I create the new or revised page, edit the presentation version of the file, and upload - so that my students know where changes have occurred. I also add an entry to the "news" page. Before the start of the next term (and the printing of the courseware package), I make the necessary editing changes and delete the extra file.

Tutorials and Tests. The test heading (TT1 for Term Test 1) and problem set links (PS1 etc.) are placed within the index to reinforce the course sequence (when specific problem sets should be completed and what preceding block of work is covered by each test). Links to the sample (prior) tests links are placed on a separate page to keep the index page simple.

Power Devices and Systems
On-Line Instructor's Notes by Robert T.H. (Bob) Alden

Links to: [Laboratory](#) , [Projects](#) , [Sample Tests and Exams](#) ,
[Additional Resources](#) , Course [Photos](#)

INTRODUCTION
[Course Intro](#)
I1 [Power Concepts](#) , [presentation](#)
I2 [DC Circuits](#) , [presentation](#)

DC MOTORS
D1 [The DC Machine](#) , [presentation](#)
Tut1 DC Circuits: [PS1](#)
D2 [The DC Motor](#) , [D2 Addition](#) , [presentation](#)
D3 [DC Motor with SCR Drive](#) , [presentation](#)
Tut2 DCM Calculations: [PS2](#) , [PS3](#) , [PS4](#)
TT1 DC Motors

Fig. 2: Top Portion of Index Page (Right Frame)

On-Line Laboratory Manual. This section of the course web site contains everything needed for students to perform the laboratory experiments; the instruction sheets, descriptions of the laboratory layout, machines, transformers and instruments, the lab schedule, composition of student groups, names of and contact details for the teaching assistants. Also included are photos of the laboratory and individual pieces of equipment, as well as overall objectives and evaluation criteria. Problems that arise in the laboratory, can be addressed by editing any of the instructional pages for each experiment - which can then be viewed or downloaded by students.

Project Information. This section contains resource materials and information on objectives and procedures for the two course projects, one is an extension of a laboratory experiment while the other is a distribution system design. Technical writing guidelines are also included.

Photos of students, teaching assistants, and all related staff are placed in the password protected site to respect privacy of individuals.

Term Tests and Final Exams. These are included, many with partial solutions, as study aids. During term, complete solutions are posted after term tests are marked and returned.

Use of Frames. I use a small frame on the left side of the page (subdivided into a top and bottom frame) as shown in Fig. 3 for my use in classroom presentations.

The top portion, under the **Notes** heading, enables me to skip down the page more reliably than scrolling using the cordless mouse and the projected computer screen (the scroll bar is often at or off the edge of the projection screen).

I can show pages under the **Class** and **Lab** heading while the current lecture "slide" is open in the main window. These pages are opened in new windows which saves reloading if I already have a multi-page PDF file open in the main (right) frame.

In the bottom portion (the lower separate

frame), each link causes a new menu to replace the one entitled **Graphics**. This menu is a list of links, each for a new small window to be opened at the top of the screen (above the course content being projected) containing a graphic such as an equivalent circuit or a phasor diagram or a small table.

Tools and Tips to Create Our Web Site

I now address the five aspects of creating an instructional web site; the kind of server facilities we need, how to create our HTML files, how to create our PDF files, how to upload these files, and some tips about maintaining this site once we have got started.

The Server Facilities We Need. We need access to a server which is a computer that is permanently connected to the Internet. Most servers have a Unix (or Linux) operating system and this paper is based on this assumption.

The server I use (power.eng.mcmaster.ca) is part of my university network. The original Unix-based machine was replaced by a PC (personal computer) running Linux and the switch was transparent to me. We need to talk with our system manager who should be able to set system defaults and permissions for some of the features I will refer to.

We need to be given a directory (file space) on the server where you or I are the only one who has write permission. This is where we store all our files. My directory name is alden so my address is: "http://power.eng.mcmaster.ca/alden/"

If I create a file called "index.htm" (on some systems the extension is html - the system manager can set this default), then this file is automatically loaded into the web browser when "my address" is used. This file is my personal home page and is where I put the link to my course home page. It is best to create a new directory for each course.

FTP Access. We need FTP (File Transfer Protocol) access to our directory. We will be given a logon name and password in order to be identified as the only one who can delete files or

Notes Top I notes D notes T notes M notes P notes S notes
Class News Sched Home
Lab Sched Groups TAs
Graphics DC Mtr AC Cir Transf 3ph Mac Ind Des 1ph Mtr

Fig. 3:
Left Frame

put new files in this directory. We can also create new sub-directories, and rename existing ones using the FTP program.

Password Protection. If we want to password protect some of these sub-directories, we will need our system manager to create a special directory (usually named "htpass") where the password files will be stored. We will also need to learn some Unix commands to set up and maintain these password files. For details on how to implement password protection on a Unix based server, please see my column in the July 1999 issue of IEEE's **THE INSTITUTE**. The password-protected directory can either be a sub-directory of the course directory or at the same level.

Creating HTML Files. Both the instructor's home page and the course home page are HTML files, as are many of the administrative detail pages (notes, schedules, etc). HTML files can be created with many tools - Wordprocessors or publishing programs like Word or WordPerfect or PageMaker, Netscape's Composer, any kind of text editor, and so on.

Word, WordPerfect, PageMaker, Composer, and their like, can directly output HTML files with correct syntax. If we are using a wordprocessor, we need to save both the wordprocessor version and the HTML version of the file - often the HTML file can not be read correctly for further editing. These software packages have tools for formatting web pages - providing we switch to web editing (which is a different and much more limited subset of wordprocessor editing).

Text editors require that we type in every HTML code we need - which is time consuming and requires that we know the HTML syntax. However, judicious use of cut and paste from previously produced web pages can be quite efficient.

I use a mix of WordPerfect and a text editor - using WordPerfect to create complicated tables or a lot of text where I want to use a spell checker. I find the "defaults" in wordprocessors to be very annoying, because they often change or distort the visual effect I want. I create these files on my PC and then upload to my server using FTP (or alternative file transfer methods which are available over my university

network).

We create the set of frames for the On-Line Notes by writing four HTML files. The first (index.htm) calls the other three (index_l.htm, index_g.htm, index_r.htm). Please see Fig. 4.

Creating PDF Files. Creating a PDF file is very different from creating an HTML file. We use our wordprocessor (e.g. Word, WordPerfect, PageMaker) to produce a file as if we were going to print it, but save it as a printer file and convert it to PDF format (with an extension .pdf). This file is viewed using a web browser (e.g. Netscape or IE) which automatically loads Adobe Acrobat Reader (anyone who wants to view PDF files must have installed this Reader).

While newer versions of some wordprocessors can create a PDF file directly, others do not. If our wordprocessor does not, we use the wordprocessor "File", "Print", menu to produce an output file in a

```
<html><head><TITLE> EE 3PI4 on-line notes</TITLE>
</head>
<frameset border=0 frameborder=no cols="12%,*" >
<frameset border="0" frameborder=no rows="50%,*" >
<frame name="ij" src="index_l.htm" scrolling=auto >
<frame name="ig" src="index_g.htm" scrolling=auto >
</frameset>
<frame name="ii" src="index_r.htm" scrolling=auto >
</frameset></html>
```

Fig. 4: Code to Define Frames in Fig's 2 & 3

postscript printer format and select "Print to File" instead of "Printer Port". We then use the Adobe Distiller program to convert the postscript printer file to a PDF file. We need to purchase the Acrobat Distiller program from Adobe - only Acrobat Reader is freely down-loadable from "www.adobe.com".

In my experience, producing postscript files that convert correctly (judged by viewing, printing, and projecting using a web browser) can be a tricky and frustrating task - especially when equations are included. Acrobat PDF Writer can be used as the printer format - but I have experienced many difficulties with it. I have also used NEC Silentwriter LC 830 and, am currently using Apple Laserwriter II NTX. These are the names of the printer drivers (one or more) that we need to install on our PC, in addition

to the drivers for the printers we actually use.

I am using WordPerfect 8 and the original WP equation editor (it is amazing how many reference manuals do not discuss the equation editor or do so in a minimal fashion). One tip - we must use the backslash (\) preceding the characters =, +, -, if we want them to display correctly - they do not look too bad when printed on paper as notes but are not visible when projected as slides.

From Notes to Slides. I use a 12 point font for notes and convert notes to slides, initially, by copying and renaming the file, changing the page setup from portrait to landscape, doubling the font size, changing the margins to match the window ratio, increasing the size of equations and drawings, deleting most of the text, and using point form with bullets for emphasis on much of the remainder.

Uploading Our Files. We use an FTP program to transfer the files between our PC and our server. If we are on a network, we may have other options for file transfer. One tip - Unix is case sensitive so we must be careful with filenames, and ensure that the name is identical (including case) between the file and the link that calls it. Under "Program Options" in the FTP program (it may be slightly different in your version) we can force the case of files being transferred to be lower case.

I prefer to always use lower case everywhere and to restrict my filenames to be not more than 8 characters in length (plus the 3 character extension). I have found that some utilities and programs I want to use do not handle the newer Windows long file names.

Maintaining Our Site. As soon as our site is initially complete, it is likely time to change something that is out of date. Links to other sites may become unusable because that other site changes something - the file name, the directory, even the server or its name.

All files should have the date of last modification. The date at the bottom of our news page should agree with the date of the most recent entry. Initially corrections, additions and appearance improvements are needed. Then the enhancement stage follows when we realize we can make better use of this new medium.

Concluding Remarks

Last but not least, are some observations on the overall design of our web site. When we put material on the web, we are publishing. Use of password protection and hence limiting access to currently registered students does not change the perception of our customers - those who we should expect to learn better by the use of this medium.

I have found the web a tremendous aid to me in becoming better organized and setting higher standards for material I provide as a teacher.

This does not just happen. We must focus on screen appearance and the look of our printed pages. The quality of the "printable notes" should be judged by appearance (when printed) and student appraisal.

The appearance of the slides for projection as well as the home page, the index page, on-line news, schedules, and the like (those items not often printed but viewed on-line to either move around the web site or read details that may be updated) must be carefully designed.

A few tips: use a white background with most text in black and selective use of colour (set the browser to print all text in black before printing anything - unless using a colour printer); be consistent with use of white space and colour, font size and type; use additional small windows to show graphics and equations; scan photographs of equipment or use a camcorder and transfer the images (with editing) to the web.

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He has been writing a monthly column entitled "Travelling the Information Highway with Bob Alden" for IEEE's **THE INSTITUTE** since 1992, where many techniques applicable to this paper have been published. A complete on-line index of these articles is available at "power.eng.mcmaster.ca/alden/ti.htm".