

Web Development Modules for Non-Web Programming Students

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ABSTRACT

The World Wide Web is ubiquitous, interesting, and is now a part of many electrical and computer engineering courses. A set of Web design modules for utilization in non-web programming electrical and computer engineering undergraduate classes is introduced in this paper. The modules began as an introductory exercise for a “Circuits for the non-major” class, and have been adapted for utilization for a number of different audiences. The introductory module for the Circuits class takes about 15 minutes on the first day of class, and proves to be a popular introduction for the non-major [mechanical engineering students and civil engineering students] to the topic of ‘electrical and computer engineering’. The students have laptops in class, and are instructed to develop a small webpage to describe themselves to the entire class. The WebPages are posted on the course Blackboard, which is course management software, during the first session and the instructor displays the pages as a different way for students to introduce themselves on the first day of class. This type of interactivity is utilized in engineering design in industry, and students find the environment stimulating. Web page design is approached in the

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format of mechanical engineering design, and reinforces the step-by-step design concepts that are essential for the modern engineer. Lastly, the student utilizes and reinforces 'technical communication' skills that are a part of a required humanities course. An additional benefit is that it takes less than a half an hour for one module.

Justification for Inclusion of Web Page Design Modules

The mechanical engineering professional society, ASME, and the accreditation board for engineering and technology, ABET, target both information technology and technical communication as critical knowledge areas for mechanical engineers in the new millennia. Web Page design encompasses both of these topics, and relates also to the required circuits and electronics course. These modules are not time-consuming, are relatively easy to absorb, and have proven advantageous on our program assessment criteria [7].

Information technology skills for mechanical engineers are highlighted as an 'Important issue' for the twenty first century, according to ASME in a report in 2002, entitled, 'New Directions': <http://www.asme.org/education/enged/me2002/pdf/newdirectionsreport.pdf>. Specifically, ASME also finds that 'the study of computers' should be integral to the mechanical engineering. Other areas that particular attention should be paid are: Biotechnology, energy/ecology, micro/nanotechnology

In addition, ABET EC2000 states that 'simulation and information technology' topics should be included in engineering curricula. Introductory web page design concentrates on engineering specific issues including: technical communication and design theory, as well as information technology. The color spectra and file formats are additional information technology topics that students obtain exposure to, and in the context of 'electrical and computer engineering' related to mechanical engineering.

Further, the Fundamentals of Engineering examination [8] has increased its percentage of questions that relate to computers in recent years. Web programming will be very useful for the engineer preparing for professional registration. Actually, questions on practice exams [8] are increasing emphasis on knowledge of the Internet. Web document design is a valuable skill that has increasing emphasis.

INTRODUCTION TO MODULES

A description of the developed modules is presented:

1. Pre-packaged web-page development
2. HTML basics
3. Colors, RGB, and the spectrum
4. Graphics, megabits, and file formats
5. Hypertext and linking to the World Wide Web
6. JavaScript and the alert box
7. Java applet text applications

The modules, in one form or another, have been used for four years and undergo revision every semester based on a number of criteria, including the assessment utilized for ABET's EC2000 criteria. The set of modules integrate seamlessly into a number of

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different courses. The following sections describes the modules, the development of a web page, the courses for inclusion, and a description of the future of this type of module in various curricula.

Example progression of web pages:

1. Pre-Packaged web-page development

The online course management software program Blackboard is utilized. The following are the two screen shots of the program. The first screen shot (Figure 1.0) shows the initial screen the student sees in the Tools section. Figure 2.0 shows the screen after "edit the homepage" has been clicked and is used throughout the student's web page development. By utilizing the management software program Blackboard; students can even upload a picture (e.g., self portrait jpeg). Students are required to complete this before the second day of class, and then review the class pages.

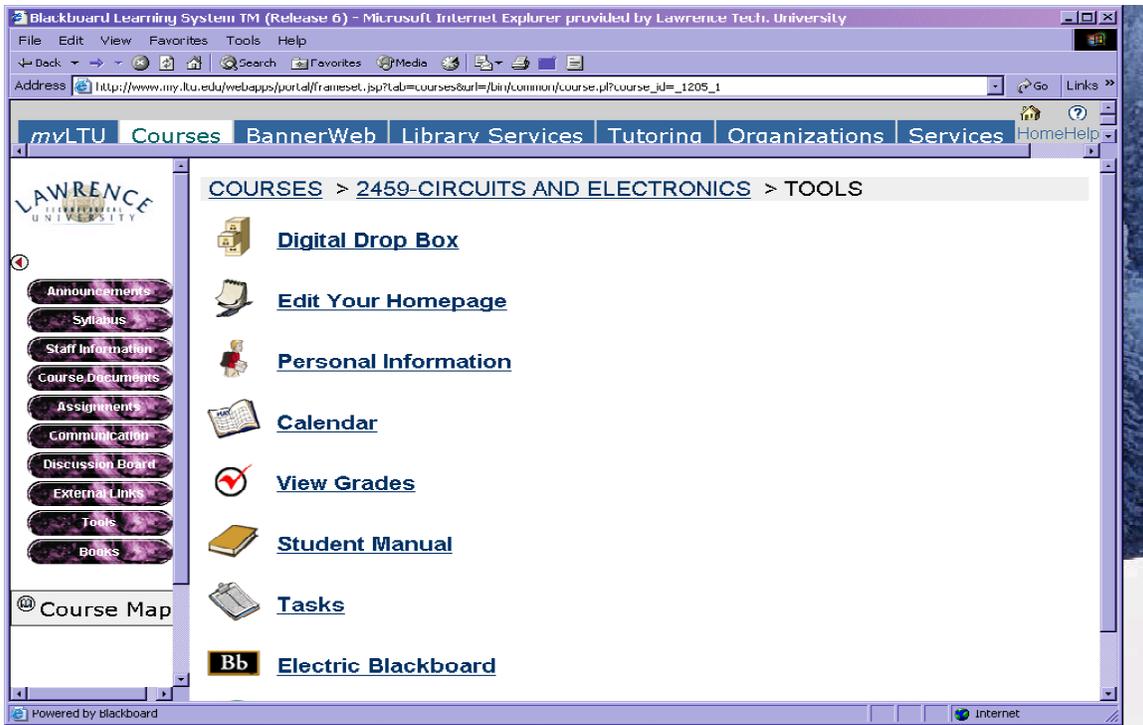


Figure 1.0. Initial starting screen shot.

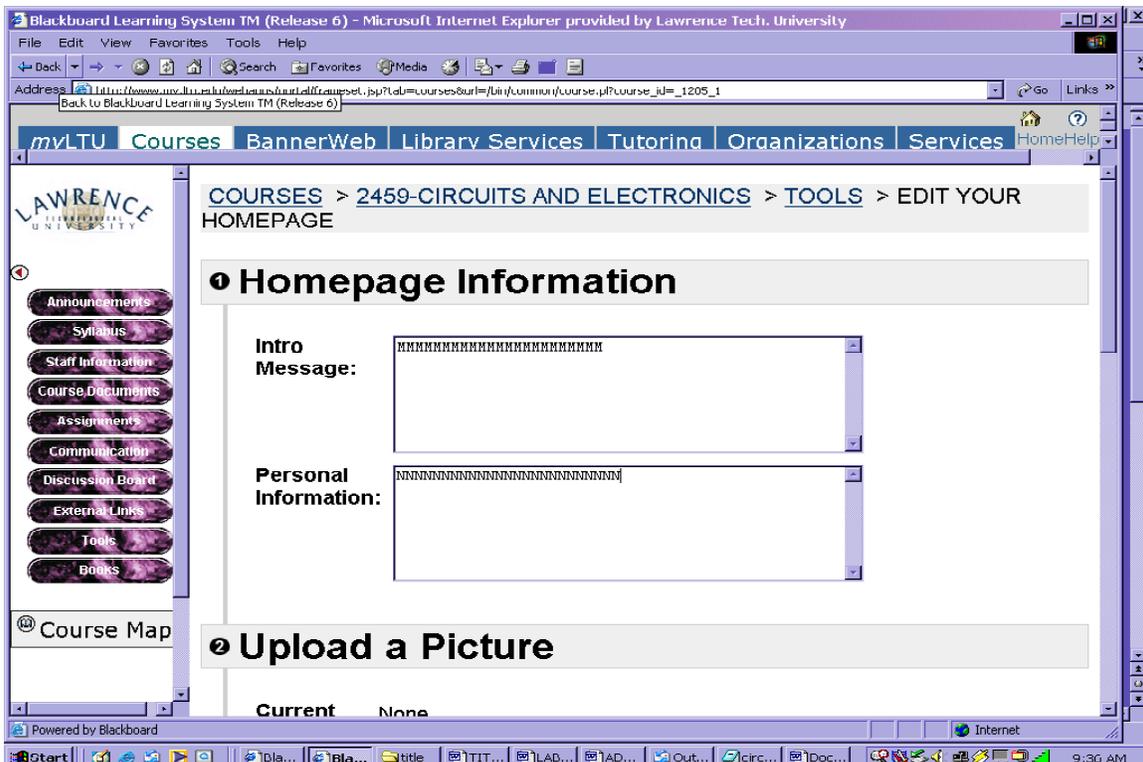


Figure 2.0. Student has clicked "edit the homepage".

2. BASIC FIRST HTML PROGRAM

This section illustrates a simple set of HTML commands that students can use to start their homepage. For example:

```
<html>
My name is John Smith. I am a Mechanical engineering junior, and I like to work on cars.
</html>
```

Students can jazz up the HTML easily by using additional web page items (see below). This breaks the ice with students; they get a positive feeling about computer and electrical engineering. (Remember that many of these simple commands are new and awkward to use by non-majors.)

Additional web page items:

Send an email:

```
<A HREF=mailto:you@hotmail.com>Send me email</A>
```

Music:

```
<BGSOUND SRC="coretarot.mid" loop=5 autostart=true>
<EMBED SRC="music.mid" height=25 Width=100 BORDER=0 AutoStart=TRUE>
```

Various font settings:

```
<FONT FACE="Arial" COLOR="#FF8000"> Send me email</FONT>
```

Other Body type settings:

```
<Body TEXT="#FFFFFF" BGCOLOR="#000000" >
<body LINK="#0000EE" VLINK="#33CCFF" ALINK="#FFFF99">
```

Unordered lists:

```
<ul> Beginning of lists
<li>first item
<li> second item
<li> third item
</ul>
```

Number your lists:

```
<ol> start list
<li>first item
<li> second item
</ol>
```

3. COLORS, RGB, AND THE SPECTRUM:

Colors are a wonderful part of the Internet and web development. In our experience teaching this course, color commands are easy for the novice to understand.

For example:

```
<font color = blue>  
which, specifies the font color as blue.
```

A small discussion of the RGB notation in HTML is presented, so students can really customize backgrounds and fonts. A discussion of the light spectrum, the RGB color notation, hexadecimal numbers, and presentation ensues. The disciplines of Physics, Mathematics, and the Humanities are tied together by computer engineering.

| Common Color names and RGB values | | | |
|---|---------------------|---|--------------------|
|  | Black = "#000000" |  | Green = "#008000" |
|  | Silver = "#C0C0C0" |  | Lime = "#00FF00" |
|  | Gray = "#808080" |  | Olive = "#808000" |
|  | White = "#FFFFFF" |  | Yellow = "#FFFF00" |
|  | Maroon = "#800000" |  | Navy = "#000080" |
|  | Red = "#FF0000" |  | Blue = "#0000FF" |
|  | Purple = "#800080" |  | Teal = "#008080" |
|  | Fuchsia = "#FF00FF" |  | Aqua = "#00FFFF" |

Figure 3.0. Color chart.

Using the color chart in Figure 3.0, and given that the RGB color is really a 24-bit system, with eight bits of data devoted to each of three-color items: red, green and blue, eight bits of data can describe 256 colors. With 256 possible colors in each of the three channels, the total possible number of colors is calculated by multiplying $256 \times 256 \times 256$ for a total of 16,777,216. Students use the following program to utilize color:

```
<html>  
<body bgcolor = pink>  
<font color = aabb33 size = 12>  
My name is Mary Jones and I am a civil engineer  
</html>
```

4. GRAPHICS AND FILE FORMATS

In this section we show students that many different files formats can be used inside an HTML program, i.e., a small introduction to various file formats is presented, with this following chart:

File Extensions:

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| | |
|-------|--|
| gif: | Graphics Interchange Format for WWW browser viewing (binary) |
| dxg: | Drawing Interchange file (text) |
| dwg: | AutoCad Drawing file (binary) |
| ems: | Intergraph Engineering Modeling System (I/EMS) file (binary) |
| eps: | Encapsulated PostScript file (text) |
| igs: | International Graphics Exchange Standard (IGES) file (text) |
| pict: | PICT file for inserting into a file (binary) |
| tiff: | Tag Image File Format for inserting into a file (binary) |

With this chart, students can now include graphics in their pages. The following program is used for that purpose.

GRAPHICS HTML program

```
<html>
I am Ali Amari, and I am a construction engineer. I enjoy renovating houses.

</html>
```

We have found that many non-majors, specifically the Mechanical Engineering students, relate AutoCAD programming experience with this graphics section that is presented here. A picture is worth a thousand words, and often a thousand or so bits. Finally, file extensions, file sizes, graphics representation, and the web as a resource are stressed during the presentations.

5. Hypertext and linking to the World Wide Web

In this section, we demonstrate how to link the student's web page to the entire Internet. There are many excellent web sites student can link their homepages to. For presentation purposes we show only three of them. This section is very easy for students to understand and use. This section is perhaps the most fun for students, since links can go to many excellent web pages on the Internet.

Example1: A simple link to IEEE.

```
<html>
We are not electrical engineers in this class!
<a href=http://www.ieee.org>Link to IEEE's resource page</a>
</html>
```

Example 2: A simple link to yahoo mapping program

```
<html>
Do you want to know how to get to my house?
<a href=http://map.yahoo.com>Link to Yahoo's map resource page</a>
</html>
```

Example 3: A link to theNCEES homepage

```
<html>
Do you want to know what to study for the Fundamentals of Engineering Exam?
<a href=http://www.ncees.org/exams/fundamentals/>Link to NCEES's resource
page</a>
</html>
```

6. Javascript and the alert box

The section introduces JavaScript and other related topics. JavaScript is a rather basic programming language, which conforms tightly to the core concepts of computer programming. It is also relatively easy to learn and interesting to incorporate into the technical communication section of the web page assignments. For example, an Alert box is a one-line addition, and students have fun with this item.

```
<BODY onLoad="confirm('Welcome to Our page!!')">
```

This section is one of the hardest for students to understand. We suggest keeping your examples simple.

```
<BODY onUnLoad="confirm('Goodbye to Our page!!')">
```

7. JAVA APPLETS HTML webpage

The final section shows students Java applets, i.e., students do not write Java applets, but a shareware set of applets for inclusion in their WebPages is introduced. The Text bouncing applet has a number of interesting parameters: gravity, color, speed, and bounce can be tinkered with, and students find the working applet interesting and fairly easy to understand. The following program illustrates the applet inclusion, and the highlighted areas are parameters to change:

```
<html>
<APPLET CODE="TextBouncer.class" WIDTH=800 HEIGHT=800>
```

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```

<PARAM NAME=fps VALUE=20>
<PARAM NAME=text VALUE=" Anyone can utilize a Java Applet in their html!!!">
<PARAM NAME=textcolor
VALUE="#A01111|#11FF10|#99FF20|#aa0025|#FFFF40|#FFFF50|#FFFF60">

<PARAM NAME=bgcolor VALUE="#ffffff">
<PARAM NAME=fontname VALUE="TimesRoman">
<PARAM NAME=fontsize VALUE=40>
<PARAM NAME=fontstyle VALUE=2>
<PARAM NAME=hspeed VALUE=5>
<PARAM NAME=bounce VALUE=100>
<PARAM NAME=gravity VALUE=5>
<PARAM NAME=random VALUE=3>
<PARAM NAME=type VALUE=2>

</applet>
</html>

```

CONCLUSION

The modules began as an introductory exercise for a “Circuits for the Non-Major” class, and have been adapted for utilization for a number of different audiences. We have found that students (non-majors and majors) have responded well to the inclusion of web homework. In particular we found that non-major student responded especially well to web homework, according to specific assessment criteria [7]. In the future, we will conduct further assessment of basic constituencies: students, alumni, and the industrial advisory board in order to revise and evolve the inclusion of web modules in the various courses.

APPENDIX

For those of us that do not have access to Blackboard or a related teaching tool, there are many different homepage providers that will host your site for free. One of the best sites for a 2 Meg. free homepage space is at www.geocities.com or www.yahoo.com. Unfortunately, your homepage will have an advertisement as part of this free service. In addition, these places offer one of the better on online graphical user interface tools to create your web page called [Yahoo! PageBuilder](#) (It is important to note that PageBuilder is not wizard style PageBuilder). If you are more interested in HTTP coding, then using NotePad.exe is an option and uploading it to your web site or using a online text editor is typically available at most of these hosting sites.

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