

A Web Site for Teaching Graduate Science Students in Thailand

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Abstract

This paper describes a web site designed mainly to provide lecture notes for graduate students in the subjects which are currently being taught, or have previously been taught, by the author. The web site contains other information such as course outlines, a working model for solar radiation calculations, and the author's timetable for scheduling appointments. The philosophy on which the web site is based, the methods used to create it, and further implications for the general use of teaching web sites in Thailand will be discussed. The web site is in English which is rather carefully controlled to make it easy for Thai students to read, but no relaxation of the rigor has been allowed in the general contents. The web site contains a lot of mathematics, but only simple HTML code has been used so that no special browser features are needed. The files in the site have been designed for fast downloading.

1. Introduction

The development of the internet has given teachers, especially university staff, a useful tool for distributing lecture notes, course outlines, schedules and other information to students. Today practically all students in Thailand have access to the internet. Even students who do not own a personal computer have access in laboratories and libraries.

A few years ago the author decided to use this technology to make some of the materials accumulated during a long teaching career available as a service to the educational community. These materials are currently accessible, not only in Thailand but anywhere in the world, from the server of the Joint Graduate School of Energy and Environment, King Mongkut's University of Technology Thonburi, Bangkok[1]. The web site appears in search engines, such as Google, in response to queries such as "exell".

2. Contents of the Site

The title of the site is *Professor Exell's Notes for Students*. The Home Page consists of links to course notice boards and notes on a variety of topics, mainly in mathematics, physics, and solar and wind energy.

2.1 Course Notice Boards

The course notice boards, besides containing descriptions of the graduate level courses currently being taught by the author, also contain supplementary notes, homework exercises, and schedules of exams and seminars where appropriate.

2.2 Notes for Students

The notes for students, which comprise the major part of the web site, are designed to be of very general use for students anywhere, not just in my courses. For example, there is a complete *Guide to Logic* in four chapters, reviews of real and complex numbers and calculus, practical mathematics, and notes on solar and wind energy, meteorology and thermodynamics.

In some of the notes the emphasis is on new ways of looking at the subjects in order to make them easy to understand, especially for providing foundations for further study. For example, the notes on *Simultaneous Linear Equations* discuss the various situations leading to the existence or non-existence of solutions, whether or not the solutions are unique, and how to calculate these solutions numerically. Students who understand the examples given here will have a basis for understanding the solutions of other linear problems involving differential and integral equations.

Another example is a new theory of thermodynamics which should make the subject conceptually clearer than it is in traditional treatments. Although the theory may appear unfamiliar at first sight, one file entitled *Understanding Entropy and Temperature* attempts to explain the basic idea in simple language.

In the solar energy section there is a JavaScript model for generating simulated solar energy data in tropical climates.

2.3 Time Table and Schedule of Appointments

A very useful feature of the web site is a daily updated timetable and schedule of appointments. This is almost a necessity for the author who works in several different places throughout the week and must still find time to give face-to-face attention to students and staff on an individual basis.

3. Philosophical Principles for the Site

The basic philosophy in the creation of this site is that it should be simplified as much as possible while remaining adequate for the purposes intended. This philosophy governs the principles discussed below.

3.1 Technical Principles

It is assumed that some visitors to the site may still have old computers and old software, so the oldest technology which still provides the facilities required is used. It is also a principle that the display of the pages should be adjustable in the user's browser instead of being fixed.

The HTML coding is the oldest version which meets the requirements of the site, namely HTML 3.2. Even here only a selection of the available features in the full specification[2] are needed. The code, which is validated by the World Wide Web Consortium[3], is written in a style as close as possible to the more recent XHTML specification. Nothing beyond a simple text editor (Microsoft Notepad) is used to write the files. The author has found that files written by Microsoft Word and saved in HTML format can be much larger than necessary, and these files fail the HTML validation test. It is easier to learn how to insert HTML tags in a simple text file, than it is to learn how to control the mass of intrusive features in Microsoft Word.

Graphics are kept to a minimum. Most of the figures are black and white drawings made by Microsoft Paint tailored to approximately 300 by 200 pixel size, or smaller, and saved as GIF files only a few kilobytes in size.

The whole web site at present contains about 180 files and its size is less than one megabyte. It can all be stored on a 3½ inch floppy diskette.

3.2 Style of Presentation

In spite of the apparent limitations of the technology described above it is possible to

produce elegantly laid out pages with colored headings, good paragraphing, bold and italic font, etc. The pages resemble in appearance the pages in a modern textbook or a quality periodical rather than the jumbled pages overloaded with frames, graphics, dancing images, etc., which one sees on many web sites these days. Instead, the emphasis is on good quality content presented in a simple clear style.

3.3 English Language

Much thought has been given to the English language used on the site. The majority of readers are Thai, many of whom have only a limited knowledge of English.

Although necessary technical terms have not been avoided, the vocabulary has otherwise been restricted where appropriate to only the commonest words. Uncommon words are replaced if possible by commoner words, especially those from the Longman Defining Vocabulary of 2000 words. However, single verbs are preferred to phrasal verbs, and pronoun references have been avoided when they are difficult. Verb tenses and sentence structures are kept as simple as possible. Decorative idioms are avoided.

3.4 Mathematical Notation

There is a lot of mathematics on the site. This is a problem. Simple formulas can be written easily and directly in HTML 3.2, but complicated formulas containing special symbols cannot. Many web sites use GIF images for mathematical symbols. The problem here is that one needs many small image files, and more HTML code to control the size of the ordinary text.

The method used on this site is to compromise by using words such as "alpha" and "Integral" as mathematical symbols. Another method is to put mathematical pages on the site in a different format, such as Rich Text Format.

4. Use of the Site

Lecture notes and other materials on the web site are extensively used by all my students in current courses. My timetable and schedule of appointments is also used frequently by students and staff for arranging meetings.

Occasionally e-mail messages come from other visitors, both in Thailand and from abroad as far as India, Indonesia, the United Kingdom, etc., asking me to explain

something further, or to express thanks for the fact that the web site has helped them in some way. This suggests that the web site is worthwhile and useful. There must also be others who visit the site and derive some benefit from it without my knowledge.

4. Implications

The ease with which this site has been made suggests that other academic staff could do the same. This is now happening in many universities in the world outside Thailand. A network of web sites in university courses within Thailand would be valuable, especially at the graduate level.

References

1. Exell, R. H. B. (2002). *Professor Exell's Notes for Students*, <http://www.jgsee.kmutt.ac.th/exell/>.
2. World Wide Web Consortium, (1997). *HTML 3.2 Reference Specification*, <http://www.w3.org/TR/REC-html32>.
3. World Wide Web Consortium, (2001). *W3C HTML Validation Service*, <http://validator.w3.org/>.