Introduction to Information Technology

Welcome to Introduction to Information Technology! This course will provide you with a well-rounded general knowledge to computing concepts and practices.

This course will cover:

- basics of digital multimedia
- the internal workings of a computer process
- internet and networking

Before we dive into the main course content we'll start off with some introductory material to help you understand exactly what it is we'll be doing, how it all fits together, and the skills that will assist you in achieving those goals not just in this course, but other online and distance education courses.

What Can you expect

The main subject learning material for this course is the text book:

> **Introduction to Information Technology** (**3rd Edition)**, Pearson Choices, 2011, Printed copy ISBN: 978-1-4425-5658-4 or Ebook ISBN: 978-1-4425-5660-7

The textbook is an essential part of this course. We have combined chapters of two separate textbooks into a single book created specifically for this course. The textbook is available in a hardcopy version from www.unibooks.com.au or as a digital version/eBook from Pearson www.mypearsonstore.com.au.

The reading lists for the textbook are included in the summary sheet for each week. Also part of the study material are lecture videos, these are taken from the on campus lectures and are split into sections according to topic.

In each weeks summary you will also find, the learning objectives for that week, A copy of the tutorial guide, this will show you what questions will be discussed in the tutorial (tutes will start from week 2 and will generally cover the previous weeks study material, answers to the tute questions will be available the week after the particular tute. Tutorials will be conducted using Elluminate, this is an electronic whiteboard tool with chat and audio chat facilities.

In week 1, I would encourage you to become familiar with the online teaching environment, especially the discussion boards. Please post a welcome message in the welcome forum.

Above all, if you don't understand what's going on please post a question to the discussion board.

What Will Be Taught

In this first part of the course we will look at the digital multimedia. We analyse the factors that influence how a sample is encoded in digital format and how these factors influence the file size and quality.

In the next area of study, we'll be exploring the computer itself -- how did they get as prominent as they are? After gaining a historical perspective of the desktop computer, we'll start to look inside and discuss the components of a computer; what makes them "tick".

No matter what computing platform you're using, they're all designed on a common framework; an integrated set of hardware components, each with a specific role to play. We'll be looking at these components one after another, and see how they assist in providing the services we expect from a typical desktop system.

A computer -- alone -- is a very flexible and useful tool. A network of computers, sharing huge amounts of information, is even better. Since the early 1990s, the Internet has taken centre stage as the premier information network for personal use and worldwide commerce (yes, there were others!)

We'll look at the technologies behind the Internet, and how they are used to provide the services we're used to seeing from our web browsers and mail clients, as well as some more specialised functions you may not have seen before. Finally, with any society, be it actual or virtual, there are risks. As the internet has grown, so has its "underworld". Educating yourself about, and learning how to protect yourself from the various risks that are present on the internet is vitally important. We'll explore what kinds of risks the online community poses, from the mildly annoying to life-changing, and how to protect ourselves from them.

Navigating Through the Course

Week	Weekly Reading/Tutorial	Textbook ref. (3rd edition)
1	Introduction to Studying Online	*3 – 19*
2	Digital Imaging	23 – 55
3	Digital Imaging	57 – 93
4	Digital Audio	99 – 153
5	Data Storage	203 – 224
6	Data Storage	226 – 251
7	Data Manipulation	257 – 272
8	Data Manipulation	274 – 285
9	The Future of IT	*external links*
10	Operating Systems	293 – 308
11	Operating Systems	309 – 316
12	The Web & Internet Security	323 – 365
13	Revision	

Online Learning

Online learning offers a number of compelling benefits to traditional campus teaching; however with these benefits, there are also issues that need to be addressed so that the quality and depth of education is equivalent.

We'll look at some of these benefits, and learn how to make best advantage of them; and look at the downsides, and how to nullify (or at least minimise) their impact.

Independence

The obvious difference with online education is that it offers total independence -- there is no campus to attend, no daily timetable to adhere to, and you are left with near-total freedom in how you organise your education alongside your other priorities in life. It also allows those who otherwise couldn't attend a traditional academic institution (through distance, time, or circumstance) to gain an education.

Being an online student means that you'll become an independent learner; in addition to the contact you have with your instructor and fellow students, you'll also find it more "natural" to go out for yourself and look up and explore other sources of information. Throughout the course, we'll provide external links that provide further details on various topics. These, along with independent research skills (covered later on in this chapter), will enable you to not only follow along with the prescribed content of the course but also make it easier for you to read further into the material you find most interesting.

It also works the other way around; if there's a part of the course materials that you find difficult to follow, another perspective might make things clearer. Being able to find an alternative reference that lets you understand the course topics better is a very useful skill to have.

Responsibility

With the independence, however, comes responsibility. The freedom in being able to organise your learning on your own terms is a double-edged sword; it will take *your own initiative* to keep going. Unlike a traditional campus education, there is no weekly class with a lecturer, directly encouraging you to keep up with materials and looking up further information if need be.

There are still important assessment dates such as tests, assignments and examinations to keep in mind - as part of your planning, you'll need to make sure that you have enough time to study the underlying topics behind these tasks, and to complete them before the due dates. It may help to consider these assessment dates as broad 'milestones' for your study programme.

That being said, the online environment is still a place that is conducive for learning. Along with sound planning and initiative on your own part, there are other facilities open to you that will preserve the "classroom atmosphere".

Pacing Yourself

This course is split into a set of chapters, each of which is approximately one weeks' worth of material. It's expected that -- on the whole -- you'll do about a chapter's worth of work each week.

One benefit of distance learning is that you can, to some extent, fit the learning around your other life commitments. It's important, though, that your learning becomes another one of these commitments, and not something to be done "if there's time left over".

It might be that you'll fall slightly behind, or have a chance to work ahead -- whatever your pace, it's important not to fall too far behind. The recommended weekly pace of the course has been designed to fit in with the assessment tasks, as well as ensuring that each topic gets an appropriate level of coverage.

Falling behind means that not only might you not be able to learn everything in time for completing an assessment task, but that in the rush to catch up, you may not give a topic the time it deserves, or miss important parts of the course.

A good idea is to draw up a calendar of major events throughout the study period -- not just for the course, but holidays, functions, business trips, and other commitments.

That way, you'll be able to see at a glance what it is that's coming up, and identify times where you may be unusually busy, or idle. For example, it may be that you have a holiday scheduled in the middle of the study period; this could be accounted for by working ahead in the weeks leading up to it.

Forms of Presentation

A traditional higher education science or engineering course is usually presented with three classes:

- *Lecture:* This is where the bulk of the course material is introduced. These are typically sessions held in large theatres, where it's not often possible to ask direct questions, or otherwise interact directly with the teaching staff.
- *Tutorial Class*: These are held in smaller groups of 15 to 30 students, and focus on applying the knowledge learnt in the lectures, to help consolidate the knowledge in students' minds. These classes often leave ample time for students to ask questions and have them answered as a group.
- *Laboratory/Practical Class*: These, held in group sizes similar to tutorials, aim to provide practical experience of the concepts learnt in lectures and discussed in tutorials. Students typically work a problem sheet independently, and the classroom is supervised. When students have difficulty, they can ask the supervisor and get personal assistance.

So, what is provided in an online environment, to emulate these classes? This course has materials split up into the following categories:

- **Course Material.** This is taken from the lecturers presented with the 'on campus' subject and lecturer. The course textbook, this has been compiled especially for this course and is also used with the 'on campus' offering of this subject. It is available either as the hard copy – printed version or an EBook version. It is very strongly recommended that all students should obtain a copy of the textbook for this course.
- **Tutorial Questions.** These are a set of questions in the text book designed to provoke the online student into considering particular topic concepts, and working through problems. These questions will also be looked at in the weekly tutorial sessions run by the tutors using Elluminate.

Forms of Communication

Instead of the traditional feedback loop of on-campus courses, communication amongst students and staff take place along the following lines:

- **Discussion Boards.** A discussion board is a place where students (and staff) can place postings that other users can view and reply to. These are most useful for general discussion of a particular section of the material, or to ask for general advice about a particular issue.
- **Emails.** Course instructors can also be contacted directly through an email alias. This is used most often for when students have a specific, detailed problem; or when they wish to discuss sensitive parts of an assignment, where publishing it on a discussion board could provoke cases of plagiarism. Feedback on assessment tasks is also delivered through email.
- **Chat Rooms.** Students often make use of live "chat rooms" where they can discuss problems as a group.
- **Instant Messaging.** Students can also have direct, instant contact with each other via instant messaging software such as MSN Messenger, Yahoo! Messenger, or ICQ.

Independent Research

The ability to independently research a topic is an important skill to master, especially for online learning. There are a number of resources that can help facilitate research, and find relevant articles of interest.

Web Research Tools

The Web can be an invaluable tool of up-to-date information on just about any topic. Usually the most difficult task is to find what it is that you're looking for!

A word of caution, though; *just because it's on the Internet doesn't necessarily mean it's true*. As anyone can publish material on the internet, there is often content that includes considerable bias, half-truths, or could simply be flat out incorrect.

Using unmoderated, un-reviewed sources such as the Internet underlines the importance of finding many different sources of information so that bias and inaccuracies can be identified and weeded out of your final pool of data.

The primary difference is one of "expert peer review"; before articles are published in traditional research journals and reference texts, they are often subject to a peer-review process where other experts in the field make comments and criticisms. This process greatly adds to the trustworthiness and authority of those sources.

Search Engines

Search engines are a good "first stop" to find web pages of interest. Not all hits may be relevant, but looking through the first few pages of results are likely to find most of the relevant pages the search system has to offer.

Note, however, that there are different kinds of search engines.

- **Directory search engines** have a manually- (or semi-automatically) maintained listing of web sites that are maintained in groups. These sites typically include a browsable category list, as well as a basic search function which will attempt to match your search keywords to a category name, site name, or site description. An example of a directory search tool is the Yahoo! Directory. (Please note that the Yahoo! Directory is different from the standard Yahoo! Search tool.)
- **Keyword search engines** scour the web and index the actual text of web pages, as well as pay attention to "keyword" fields hidden inside each page. These systems do not require any active maintenance of their site databases, and typically have a greater amount of indexed data. However, some sites have taken to flooding their pages with keywords, with the intention of getting as many site visitors as possible. An example of a keyword search engine is Alta Vista.
- **Link structure search engines** scour the web, but also look at how often other web sites refer to a particular page. This provides a more accurate indication of how relevant a web page may be for a particular topic or set of keywords. An example of a link structure search engine is Google.

Online Encyclopaedias

Online encyclopaedias can be a convenient "first stop" for research. Often, they do not have enough information to be considered a complete or authoritative source, but the information offered is enough to gain enough understanding of the topic, in order to make educated decisions on where else to look, and what search keywords to use.

There are a number of different kinds of encyclopaedias available online:

- **Online versions of more traditional sources** such as Encyclopaedia Britannica, or Microsoft Encarta. These sites sometimes charge an extra fee for accessing value-added content, to cover the costs of the traditional expert research that forms the base of their articles.

- **Free encyclopaedias** such as Wikipedia. These sources are built on the collaborative efforts of many internet users (mostly volunteers). Unlike more traditional encyclopaedias, any registered user of these services can contribute to and edit articles. Mechanisms are in place to detect and avoid bias and inaccuracy of articles; however with any source without a traditional process of expert peer review, care must be taken -- especially when researching contentious issues (for example; social policy, politics, or religion).

Technical References

Some sites act purely as a place for technical reference; for example, PCGuide.com is a comprehensive reference on computer internals. The specialised and nature of these kinds of sites mean that they often appear highly ranked on most search engines.

It's important to pay attention to the care in keeping such references up to date; for example, the aforementioned PCGuide.com hasn't been updated since 2001. Often these sites will stamp their web pages with the date they were last updated, so that you can verify their relevance.

Companies often offer manuals, detailed technical references and data sheets to their products on their web sites. (Corporate websites usually offer an internal search engine to find exactly what you're looking for.)

Hobbyist/Enthusiast Sites

There are also a number of sites dedicated to enthusiasts of all kinds of hobbies and disciplines. Many such sites include news, commentary, product reviews, and self-written tutorial articles to inform users about their subject of choice. Examples of such sites in the information technology field are AnandTech, Ars Technica, and Tom's Hardware Guide.

Multimedia Research

Aside from the internet, there are a number of multimedia references which are typically distributed on CD or DVD physical media. Information distributed in this manner includes things like encyclopaedias, telephone directories, image libraries, navigation, mapping and other geographical products.

The reason why this material is provided in a physical medium (rather than placed on the web) is that there is simply too much information to transfer; for example, compared to shipping a set of compact discs in the mail, it isn't feasible to transfer highly accurate land maps for a whole country over an internet connection.

These services are usually subscription-based; similar to a magazine, a yearly subscription fee is paid, and up-to-date versions of the data on compact disc are sent out at regular intervals. Some of these services also offer a web-based service to access the most up-to-date content.

The cost of these services is often quite high, and out of the reach of an individual. However, many libraries subscribe to such services and will allow the general public to use them for personal use.

Traditional Research

The traditional method of research is often not the most convenient, but usually yields detailed, authoritative information on your topic of interest. However, technology has made life easier: instead of cabinets full of record cards, libraries now have computerised indexes of their book catalogue. Most also have electronic archives of newspapers, magazines and journals.

Library Cataloguing

Libraries' book catalogues store many kinds of information, which can be useful to isolate the particular references you are after.

- **Keywords:** words that describe the purpose and content of the book.
- **Category:** a standardised set of category information has been developed by the U.S. Library of Congress to aid in finding all books that match a certain subject.
- **Title:** books can, of course, be searched by their title.
- **Author:** books can be found by their author(s).
- **ISBN:** this is a number that uniquely identifies a book.
- **Date:** the year of publication is useful to ensure that you receive results relevant to the time period you are researching.

The Dewey Decimal System

In addition to keywords and categories, non-fiction books are also categorised as part of the Dewey Decimal System. This category system, consistent throughout the world, relies on giving each category and subtopic a unique number, so that books can be easily sorted and identified on the shelves.

Dewey Code	Subject
000	Generalities
100	Philosophy and Psychology
200	Religion
300	Social Sciences
400	Language
500	Natural Sciences and Mathematics
600	Technology and Applied Sciences
700	The Arts and Recreation
800	Literature
900	Geography and History

Through the Dewey code (which uses all three numbers, plus decimals for specific subtopics) and the first three letters of the author, books can be categorised so that they can be easily

found on library shelves. For example, there is a book about digital photo retouching that can be found in the RMIT Library under Dewey code 778.3 B977. To break down this code:

700	The Arts and Recreation
770	Photography
778	Specific Fields of Photography
778.3	Digital Photo Retouching
778.3 B977	The book "Digital Retouching and Compositing" by David D. Busch

Based on this, you could expect other books related to the topic digital photo retouching to have the Dewey code of 778.3.

Report Writing

This topic gives you an introduction to technical writing. Before you start writing your document, spend some time planning what you are going to write. Produce an outline (or plan) for your work; this could be a simple list or a mind map. When you are writing your document, you should aim to have a logical flow with no superfluous words and a simple sentence structure.

Some Tips

Simple writing follows from a few simple rules:

- Have one idea per sentence or paragraph and one topic per section.
- Have simple, logical organisation.
- Use short words.
- Use short sentences with simple structure.
- Keep paragraphs short.
- Avoid buzzwords, clichés and slang.
- Avoid excess in length or style.
- Omit any unnecessary material.
- Be specific not vague or abstract.

Break these rules if there is a good reason to do so.

Review and Proofreading

You should be prepared to look at your own work critically and revise where necessary; this may need to be done many times.

It usually helps to get someone else to read over your work before submission. Another hint is to read your work aloud - this can help fix sentence structures.

Take special care of your opening paragraphs, these can set the attitude of the reader to the whole document.

Bibliography, References and Quotations

Note the difference between a reference and a quote:

A Reference:

... is discussed by Whelks and Babb (1972) ... is discussed elsewhere Whelks and Babb (1972;pp.22-31)

A Quote:

Computer security forensics is "the study of matching an intrusion event to an IP address, location, and individual" (Briton 1997).

The above examples are of the "Harvard style" in which the entries are cited by author name and publication date using either square or round brackets.

Your bibliography should include enough information for the reader to find the reference work. For books give the author(s), title (underlined), publisher, year and where relevant, edition and volume. For example, the course text would be listed as:

Introduction to Information Technology 2e, compiled by James Harland and Geoff Warburton from Burg, The Science of Digital Media and Brookshear, Computer Science: An Overview: International Edition, 10/E, Pearson Choices, 2011

For web pages attempt to find a durable URL that is unlikely to change.

Diagrams

Always label your diagrams:

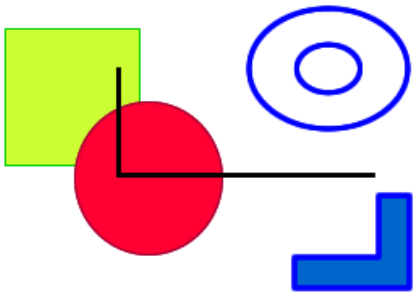

Fig 1.3. This is a diagram of some sort.

Presentation

Present your work in a format that is easy to read - don't use a folder where the bindings can cut off part of the text. Make sure your submission can lay flat. Read your submission guidelines carefully and follow them.

A useful reference for technical writing is:

Zobel, J., "Writing for Computer Science", Springer-Verlag, 2nd Ed., 2004