

Draft Guidelines for Technology Intensive Courses 3.04.10

What is a technology intensive course?

Defining technological literacy or even finding a common definition of technology is a challenge. Since technology is a “moving wall” and always changing, technological competency should not be tied to a specific technology. Instead it should be tied to the skill of knowing how and when to effectively use technology to accomplish a task. 21st century students should have a disposition to use technology, be prepared to learn new technologies and to understand and critically evaluate the implications of various technologies on society.

In addition to the ever changing nature of technology, each discipline will define “technology intensive” differently. Ideally each department would develop its own definition using standards appropriate to the discipline. Information and communication technology skills (ICT) have been defined as a “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information.”¹ While one focus of technology intensive courses at the UCC level will be digital and information and/or communication related, it should be recognized that technological competency within a specific discipline may incorporate a range of other technologies such as biotechnology, computing, energy, informatics, industrial, medical, and many others. Departments should be responsible for the development of discipline-related technological competencies.

A technology intensive course must address all of the outcomes listed below.

Technology Intensive Outcomes

1. Demonstrate a sound understanding of technology concepts, systems and operations
2. Use a variety of technologies to access, evaluate, collect, and manage data, information and datasets.
3. Understand the impact of technology on themselves, their culture, their environment and their society
4. Practice legal and ethical behaviors in the context of technology

Guidelines for Technology Intensive Courses

For a course to be identified as “technology intensive”, the GE Council will use the following common sense guidelines.

- A technology intensive course engages students in the use of technologies while at the same time developing an understanding the impact these technologies have on society.
- A technology-intensive course will incorporate each of the outcomes in a substantive and demonstrable way. (Would a reasonable person consider this course to be technology-intensive?)
- A technology-intensive course will assess the use of technology in terms of its contribution to the learning outcomes for the course. (Does the use of technology contribute to the student learning outcomes for the course?)

- A technology-intensive course specifically addresses the impact of technology on society or the discipline. For example, the course proposal describes how the role of technology and its impact will be incorporated in class activities and assignments throughout the course.

¹ Blurton, C., "New Directions of ICT-Use in Education". Available online <http://www.unesco.org/education/educprog/lwf/dl/edict.pdf>; accessed 5 February 2010

Examples of technology intensive courses

Example One: 18th Century Literature

Students work in small groups to write and design a set of webpages that explores some aspect of life and culture in eighteenth-century England. The website combines an ever-expanding showcase of completed student research projects with an extensive set of resources and guidelines designed to help students develop new material for the site. Students must address copyright issues in the process of selecting materials for their project. Course discussions and reflective pieces encourage students to consider on how their efforts contribute to an understanding of the 18th century

Adapted from David Porter (dporter@umich.edu), Associate Professor of English and Comparative Literature, is responsible for the design and implementation of the Eighteenth-Century England website, an ongoing, collaborative project by U-M students studying eighteenth-century literature. <http://www.umich.edu/~ece/>

Example Two: Environmental Studies/Anthropology

As part of an Arctic Circle series on social equity and environmental justice, students form teams and analyze a U.S. Army and Navy project using radio waves to enhance military communications and surveillance systems. The case study asks students to understand the range of problems raised by HAARP by breaking them first into smaller, manageable units, then viewing all the issues with greater understanding, and finally writing a position paper.

This project refers students to a wide variety of information on the Web, such as official information from the U.S. Navy, Air Force, and Defense Department; position statements and resources by environmental organizations; Web sites of individuals; and books, journals, magazines, and newspaper articles. Students teams are required to give summary presentations of their findings once the available information has been obtained and position papers written and distributed. The assignment suggests ways for students to find and evaluate Web-based information in formulating an understanding of specific issues.

Adapted from a course description by Norman Chance, Arctic Circle Virtual Classroom, Anthropology Department, University of Connecticut. The Arctic Circle Virtual Classroom is housed on the University of Connecticut's [Borealis server](#), which also acts as a gateway for combined online resources in anthropology, archaeology, and environmental studies. [HAARP \(High-frequency Active Auroral Research Program\): A Case Study in Ultra-Modern Warfare](#)

Example Three: Management Information Systems

This course approaches technology from two perspectives with the goal of training undergraduates to be business managers and business associates.

1. The first perspective looks at technology from a technical standpoint. Examples of technology skills to be developed include - programming and technical specification reading and writing; understanding the actual technology which business incorporates into their organizations. Students are expected to design and develop web pages; design and develop a database, and then they also need to look at these projects from the second perspective.
2. The second perspective looks to train the undergraduates in terms of strategy, information laws, information privacy, and ethics as they deal with different types of information. They also are taught to think about how they give access and authentication to end users from a management perspective and how as managers they need to guard against unauthorized use of data and information. They are also given strategy instructions in terms of technology acquisition for organizations based on the strategy which the organization needs to remain competitive.

Students in this class engage in a number of projects designed to evaluate and use a variety of systems used in a wide-range of business settings. Students working in pairs create a database for a catering company; they also prepare a written report on legal and ethical issues pertaining to privacy to the Board of Directors of a medical facility. Here is an example of the 3rd assignment.

Internet and Web Project

The Internet is an explosive dynamic information hub growing more and more with each passing day around the world. Your small company Imports and Exports antiques from Egypt to your shop in Queens, NY and you have decided to be more pro-technology oriented and expand your business strategically by going on the Web for those customers both here in the US and around the world.

Tasks:

You need to provide the following:

- A word document explaining your strategy and plan of action. Discuss, communication issues, currency issues, language, security and privacy issues. Justify your reasoning with sound MIS principles or theories. Explain where you would be available and what services are there to support you and how are they available. What are the constraints and limitations.
- Develop and design a prototype sample of a proposed web page, using software available
- Provide samples of product, services, and prices in an Excel format.
- Provide alternatives in terms of ISP's comparisons.
- Make recommendations

Assessment:

- Students are asked to think about issues in web page design such as currency, language, security, privacy issues with regard to data. Diagnostic and problem is an important aspect of this section of the report. (2 Points)

- Application of sound MIS principles and theories also need to be discussed within the document. (2 Points)
- Software for web page design could include any of the following: Dreamweaver, HTML, MS FRONT PAGE, MS PUBLISHER (2 POINTS)
- Spreadsheet needed with prices and products list to be hyperlinked if possible. Also, ISP's need to be compared in terms of prices and services available. (2 points)
- Finally, recommendations to management need to be made with options given based on different scenarios. (2 Points)

Adapted from an MIS course description by Thomas Roberts, Adjunct Faculty, Department of Marketing and Management Sciences, Cotsakos College of Business.

Example Four: Discipline-specific technologies

The following examples illustrate the range of discipline-specific technologies that could be incorporated into a technology intensive course. Note that student use of technology (Technology Intensive Outcomes 1 and 2) will need to be incorporated for these courses to receive UCC designation as technology intensive courses.

Nurses – Our future nurses will confront an increasingly technology-saturated system of medical practices. Many of these practices will be based on digital technologies, but many will be far more concrete: new types of artificial organs, genetic therapies, cloning, stem-cell therapies, and life-extension technologies. These technologies obviously raise an enormous host of ethical issues. Case-studies can be done of relevant technologies.

English – Technology-intensive courses may discuss novel uses of computers in textual analysis (e.g. attribution of authorship, stylistics, the automatic evaluation of writing quality). Has the nature of writing changed since the introduction of word-processors? What have blogging, texting, or twittering done to writing? Students may study these technologies through direct hands on interaction. Case-studies can be done of the relevant technologies (most of which are digital).

Political Science – Technology-intensive courses may discuss the use of surveillance technologies; the use of social network technologies to fight crime or terrorism; and the ethical issues associated with privacy. How should technology be used in the courtroom? What about new computer-based “mind-reading” technologies. What are the ethical or political issues associated with the new “automated battlefield” where autonomous robots kill human beings? Case-studies can be done.

Philosophy – Technology-intensive philosophy courses will take broad overviews of the nature of technology, its roots in the natural world (humans are not the only animals to use tools), and its consequences for the future. Does technology control us? Does it threaten our future as a species or does it open paths to new forms of transcendence? Is technology ultimately inspired by Western religious imperatives -- and if so, does it essentially entail the destruction of non-Western lifeways?

Mathematics – Computers are now routinely used not merely to crunch numbers, but to prove theorems. Are automated proofs genuine? What if they are too long to be verified by human mathematicians? How are computers being used to develop empirical mathematics (e.g. testing Goldbach's Conjecture out through trillions of trillions of numbers)? How do computer modeling and visualization tools (like Mathematica) affect the teaching of mathematics?

Biology – Technology-intensive courses may study the technologies (both computational and non-computational) behind the genomic revolution. These technologies often involve the construction of very-large scale databases, the use of data mining techniques. These technologies have the potential to cure disease, but they also have the potential to be abused. What are the ethical and political issues associated with genetic screening (e.g. for insurance purposes)? What should potential parents do if they find out their genetic profiles entail high risk of genetic disease? Case-studies!

Business – Technology-intensive courses may study the technologies currently used in global business systems. Did novel forms of computerized trading (e.g. in derivatives markets) contribute to the market crashes of 2008? How does globalization affect the third-world? Is it just or unjust? On what crucial technologies does modern global business depend? How does rapid technology change affect established business models (consider the impact of the internet on the music industry, the newspaper industry, etc.). How will advanced robotics or artificial intelligence affect manufacturing? Case-studies should be used to focus the attention of the student.