CS050
Information and Computation: History and Ethics
Fall, 2008

Catalog description: Social and ethical impacts of information, computation, and computing machinery from ancient Babylon to the present. Develop an historical perspective on information and computation. Comprehensive coverage of ethical theories and how they apply to technology – particularly information technologies – and how they can inform policy decisions. Significant attention to philosophical concepts of property rights, how they apply to information, and how they have been applied through history. Consideration of interactions and tensions between privacy and information infrastructure.

Introduction

OVERVIEW: What does it mean to say that we live in an “information society” and how did we get here? What is the nature of information or computation? Is information a kind of “stuff” and where does it come from? What historical forces and developments combined to give us TFLOP computers and are leading us to quantum computers? How can humanity avoid drowning in an ocean of information? What does it mean to be human, anyway? What have humans discovered about “living the good life” in a world saturated with technology? How can we do better at living the good life by personal and policy decisions? What are the consequences of our current policies regarding intellectual property? Does a person have a right to privacy? How does technology impact privacy?

In this course, we will address these questions and others. The course will be seminar style where students are expected to arrive in class prepared to engage the questions and ideas encountered in the readings. Several formal presentations will be required, as will numerous short papers

PREREQUISITES: No background in computer science or philosophy is required.

Course Description

PRIMARY READING LIST:
Ifrah, Georges. The Universal History of Computing: From the Abacus to the Quantum Computer. [required]
Patterson, Lyman. Copyright in Historical Perspective. [required]
Miscellaneous other handouts from:
Hamming, Richard. Information and Coding Theory.
Dretske, Fred. Knowledge and the Flow of Information.

COURSE OBJECTIVES: As the primary goal of the course, successful students will think like philosophers about information, computation, and how they interact – for better and worse – with the human race. More specifically, we want to equip students to make informed value judgments in regards to technology. In order to accomplish this, one needs to understand the nature of value and value judgments, how a Christian faith informs one's value judgements, the nature of information and information technologies, and the impacts of technology on individuals and communities. This suite of concerns provide one exemplification of a Christian liberal arts education. The course is being
proposed to satisfy the GE’s Common Contexts category, Philosophical Reflections on Truth and Value.

If we want to determine the best course of action – perhaps formulate a policy – regarding a given information technology, we need to understand our values and why we hold them. Philosophers in the area of ethics have been considering this and related questions for thousands of years. When we ask such questions about a new technology, say video or phone surveillance, we are stepping into a stream stretching back in history and engaging with what others have thought. Within the field of ethics, several theories have come to dominate our thinking and we want to study those theories, with the eventual goal to apply them to our specific problems with information and communication technology. However, before applying value judgments, one not only needs an ethical theory but also must understand the nature of the subject in question. Thus, students will also study the nature of information and computation.

An ethical theory cannot effectively guide behavior without an understanding of the topic about which we want to make choices. Exploring the nature of information and computation raises questions such as: What is information made of? Or is everything made of information? How is information communicated? Does information require a mind to behold it? If so, are minds anything other than information processors? These are some of the kinds of questions that philosophers ask about any subject when approaching the Philosophy of X. More specifically, these are questions of metaphysics (regarding the nature of “what is”) and epistemology (concerning knowledge and how we come to have it). Keeping in mind our primary goal of making value judgments about information technologies, we truly need a deep understanding of information and knowledge. Consequently, we will look at what mathematicians and philosophers have to say about the metaphysics of information and knowledge, and the epistemological concerns surrounding the interactions between minds, information and knowledge. As a result, students will begin to form a detailed picture of computer and information science as a discipline, while at the same time gain familiarity with some of the sub-disciplines within Philosophy and how they contribute to our understanding of computer science.

Finally, with an understanding of the subject matter and several ethical theories on which to draw, we will focus our attention on one particular issue that has been introduced or exacerbated by information technology. The specific topic will vary from one instance of the course to another. The intent is for students to apply their knowledge of ethics to a particular problem in detail. Examples of problems include: copyright, privacy, democracy, and virtual reality. For the Fall 2008 semester, we will explore the notion of copyright and consider in what respects it is helping and hurting our society. Once again, to attack this problem requires an understanding of what copyright is today, as well as the historical development of that construct.

**Outcomes Pertaining to GE Common Contexts: Philosophical Reflections on Truth and Value**

1. [Philosophy] Students will be able to recognize and articulate foundational questions of philosophy—especially foundational questions of particular interest to Christians—though the emphasis among knowing, being, and value will vary by course.
2. [Liberal Arts] Students will be able to articulate some of the main components of a Christian liberal arts education and the interrelation of philosophy and other areas of academic study in the liberal arts, both in terms of content and the development and application of transferable skills.
3. [Worldview] Students will be able to articulate the relationship between philosophical commitments in academic life and their beliefs, feelings, commitments, and practices as components of an integral life, considered as a whole.

Other Learning Outcomes
As a concomitant goal to thinking philosophically about information and communication technologies and making value judgments about them, students who successfully complete this course will understand the contemporary information society within a rich historical context of conceptual, technological, and ethical changes. Together, these goals enable students to think critically and reflectively on how a study of computer science interacts with other disciplines, society in general, and one's personal faith in particular (departmental outcome C4; college learning standards 1, 2, 4 and 6). In addition, the application of multiple ethical theories to given problems should support a student's ability to think flexibly and creatively (departmental outcome C3).

As a seminar course, a subsidiary goal is to give students practice reading critically, writing essays, making presentations to their peers, and discussing ideas vigorously. In short, students should become more critical thinkers and better communicators (departmental outcome C2).

Traditionally, philosophically intensive courses offered within computer science departments address either computer ethics or the philosophy of artificial intelligence. Indeed, many of the questions we want to consider in this course have received considerable attention in the literatures flowing out of those two communities (i.e., computer ethics and philosophy of artificial intelligence). However, we will additionally be looking at information theory and theories of knowledge, as well as social commentary on the impacts of (information) technology. Of course, by casting the net this wide, many of the topics will not be addressed in great depth. However, as a first- and second-year seminar, this breadth over depth is entirely appropriate. Furthermore, the issues in computer ethics are addressed in greater detail during the Senior Seminar (CS195), and likewise, at least a third of the artificial intelligence course (CS116) delves into the philosophy of AI. The shape of the present course (CS050) will be roughly split four ways between: ethical theories; theories of information and knowledge; philosophy of AI; and the consideration of a current issue (e.g., copyright policy). (A detailed schedule will be provided to students on the course website.)

Requirements
ASSIGNMENTS: Readings; reading journal; short essays; term paper; online portfolio. The course is reading-intensive. Each class session will be organized around several questions. Readings pertaining to the questions will be identified. One of the challenges students must face is strategic selective reading. Students will maintain reading journals that record their thoughts, reactions and questions as they read. Students are expected to come to class prepared to lead a discussion of the primary questions and to present their own additional questions triggered by the reading. Reading journals will be periodically evaluated. Students will write (and re-write) five or six one-page position papers on assigned topics from the readings. Papers will be reviewed and critiqued by peers and then revised for final submission and grading. One longer research paper will be written on a topic chosen by the student and approved by the instructor. In addition, students will update their online portfolio (or create one if they do not already have one) with relevant information from the course. (Students are encouraged to submit their reading journals via their online portfolio.)
PRESENTATIONS: Students will make one or more presentations to the class.

EXAMS: There will be two exams, one during the semester and a final. The final, consisting of several short essays will comprehensively query what students have learned during the course.

ATTENDANCE: Attendance is required and counted at the beginning of class; come to class on time. In accord with Westmont's Academic Policies and Procedures, missing more than three classes without prior approval of the instructor will result in a letter grade reduction for each additional unexcused absence (e.g., missing four classes makes the best possible grade a B, while missing seven classes will result in removal from the class with a grade of F).

GRADING: Course grades will be based on (1) class preparation and participation, (2) reading journals, (3) essays, (4) research paper, and (5) the two exams.

ACADEMIC HONESTY: As in every area of life, I presume that you behave honestly within the context of this class. This reflects the respect that I grant each student coming into an academic relationship. If you act dishonestly toward me or your peers, you break that relationship. Do not attempt to receive credit for work that is not your own without properly acknowledging sources via appropriate citations or references. You are encouraged to get help from your peers but make sure you acknowledge such help and that you subsequently understand the help you received. The consequence of violating the trust I implicitly extend to you will typically be an F in the course for reason of academic dishonesty (first incident).

Administrivia

WHEN AND WHERE: MWF 8:00-9:05am, Bauder Hall classroom
WEBPAGE: http://www.westmont.edu/~iba/teaching/CS050
INSTRUCTOR INFORMATION: Dr. Wayne Iba, x6799