Course Description

The IT revolution is far from over, and, contrary to the well-known claim of Nicolas Carr, IT does matter. In fact, according to Bill Gates, “we’re only beginning to realize computing’s potential” and that “we’re entering an era when software will fundamentally transform almost everything we do,” ranging from the evolutionary to the revolutionary transformations disrupting previously adopted technologies and business models. These transformations should create intelligent real-time enterprises that would conduct business in a significantly more effective, efficient and agile manner, and that could adapt to the changing business conditions and grow “smarter” over time by leveraging the future generations of Information Technologies. These technologies can be the greatest friends or the worst foes in building such “smart businesses,” depending on how well they are adopted and deployed in the enterprises.

In this course, the students will study various principles of technological innovation driving major business transformations and leading to the creation of more intelligent and agile enterprises. Some of these principles include evolution and generations of emerging technologies, different types of technological trajectories, cycles and path dependencies of these technologies, business-pull and technology push, can-do vs. should-do, the “magic” quadrant, crossing-the-chasm and the beagle-and-the-rocket principles. The course will also cover various technological standards, battles between the competing standards, convergence to one or few dominant standards, and commoditization of technologies.

The students will also examine how these key principles of technological innovation work in practice by studying several business cases. This semester, the cases include:


These cases will cover different types of technologies, such as

1. Communication technologies, including landline and wireless/mobile
2. Cloud computing
3. Knowledge and content management technologies
4. “Cutting edge” and “smart” technologies for building agile and responsive businesses

In order to understand these cases and also to illustrate the principles of technological innovation using these technologies, the students will examine them and see how these technologies are used in various applications and deployed in real business settings. Moreover, we will discuss possible future directions and trends for the technologies being studied, novel applications that they enable and how high-tech companies can leverage these trends.

What differentiates this course from other related courses is the emphasis on solid understanding of both business problems and underlying technologies and deep understanding of how the two interact. This understanding is becoming increasingly important in decision making and in managing modern businesses. For example, should a wireless phone company adopt a CDMA-based or a GSM-based standard, or can a small startup company leverage its innovative and IP-protected technologies and stay in the value chain or should it get out of the value chain and do something else because some of the major IT vendors try to integrate forward and backward in the value chain and squeeze the small startup out? These and many similar types of decisions are not purely business or purely technological decisions since they involve complex interactions between business and technical issues. The students will also learn that the ability to understand both business and technical issues can often differentiate between the success stories and major blunders, such as Enron’s overly ambitious plan to develop software-based switching hubs to provision high-speed circuits to customers in near real-time.

The students will learn the material through the combination of class lectures, discussions, student presentations, and the case studies. Periodically, experts from the industry will be invited to share their experiences pertaining to the technologies being studied and discuss current trends and future directions for these technologies and corresponding industries. For example, the following guest speakers gave their guest lectures last year:

- Richard Lynch, CTO and Executive Vice-President of Verizon
- Stephanie Mitchko, Vice President, Interactive Platform Development, Cablevision Systems.
- Tianyi Jiang, CEO of AvePoint (a successful late-stage startup company based in New Jersey).
Intended Audience and Prerequisites

The course should be useful to the students interested in the careers in the high-tech companies, IT consulting, technology entrepreneurship, investment banking in the technology sector, and to the students interested in joining the VC firms.

Although this course does not have any formal prerequisites, I will assume certain very basic familiarity with key technologies, including the basic understanding of

1. communication networks and how Internet works
2. WWW basics
3. data organization, such as relational databases.

If you have any prior technical background (from the school or work-related), it should be sufficient for this course. If you have no prior technical background, you can still take this course, assuming that you are a fast learner and are willing to put extra time to learn some of the basic technical concepts during the course. If you are not sure whether you have the appropriate knowledge, you can examine the content of the book “How the Internet works,” by Preston Gralla, Que, 2006 to see if you have basic familiarity with key technical concepts covered in that book (or at least the ability to learn this material fast on your own). Finally, if you are still not sure if your background is appropriate for this course, you can contact the instructor (see below).

The Projects

There will be a group term project and a mini-project in this class.

In the term project, the students will be grouped into small teams and asked to analyze a company or a group of company in some high-tech “space”. The deliverables of this analysis are (1) a short in-class presentation and (2) a written report that will be delivered at the end of the course. The purpose of this project is to encourage exploration and independent research and to stimulate thinking about emerging applications and factors contributing to the success or failure thereof.

In the mini-project, the students will be given a list of emerging technologies and will be asked to chose one of these technologies (or select one on their own) and analyze its potential and future prospects using the principles of emerging technologies covered in this class. Deliverables: a short report describing the findings.

Requirements and Grading

Besides the project described in the previous section, there will be two quizzes administered in-class to test the knowledge of the material. The purpose of these quizzes
is to encourage periodic review of the course material and strengthen understanding of
the concepts covered in class.

A student’s overall score will be calculated as the weighted average of the scores
computed according to the following distribution:

1. Term Project 40%
2. Mini-Project 25%
3. Quizzes (2) 20%
4. Class participation 15%

Some of the factors affecting class participation include showing interest in the subject
and active participation in the class discussions, regular class attendance, and
preparedness for the classes, including familiarity with the reading materials assigned for
the class.

Case Studies

As described before, the following cases will be covered in class:


The students are expected to read these cases before the class and be well-prepared to
discuss them in class.

Reading Materials

1. The Reading Packet (electronically distributed by XanEdu)
2. Handouts and on-line materials
Contact Information and Office Hours

Office: KMEC 8-92
Phone: 998-0832
e-mail: atuzhili@stern.nyu.edu

Course Outline

1. Overview of the Basic Principles of Emerging Technologies and Business Innovation

Discussion of how innovative technologies emerge, evolve and are adapted by businesses, and how technical and business issues are intertwined in making business decisions. The students will also learn about various types of technological innovation and the value of emerging technologies. Finally, we will discuss how intelligent adoption of modern emerging technologies leads to the creation of “smart” real-time enterprises.

The students will learn how these principles are applied in real-life business situations by doing five case studies of various technology companies. These cases (unlike typical Harvard Business School cases) will have a heavy “dosage” of technical content. Therefore, the students will learn some of the technologies covered in these cases and how they are used in business. In particular, the following technologies will be covered in this class.

2. Communication Technologies.

Overview of the communication infrastructure, basic communication concepts, broadband technologies, and voice and data networks. Overview of packet switching and of some of the packet-switching communication protocols, such as TCP/IP. Overview of the Internet and its structure, including the backbone, local loop technologies, and the “last mile” problem.

Foundations of wireless technologies, different generations of wireless technologies (1G through 4G), and the corresponding standards (e.g., GSM, EDGE, CDMA, and OFDM). Making sense of these standards and examination of the transition paths across them. Overview of wireless LANs, its standards and of the pervasive and smart wireless technologies, including smart sensors and the location-based services. Discussion of the digital convergence.

These technologies will be studied in the context of various business applications where they can be deployed. Familiarity with these technologies and prior knowledge of the basic principles of emerging technologies will help the students understand the two cases covered in the class: Akamai Technologies and Mobile FeliCa from NTT DoCoMo.
3. Cloud Computing

Overview of the key concepts of the cloud computing and the architectures of the cloud computing systems. Discussion of the performance, security, reliability and economic viability issues, as pertaining to the cloud computing systems.

Familiarity with these technologies will help the students understand the Amazon Web Services and the Akamai cases.

4. Knowledge and Content Management Technologies.

Discussion of what knowledge and content management are and in which applications these technologies can be used and how. Overview of various knowledge management technologies, including search, retrieval, discovery and taxonomy generation technologies. Overview of the content management concepts. Discussion of how different types of content can be created, collected, transformed and stored in content management systems.

Familiarity with these technologies will help the students understand the Cognizant 2.0 and the Google cases.

5. “Cutting Edge” Technologies

An overview of various “cutting edge” and “smart” technologies, including real-time monitoring, business intelligence, and business process management and integration technologies, for creating agile, integrated and highly automated sense-and-response enterprises. Overview of some of the other emerging cutting-edge technologies, such as robotics, augmented reality, touch, and personalization technologies. Discussion of various entrepreneurship opportunities pertaining to these technologies.