Curricula of the International Graduate Program on *Effective Utilization of Technology* in the Graduate School of Decision Science and Technology

1. Purpose of course

This international graduate program focuses on the "Effective Utilization of Technology" and is targeting mainly those who graduated from engineering departments in universities. The course is intended to provide students with fundamental and practical knowledge and skills on utilizing various technologies, as well as concepts and approaches to applying them to new objects, issues and technology in order to contribute for sustainable development in the twenty first century.

2. Participating departments

Education programs are designed by the collaboration of the following five departments in the Graduate School of Decision Science and Technology and the Graduate School of Innovation Management:

- Department of Human System Science,
- Department of Value and Decision Science,
- Department of Industrial Engineering and management,
- Department of Social Engineering, and
- Department of Innovation.

3. Rules and requirements for course

For the master degree, the following requirements must be met:

- 10 credits from the Category I: "Technology";
- 14 credits from the Category II: "Utilization of Technology for Business Resources";
- 4 credits from the Category III: "Application Objects of Technology";
- Credits of Workshop, Seminar, Exercise and Colloquium in each semester;

and

- Master thesis.

For the doctoral degree, the following requirements must be met:

- 10 credits from the Category I: "Technology";
- 14 credits from the Category II: "Utilization of Technology for Business Resources";
- 4 credits from the Category III: "Application Objects of Technology";
- Credits of Workshop, Seminar, Exercise and Colloquium in each semester;
- 4 credits of the Off-Campus project (I or II); and
- Doctoral dissertation.

4. List of subjects provided in English

Category I: "Technology"

Those subjects are provided by other International Graduate Programs.

Category II: "Utilization of Technology for Business Resources"

[Management of Technology]

Class	Credit	Lecturers	Semester	Remarks
Institutional Management of Technology No.1	2-0-0	Prof.C.Watanabe, et al.	Spring	
Institutional Management of Technology No.2	2-0-0	Prof. C. Watanabe, et al.	Autumn	
Technology Policy Systems	2-0-0	Prof. C. Watanabe	Autumn	
Strategic Management of Technology	2-0-0	Prof. K. Miyazaki	Spring	
Strategies and Systems of Innovation	2-0-0	Prof. K. Miyazaki	Autumn	
Corporate Management and Intellectual Property Activities	2-0-0	Assoc. Prof. Y. Tanaka	Autumn	Even year: in English, Odd year: in Japanese

[Utilization of Technology]

Class	Credit	Lecturers	Semester	Remarks

Business Information Systems Project	2-0-0	Prof. J. Iijima and Assoc. Prof. D. Senoo	Spring	Even year: in English, Odd year: in Japanese
IT Investment and Digital Organization	2-0-0	Prof. M. Hirano	Autumn	
IT and management	2-0-0	Prof. M. Hirano	Spring	
Quality Management	2-0-0	Prof. H. Osada	Autumn	Given in even year
Information Technology for Organizational Strategy	2-0-0	Prof. K. Higa	Autumn	
Colloquium in Strategic Management	1-0-0	Prof. H. Yasuda	Autumn	
History of Science in Regional and National Contexts	2-0-0	Assoc. Prof. M. Kaji	Spring	
Advanced Course of Mathematical Logic	2-0-0	Prof. T. Waragai	Spring	
Advanced Course for Historical Development of Technology	2-0-0	Prof. T. Kimoto	Spring	
Presentations skills	2-0-0	Prof. S. Mayekawa, et al.	Spring	
Transdisciplinary Collaboration Practice	0-0-2	Prof. J. Iijima and Assoc. Prof. D. Senoo	Autumn	
Ergonomics for Organization and Systems Design	2-0-0	Prof. K. Itoh	Autumn	

Category III: "Application Objects of Technology"

Class	Credit	Lectures	Semester	Remarks
Product Design and Human	2-0-0	Assoc.Prof. H. Umemuro	Spring	
Organizational Design for Planning	2-0-0	Assoc. Prof. T. Sakano	Autumn	
Business in the Net-Society	2-0-0	Assoc. Prof. D. Senoo	Autumn	Even year: in Japanese, Odd year: in English
International Institutions	2-0-0	Assoc. Prof. K. Kanie	Spring	
A Comparative Study of Modern Japanese Culture	2-0-0	Prof. Leith Morton	Autumn	

Category IV: Obligatory Subjects

1) Workshop

Class	Credit	Lectures	Semester	Remarks
Decision Science and Technology International Workshop I	2 credits	Supervisor	Autumn	
Decision Science and Technology International Workshop II	2 credits	Supervisor	Spring	
Decision Science and Technology International Workshop III	2 credits	Supervisor	Autumn	
Decision Science and Technology	2	Supervisor	Spring	

International Workshop IV	credits			
Decision Science and Technology International Workshop V	2 credits	Supervisor	Autumn	
Decision Science and Technology International Workshop VI	2 credits	Supervisor	Spring	
Decision Science and Technology International Workshop VII	2 credits	Supervisor	Autumn	
Decision Science and Technology International Workshop VIII	2 credits	Supervisor	Spring	
Decision Science and Technology International Workshop IX	2 credits	Supervisor	Autumn	
Decision Science and Technology International Workshop X	2 credits	Supervisor	Spring	

2) Seminar, Practical Exercise and Colloquium

Class	Credit	Lectures	Semester	Remarks
International Seminar in Decision Science and Technology I	0-1-0	Supervisor	Autumn	
International Seminar in Decision Science and Technology II	0-1-0	Supervisor	Spring	
International Practical Exercise in Decision Science and Technology I	0-0-1	Supervisor	Autumn	
International Practical Exercise in Decision Science and Technology II	0-0-1	Supervisor	Spring	
International Colloquium in Decision Science and Technology I	1 credit	Supervisor	Autumn	
International Colloquium in Decision Science and Technology II	1 credit	Supervisor	Spring	
International Colloquium in Decision Science and Technology III	1 credit	Supervisor	Autumn	
International Colloquium in Decision Science and Technology IV	1 credit	Supervisor	Spring	
International Colloquium in Decision Science and Technology V	2 credits	Supervisor	Autumn	
International Colloquium in Decision Science and Technology VI	2 credits	Supervisor	Spring	
International Colloquium in Decision Science and Technology VII	2 credits	Supervisor	Autumn	
International Colloquium in Decision Science and Technology VIII	2 credits	Supervisor	Spring	
International Colloquium in	2	Supervisor	Autumn	

Decision Science and Technology IX	credits			
International Colloquium in Decision Science and Technology X	2 credits	Supervisor	Spring	

3) Off-Campus Project

Class	Credit	Lectures	Semester	Remarks
Decision Science and Technology International Off-Campus Project I	4 credits	Supervisor	Autumn	
Decision Science and Technology International Off-Campus Project II	4 credits	Supervisor	Spring	

In addition to the above-mentioned subjects, students are recommended to take classes of relevant subjects given in Japanese. Some of these classes may be admitted to include credits as either Category I, II or III. In this case, a student is consulted by his/her supervisor or department head.

5. Descriptions of subjects

■ Institutional Management of Technology No.1 and No.2 (SIMOT-1 and -2)

No.1: Spring Semester (2-0-0), No.2: Autumn Semester (2-0-0)
Prof. Chihiro Watanabe, et al.

I. Objectives

This is the core course as part of the strategic education and research program in the 21st Century COE, "The Science of Institutional Management of Technology: SIMOT." The SIMOT is aimed at elucidating the co-evolutionary mechanism between innovation and institutional systems (or social soil for nurturing innovation).

During the course, students are exposed to intangible "system", "subtlety" of the real world co-evolution dynamism between innovation and institution (particularly, co-evolution unique to Japan) and its "pitfalls" experienced and sensed by incumbent business leaders or co-evolutionary workings as seen from different academic disciplines. Students are expected to understand and digest the workings of the dynamism and attempt to systematize, visualize and operationalize it.

The course contents are requisite for future SIMOT researchers and business leaders, being primarily designed for doctoral students. If there are too many prospective students, doctoral students studying subjects/fields with certain relevance to industrial engineering & management and/or MOT are given priority and/or a selection may take place.

SIMOT-1 is relatively more theory-oriented and SIMOT-2 is more practical application-oriented. It is recommended that SIMOT-1 be taken prior to SIMOT-2. But the course is so constructed that SIMOT-2 could be taken first without serious inconvenience.

Lunch time will be used as supplementary time and students are expected to be so prepared.

II. Contents

1.
2.
3.
4. } Basic concepts, applications and approaches of SIMOT

5.
6.
7.
8.
9.
10. } About 15 real-world cases and perspectives from different academic disciplines

11.
12.
13.
14. } Colloquium (presentation and intensive Q&A)

■Technology Policy Systems

Autumn Semester (2-0-0)

Prof. Chihiro Watanabe

□. Objective

Focus on the comprehensive and empirical analysis of the theoretical framework and practical effects of a dynamism between policy, institutions and firm's strategy for inducing industry/firm's technological innovation.

□. Contents

1. Turning point
   (1) Japan's economic development trajectory after the 2nd world war
   (2) Turning point of Japan's industrial technology (1966, 1978-80, 1992)
   (3) Inducing mechanism of the Government policy (Hitting the turning point)
   (4) Role and significance of Visions
2. Trade-off
   (1) Trade-off between R&D investment and manufacturing investment
   (2) Rate of return to R&D investment- Base of firm's optimal investment decision
   (3) Measurement of Internal Rate of Return to R&D Investment (IRR)
   Factors governing IRR
3. Timing
   (1) Optimal timing of R&D program
   (2) Evaluation of the timing for undertaking R&D project
   (3) Evaluation of the return of R&D project
4. Target
   (1) Role of national R&D program
   (2) Systems option for sustainable development
   (3) Target identification
   (4) Consensus gaining towards the identified target
   (5) National industrial technology strategy
   (6) Basic strategy for IT

5. Tie-ups
   (1) Rationale of the tie-ups
   (2) Root of the tie-ups: Engineering Research Association (ERA)
   (3) Background of the enactment of the Law for ERA
   (4) Consortia and its variation
   (5) Organization of the tie-ups
   (6) Evaluation of the tie-ups
6. Trajectory
   (1) Japan's national industrial technology strategy – Review and trajectory
   (2) Optimal investment trajectory
   (3) Optimal R&D investment control model
   (4) Optimal R&D investment trajectory in Japan's manufacturing industry

■Corporate Management and Intellectual Property Activities

Autumn Semester (2-0-0) Even year: in English; Odd year: in Japanese
Assoc. Prof. Yoshitoshi TANAKA

I. Objective

The intellectual property activity is existence near corporate management for the intellectual property to contribute to strengthening and the growth of the business, and should be what the intellectual property activity positively participated in the accomplishment of the management strategy. It is necessary to link not stopping in the intellectual property activity that specializes only in expertise, and sharing a management index necessary for the target of corporate management and the achievement, that is, intellectual property activity and corporate management. The group to drop the set business objective to the intellectual property activity shall be discussed as the method about a certain corporate case, and training that ties to corporate management the intellectual property activity is done. In addition, knowledge necessary to learn the intellectual property activity of the corporate entrepreneurship such as production sector, sales department, personnel departments, and financial departments in each functional part, and to achieve effective use of the intellectual property that the enterprise has in all companies is acquired.

II. Contents

- Introduction, Business views of intellectual properties strategy
- Intellectual properties activity from the views of the business management
- Break down the objectives of IP department from corporate management
- Organization and function of PQM (Patent Quality Management)
- Patent management in Marketing department
- Patent management in Technical department
- Patent management in Production department
- Patent management in Finance department
- Patent management in Human Resources department
- Patent management in Information Technology department
- Patent management for Top Management
- Corporate organization and the function respecting IP protection
- Summing up of Corporate Management & Intellectual Property Activities

■Business Information Systems Project

Autumn Semester(2-0-0) Even year: in English, Odd year: in Japanese

Prof.Junichi IIJIMA and Assoc.Prof.Dai SENOO

□. Objective

The overall objectives of this course are to investigate the nature and t4echniques of business information systems development project. Through a semester-long project,students will learn how to set and formulate a problem and a goal of the target system.

□. Contents

- ・Fieldwork experience
- ・KJ method
- ・Brain storming method
- ・Concept creation -Metaphor,Analogy,Model
- ・Presentation skills
- ・Project management
- ・Soft Systems methodology
- ・RAD
- ・IDEF
- ・ ARIS
- ・ Ericksson-Penker

■IT Investments and Digital Organisation

Spring Semester (2-0-0)

Professor Masaaki HIRANO

1. Course Objective

Information technology (IT) has been radically changing the rules of competition and the way organisations, be it business, governmental or non-profit, serve their customers/constituents. To obtain the best possible benefits of IT investments, however, the organisation needs matching organisational capabilities. As most incumbent orgnisations currently do not necessarily have these digital organisational capabilities, they need to make organisational investments to match IT investments. The objective of the course is to explore the requisite organisational capabilities and possible strategies for traditional and/or established (mainly large) organisations to make a successful transition, so that they can exploit most of opportunities created by IT as well as leveraging their intrinsic strengths. Specifically, the course aims to help you in:

* Understanding required capabilities for digital organisations,
* Formulating strategies for the established organisations to exploit IT,
* Managing/leading transition process from an analogue organisation into a digital one, and
* Communicating with IT specialists

The course is not about IT businesses nor about cyber businesses *per se*.

Course prerequisites: Successful completion of "Information and Systems Thinking", at least a few years work experience, and a reasonable level of English. If in doubt, see me before

registering. Also, you are expected to have completed basic courses in strategy and in orgnisation. If not, you should familiarize yourself with their concepts and tools by studying books such as:

Grant, R. (2002), *Contemporary Strategy Analysis: Concepts, Techniques, Applications* (4th ed) Blackwell
Robbins, S.P. (2001), *Organizational Behavior* (9th ed), Prentice-Hall
Roberts, J. (2004), *The Modern Firm*, Oxford University Press

2. Course Outline
Module I: INTRODUCTION
1. Does IT Matter?
2. Issues of IT Investments
Module II: DIGITAL ORGANISATIONS
3. Management of Digital Process
4. Technology Management
5. Alliance Management
6. Portfolio Management of Projects
7. Diversity Management
Module III: DIGITAL STRATEGIES
8. Adding an e-Channel
9. Creating a New Strategic Group: Redesign of Value Chain / Bundle
10. Adding New Businesses
11. Exploiting the Current Position
Module IV: SAP/R3 Exercise
12. Hands on Experience of ERP
Module V: MANAGING THE TRANSITION
13. Managing the Change Process
14. Learning Organisation
MODULE VI: CONCLUSION
15. Project Presentations

■Information Technology and Management

Autumn Semester (2-0-0)
Professor Masaaki HIRANO

1. Course Objective

Information technology (IT) has been radically changing the rules of competition and the way organisations, be it business, governmental or non-profit, serve their customers/constituents. The objective of the course is to familiarize you to the recent developments of IT and its use in various facets of management. Specifically, the course aims to help you in not overestimating nor underestimating the potentials and implications of IT to the management of organisations, when making management judgement in strategic and/or functional issues.

Course prerequisites: As this is a foundation course in MIS (management information systems) and e-business, there are no prerequisites, other than your enthusiasm.

2. Course Materials

The course textbook is:
K.C. Laudon and J.P. Laudon (2006), *Management Information Systems (9th ed)*, Prentice-Hall.

3. Course Outline

Part One: Organizations, Management and the Networked Enterprise
1. Chapter 1: Managing the Digital Firm
2. Chapter 2: Information Systems in the Enterprise
3. Chapter 3: Information Systems, Organizations, Management and Strategy
4. Chapter 4: The Digital Firm: Electronic Business and Electronic Commerce
5. Chapter 5: Ethical and Social Issues in the Digital Firm

Part Two: Information Technology Infrastructure
6. Chapter 6: IT Infrastructure and Platforms
7. Chapter 7: Managing Data Resources
8. Chapter 10: Security and Control

Part Three: Organizational and Management Support Systems for the Digital Firm
9. Chapter 11: Enterprise Applications and Business Process Integration
10. Group exercise
11. Chapter 12: Managing Knowledge in the Digital Firm
12. Chapter 13: Enhancing Decision Making for the Digital Firm

Part Four: Building and Managing Information Systems
13. Chapter 14: Redesigning the Organization with Information Systems
14. Chapter 15: Understanding the Business Value of Systems and Managing Change

Part Five: Conclusion
15. Presentations

NB. The course meets at 9.00-16.30 on Monday 4th through Thursday 7th February 2008.

■Quality Management

Autumn Semester Given in even year (2-0-0)
Professor Hiroshi Osada

【Objective】

Quality Management (QM) as management method to increase quality of product and "service is explained about its concept, methods and application."
"In addition, leading edge methods in QM for improving management quality such as" assessment method on management quality and strategic management by policy etc. are introduced and discussed through case studies.

【Contents】

1. Quality Management(QM) in corporate management
2. Concept of QM and History of QM
3. Quality Management System
4. Strategic Planning and QM(Strategic Management by Policy)
5. Quality innovation and creation of best practice
6. Case study(1)：Quality innovation in Komatsu
7. Management Quality
8. Assessment method on Management Quality
9. Competitive advantage through QM
10. Case study(2)：Quality management in Toyota
11. Case study(3)：Business excellence through TQM at foreign Deming prize winner(India)
12. New Topics in QM

【Evaluation】

Two reports and group discussions are evaluated.

【Note】This subject is held every two years at Tamachi campus and will start in 2008(Autumn).

■Information Technology for Organizational Strategy

Autumn Semester(2-0-0)
Prof. Kunihiko HIGA

Ⅰ. Objective

As the society shifting from the industrial society to the knowledge society, many organizations are facing the existing high-cost structure and inflexibility to respond to the drastic changes in their corresponding markets. In this class, a new organizational structure with high cost-performance and flexibility will be discussed. Particularly the use of information technology for organizational innovation and organizational restructuring will be studied. Also the role of information technology as a strategic business tool will be examined.

Ⅱ. Contents

・Case study
・Organizational innovation
・Organizational restructure
・Strategic Information Systems
・Presentation skills
・Group work
・Brain storming

■Colloquium for Strategic Management

Autumn Semester(2-0-0)
Lecturer Hiroshi YASUDA

. Objective

This course focuses on issues related to strategic alliances and M&A, which attract attention from strategic management perspectives in today's business world. The goal of the course is to capture their overall pictures, through the understanding of their background, trend, theoretical basis, process, procedures, instructions, etc.

. Contents

・Strategic alliances: background and trend
・Typical forms of strategic alliances and their theoretical basis
・Analytical framework of strategic alliances and case studies
・Process and procedures of strategic alliances
・Instructions for performing strategic alliances
・Planning and execution of M&A
・Practical techniques of M&A

■History of Science in Regional and National Contexts

Spring Semester(2-0-0)
Assoc.Prof. Masanori KAJI

Objective

This course intends to offer a survey of major environmental problems in the 20th century, while tracing the growth of environmental awareness and environmentalism in regional and national as well as global contexts.

Contents

A survey of major environmental issues since the mid-20th century, focusing on the debates surrounding the Minamata disease Rachel Carson's *Silent Spring* (1962), and the topical subject of global warming.

■ Advanced Course of Mathematical Logic

Spring Semester (2-0-0)
Prof. Toshiharu WARAGAI

I. Objective

The standard system of predicate calculus will be discussed.

II. Contents

- Introduction to mathematical logic
- Propositional Logic: An Overview
- Semantic Consequence
- Some theorems of propositional logic (I)
- Some theorems of propositional logic (II)
- Predicate Logic: An Overview
- Structure and Validity
- Some theorems of Predicate Logic (I)
- Some theorems of Predicate Logic (II)
- Identity and Description (I)
- Identity and Description (II)
- Calculus of Names and Set Theory (I)
- Calculus of Names and Set Theory (II)
- Calculus of Names and Set Theory (III)
- Calculus of Names and Set Theory (IV)

Textbook: Delivered during the lectures.
Conditions: Average knowledge of mathematical thinking.

■Advanced Course for History of Technology

Spring Semester (2-0-0)
Prof.Tadaaki KIMOTO

This course treats some topics from the history of technology in Japan and discuss about the characteristics of technological development in Japan.

Topics to be discussed;

(1) Development of Naval Architecture before the WW □
(2) Meiji Government and her Technology Policy
(3) Development of Two Kinds of Technical Colleges
(4) Beriberi problems in Meiji and medical Scientists
(5) Mining Hazards at Ashio and Scientists
(6) Minamata Desease and 'Technology of Chisso'

■Ergonomics for Organization and Systems Design

Autumn Semester (2-0-0)
Prof. Kenji ITOH

III. Objectives

This class aims at obtaining knowledge and skills about basics of ergonomics/human factors

approaches and their applications to actual design of human-machine systems, work and organizations. Among various types of human functions with which people are working, we focus cognitive and mental processing rather than motor and muscular-skeletal functions. Contents covered in this class are largely divided into five categories: (1) Introduction to ergonomics, (2) Human cognition and perception, (3) Human-machine interaction and usability, (4) Human errors and risk management, and (5) Case studies applying ergonomic approaches.

IV. Contents

- Introduction to ergonomics
- Methods in ergonomics
- Steps applying ergonomic approaches
- Human information processing
- Human perception
- Human cognition and memory
- Human-machine systems and interfaces
- Usability engineering
- Cognitive work analysis
- Human error
- Human reliability analysis and risk management
- Safety culture/climate
- Case study: Risk management in healthcare
- Case study: Interface design of train cockpit

■Product Design and Human

Spring Semester (2-0-0)
Assoc. Prof. Hiroyuki UMEMURO

Objective

The purpose of this course is to explore the possibilities in product design which incorporate the various viewpoints of human users. Subjects include field study of users daily activities, usability engineering, funology, aesthetics, and final design proposal.

Contents

- Field study: observe your users
- Usability engineering
- Universal design
- Funology
- Aesthetics and Technology
- Design workshop
- Design proposal

■Business in the Net-Society

Autumn Semester(2-0-0) Even year: in Japanese, Odd year: in English
Assoc.Prof.Dai SENOO

Ⅰ. Objective

Technology plays a critical role for organizations to adapt themselves to the net society where the speed and scale of organizational competition have significantly increased. In this class, organizations' various ways to cope with the net society will be discussed.

Ⅱ. Contents

- Business creation by using IT
- Organizational restructuring by using IT
- Virtual organization and virtual team
- Basic concept of E-commerce (real vs. virtual commerce)
- Success factors of E-commerce (existing factors and problems)
- Analysis of success and failure (case study)