

**Pre-requisites:**

No requirement; This lecture is open mainly for students from overseas. But Japanese students are much welcome.

**Course Objectives:**

This lecture is served not only for understanding the traditional theories but also for reconsiderations of current microeconomics in view of evolutionary economics and moral science.

**Course Overview:**

This lecture firstly gives the overview of current microeconomics, and then gives some critical assessments in view of evolutionary economics and complex sciences.

**Course Details:**

1. Overview of current microeconomics
2. Coordination and conflicts in game theory
3. Market mechanism and the AI market system
4. Futures market in Tokyo Stock Exchange
5. Traditional utility theory and general equilibrium
6. The laws of Demand: Household demands among different households
7. Alternative utility theories for heterogeneous interaction
8. Linear Production theories
9. Complex adaptive behaviors in von Neumann economic system
10. Market mechanism by genetic algorithm (classifier)
11. Evolutionary games
12. Increasing returns and path dependency: Polya's urn process
13. Stackelberg equilibrium in view of a dynamic game
14. Nature and society in complex network system
15. Market and society in the 21st economic system

**Evaluation:**

- Two ways for grade the credit:
1. Do a paper on the given subjects.
  2. Days attended

**Textbooks:**

Yuji Aruka, Complexities of Production and Interacting Human Behaviour, Physica Verlag Heidelberg (Springer Heidelberg), 2011.  
Klaus Mainzer, Thinking in Complexity: The Computational dynamics of Matter, Mind, and Mankind, Fifth ed., Springer, Berlin/Heidelberg/New York, 2007

**Other Mentions:**

Microeconomics I and Microeconomics II are virtually the same lecture. These different lectures are arranged for convenience of exchange students.

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**Course Overview:**

This lecture firstly gives the overview of current microeconomics, and then gives some critical assessments in view of evolutionary economics and complex sciences.

**Course Details:**

1. Overview of current microeconomics
2. Coordination and conflicts in game theory
3. Market mechanism and the AI market system
4. Futures market in Tokyo Stock Exchange
5. Traditional utility theory and general equilibrium
6. Household demands among different households
7. Alternative utility theories for heterogeneous interaction
8. Linear Production theories
9. Complex adaptive behaviors in von Neumann economic system
10. Market mechanism by genetic algorithm (classifier)
11. Evolutionary games
12. Nature and society in complex network system
13. Philosophy of complex thinking and ethics

**Evaluation:**

Two ways for grade the credit:

1. Do a paper on the given subjects.
2. Days attended

**Textbooks:**

Yuji Aruka, Complexities of Production and Interacting Human Behaviour, Physica Verlag Heidelberg (Springer Heidelberg), 2011.  
Klaus Mainzer, Thinking in Complexity: The Computational dynamics of Matter, Mind, and Mankind, Fifth ed., Springer, Berlin/Heidelberg/New York, 2007

**Other Mentions:**

**Pre-requisites:**

No requirement; This lecture is open mainly for students from overseas. But Japanese students are much welcome.

**Course Objectives:**

This lecture is served for reconsiderations of the current socio-economic crisis in view of evolutionary and institutional aspects.

**Course Overview:**

The present world indeed is fulfilled with many such serious crises as environmental crises, the collapse of transportation systems, as well as financial and social crises such as poverty, social conflicts or wars. Complexity then is one of the key features for understanding the modern world with volatile, fluctuating, and disruptive phases, many of which might give rise to crises in the above, in particular, socio-economic systems: unstable and dangerous situations that are characterized by abrupt and large-scale changes. In the recent studies, similar common phases are often found in many different fields between society and nature: business, marketing, finance, economy, innovation, urban/traffic system, artificial/web intelligence, human behaviour/population/epidemics, biology, physics and so on. Analysing these issues and integrating such insights could contribute to discover any useful mean for managing such a crisis.

**Course Details:**

The coordinators will arrange the prominent lecturers inside and outside university to argue and discuss these issues in order to solve our pressing problems. The lectures currently depends on the lecturers' ongoing studies. So it is better for students to know how the last lectures has been accomplished. (Almost the same lecturers will be arranged also in this academic year.)

The lecture subjects of the last year:

1. Guidance by Prof. Yuji Aruka
2. Statistical Aspects of Complex Systems by Prof. Mitsugu Matsushita, Dept. of Physics, Chuo University
3. Introduction to Evolutionary Linguistics by Prof. Takashi Hashimoto, School of Knowledge Science, Japan Advanced Institute of Science and Technology
4. Modeling of Language Evolution by Prof. Takashi Hashimoto, School of Knowledge Science, Japan Advanced Institute of Science and Technology
5. Experimental Methods for social Science Research, Prof. Bertrand Roehner (University of Paris)
6. Testing Randomness by Means of RMT Formula by Prof. Mieko Tanaka, Information and Knowledge Engineering, Tottori University
7. How Continuous and Mixed Strategies Enhance Network Reciprocity I by Prof. Jun Tanimoto, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University
8. How Continuous and Mixed Strategies Enhance Network Reciprocity II by Prof. Jun Tanimoto, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University
9. Strategy Switching in the Japanese Stock Market by Dr. Ryuchi Yamanoto, Dept. International Business, National Chengchi University
10. Econophysics by Prof. Hideaki Aoyama, Dept. Physics, Kyoto University
11. Why Do the rich Get Richer? by Prof. Mitsuo Kono, Faculty of Policy Studies, Chuo University
12. Social dilemmas and Evolutionary games: Avatars Game, by Prof. Eizo Akiyama, Graduate School of Systems and Information Engineering, Tsukuba University
13. Social dilemmas and Evolutionary games: Reciprocities and other games, by Prof. Eizo Akiyama, Graduate School of Systems and Information Engineering, Tsukuba University
14. Transformation and Evolution of the Japanese Corporate System by Prof. Akira Isogai Kyushu University
15. Distributions and Fluctuations in Economic Phenomena by Prof. Yoshihisa Fujiwara, Graduate School of Simulation Studies, Hyogo University
16. Chained Financial Failures at Nation-wide Scale in Japan by Prof. Yoshihisa Fujiwara, Graduate School of Simulation Studies, Hyogo University

**Evaluation:**

Two ways for grade the credit:

1. Do a paper on the given subjects.
2. Days attended

**Textbooks:**

**Other Mentions:**

**Pre-requisites:**

No requirement; This lecture is open mainly for students from overseas. But Japanese students are much welcome.

**Course Objectives:**

We use a platform called U-Mart system in order to study Artificial Intelligent Market. First of all, we should state our U-Mar project. Originally in 1998 U-Mart Project started as V-Mart(Virtual Mart). Now it however becomes called Unreal Market as an Artificial Research Test-bed. The U-Mart Project has published an English textbook (Shiozawa et. al. 2008) as one of Springer Series on Agent Based Social Systems in Spring 2008. The development of the U-Mart system during these 10 years rather was mainly engineers-driven. Now the U-Mart system is internationally recognized as a good platform for AI markets;

Our U-Mart Lectures consists of two parts: one is this class. The other is the class for experiment, or training program. Both lectures normally are integrated into a single aims and scope of U-Mart lectures. So you are recommended to join into both classes of Artificial Intelligent Economics and Artificial Intelligent Market Experiment.

**Course Overview:**

The U-Mart System is an artificial intelligent market system to implement a virtual futures market with reference to the actual stock price index arbitrarily chosen, by the use of agent-based simulation techniques. This system, mutatis mutandis, contains, contains a spot market trading as a special case. It is also noteworthy to point out two outstanding features of the U-Mart system. First of all, any agent, either machine or human, does not presume a certain personal rational demand function in advance. Secondly, this system adopts a hybrid approach in a sense that a human agent can always join in the machine agent gaming setting. The latter is a technological feature, a new network innovation of artificial intelligent market system. The former is featured by an alternative approach to the neoclassical method.

**Course Details:**

This class will refer to the theories of the market mechanism or auction of the financial market. In particular, U-Mart simulator imitates Tokyo Stock Exchange (TSE). We will learn two methods of dealing: Itayose (Batch Auction) and Zaraba (Continuous Double Auciton). the institutional settings in TSE is also expositied. Moreover, you will learn the agent based simulation in general on which the U-Mart simulator is based.

**Evaluation:**

- Two ways for grade the credit:
1. Do a paper on the given subjects.
  2. Days attended

**Textbooks:**

Series: Springer Series on Agent Based Social Systems , Vol. 4  
Shiozawa, Y., Nakajima, Y., Matsui, H., Koyama, Y., Taniguchi, K., Hashimoto, F.2008, XVI, 161 p. 83 illus., 5 in color. With CD-ROM., Hardcover  
ISBN: 978-4-431-76822-7

**Other Mentions:**

This class is given in association with the lecture titled Artificial Intelligent market Experiment.

**Pre-requisites:**

No requirement; This lecture is open mainly for students from overseas. But Japanese students are much welcome.

**Course Objectives:**

We use a platform called U-Mart system in order to study Artificial Intelligent Market. Since our U-Mar project started in 1998, we have the history of over ten years, and several international developments, in particular, published an English textbook (Shiozawa et. al. 2008) as one of Springer Series on Agent Based Social Systems. Now the U-Mart system is internationally recognized as a good platform for AI markets;

Our U-Mart Lectures consists of two parts: one is this class. The other is the class for Artificial Intelligent Economics to understand the theories and institutions of the financial market auction. Both lectures normally are integrated into a single aims and scope of U-Mart lectures. So you are recommended to join into both classes of Artificial Intelligent Economics and Artificial Intelligent Market Experiment.

**Course Overview:**

The U-Mart System is an artificial intelligent market system to implement a virtual futures market with reference to the actual stock price index arbitrarily chosen, by the use of agent-based simulation techniques. In our experiments, we will have none only the training program for dealings as a human agent in the futures market but also for making a machine agent by JAVA programming. Our program is quit rudimentary only for beginners. . So we encourage you to join in our classes.

**Course Details:**

1. The introductory lessons for training market trades as a human agent
2. The network experiments for human trading
3. The introductory lessons for JAVA programming for making a machine agent
4. The network experiments for machine agents

**Evaluation:**

Two ways for grade the credit:

1. Do a paper on the given subjects.
2. Days attended

**Textbooks:**

Series: Springer Series on Agent Based Social Systems , Vol. 4

Shiozawa, Y., Nakajima, Y., Matsui, H., Koyama, Y., Taniguchi, K., Hashimoto, F.2008, XVI, 161 p. 83 illus., 5 in color. With CD-ROM., Hardcover

ISBN: 978-4-431-76822-7

**Other Mentions:**

This class is given in association with the lecture titled "Artificial Intelligent Economics" to understand the theories and institutions of the financial auction mechanism like Tokyo Stock Exchange.

**Pre-requisites:**

No requirement; This lecture is open mainly for students from overseas. But Japanese students are much welcome.

**Course Objectives:**

We aims at understandings on "services" as decisive factor in the modern mode of production. We have several newly added modern features on our society and economic system. One feature is that our society is dominated by Information and Communication Technologies (ICT). In ICT filed, it is needless to say that the idea of "service" is decisively important. Another is that the service class is newly emerging. The new class is also getting powers to the new society. These points of view will suggest a new science, a new service innovation, and also provide you with a new idea of social system design. See the URL of Service research and Innovation Institute (for Deriving Innovation for IT Enabled Services).

**Course Overview:**

Service Science is a new field developed by the initiative of IBM since 2004, in particular, Almaden Research Center. Now many universities and institutions created the programs specialized for this filed. This is a study of business methods to create and capture value, technology tools to reengineer processes and organizational culture to motivate and align people, and their collective impact on evolution of effectiveness and efficiency in the performance of services. Incidentally, we invite active (or former) senior researchers from IBM Tokyo Research Laboratory and eminent professors from universities (University of Tokyo, or Tokyo Institute of Technology, for example), who are committed to studying service sciences.

**Course Details:**

The class plan will be arranged in the following manner:

1. What is Service Science?
2. Analysing the main characteristics of the economy of service providing activities by econo-socio physics
3. Analysing the economy by artificial intelligence or multi-agent based approach
4. The sightseeing industry in view of service science

**Evaluation:**

Two ways for grade the credit:

1. Do a paper on the given subjects.
2. Days attended

**Textbooks:**

**Other Mentions:**