

◆ Department of Human System Science (プログラム名)

1. Program Outline (プログラム概要)

Department of Human System Science contributes to develop a new scientific technology by amalgamating humanity into scientific technology. The department intends to create a new interdisciplinary academic field based on cultural/social science and natural science/engineering, such as psychology, pedagogy, physiology, language science, cognitive science, human science, educational technology, bioengineering, method development and system development. We harmonize strictness of methodology in natural science/engineering and fertile ideas of problem solving in cultural/social science. The department produces talented graduates who have wide point of view and practical ability for problem resolving.

2. Course Outlines and Faculty (コース概要及び学習目標)

Department of Human System Science educates students from the field of science and technology to cultural and social science. The aims of the program are 1) understanding scientific experimental way for the research of various human characteristics and educational evaluation, 2) developing ability to take advantage of information processing materials which are essential for data analysis and developing aiding system, and 3) developing ability to design and execute educational program. For these aims, we provide core curriculum, which include many seminars, practices, and experiments. We also provide optional curriculum for our students to acquire knowledge and techniques for the special area.

3. Guide to Study in Human System Science Program (学習内容)

The candidate in the department learns as follows to meet the objectives of the course outlines.

(A) The candidate acquires the human power and the communication power through the colloquiums.

(B) The candidate acquires the abilities necessary to perform creative researches, to develop and deploy its application, and to pursuit the scientific truth.

4. Graduation Requirements (修了要件)

【Doctoral degree】

For a Doctoral degree a doctoral candidate must satisfy the following requirements:

- (1) Colloquium in each term must be taken.
- (2) The level of a foreign language of the candidate must reach the grading criterion, which is given by the department.
- (3) The candidate must submit the doctoral thesis. It must be consist of outcomes of the candidate's own research, which contains the planning, evaluation, and improving of a research processes of a specific research area.
- (4) The candidate must have at least one activity outside the institute (e.g. presentation in an international conference, having a publication on international journal).
- (5) The candidate must complete and submit a thesis for the degree, and take the intermediate examination, the preliminary examination, the final examination and evaluation of his/her thesis.

4. Tables of Course Subjects

No.	Course	Credit	Instructor	Semester	Notes
65056	Introductory Cognitive Psychology	2-0-0	YAMAGISHI	Spring	
65060	Presentation Skills	1-1-0	*MATSUMOTO MAYEKAWA	Spring	*part-time Instructor
65061	Introduction to Brain Science and fMRI	1-0-0	AKAMA	Autumn	
65066	Introduction to Bayesian Statistics	1-0-0	MAYEKAWA	Spring	
65067	Computational Brain Science and Complex Networks with Matlab (SPM)	0-2-0	WAKITA AKAMA	Spring	
65076	Web-based Learning System	2-0-0	MUROTA	Autumn	Odd year : in English Even year : in Japanese
65077	Members of the European Parliament Special Internship for Tokyo Tech Students(MEP)	1-0-1	NOHARA	Spring	Cancelled, 2016
65078	Technology, Environment and Society	1-1-0	HOPE NOHARA	Spring	Cancelled, 2016
65801	©Colloquium in Human System Science V	2	Academic Advisor	Spring	Doctoral Program
65802	©Colloquium in Human System Science VI	2	〃	Autumn	Doctoral Program
65803	©Colloquium in Human System Science VII	2	〃	Spring	Doctoral Program
65804	©Colloquium in Human System Science VIII	2	〃	Autumn	Doctoral Program
65805	©Colloquium in Human System Science IX	2	〃	Spring	Doctoral Program
65806	©Colloquium in Human System Science X	2	〃	Autumn	Doctoral Program
70020	Rural Telecommunications	2-0-0	TAKADA AOYAGI	Autumn	Department of International Development Engineering

© : mandatory subject

5. Syllabus of Course Subjects

65056

Introductory Cognitive Psychology

Spring Semester (2-0-0)

Assoc. Prof. Kimihiko YAMAGISHI

I. Objective

This lecture covers basics of cognitive psychology, with emphasis on memory, learning, reasoning, and decision making.

As an introductory course, familiarity with experimental psychology is not necessary prior to registration.

II. Content

Week 1-6: Structure and function of Memory

Week 7: Essay Quiz 1

Week 8-14: Higher-order cognition and development

Week 15: Essay Quiz 2

III. Grading: There will be two quiz sessions, and the evaluation reflects the quality of quiz answers.

Textbook Reference: Books by Kathleen Galotti or Robert Solso bearing “cognitive psychology” in their titles would be helpful. They are not required readings, and the lectures design assumes the necessity of no textbook.

Conditions: Registration for the course requires no prerequisites.

Comments from lecturer: English is the language of instruction.

Students should master written and oral English at the level of 60-64 score in Internet-Based TOEFL.

65076

Web-based Learning System

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

Prof. Masao MUROTA

I. Objective

First part of this course includes the essence of the Internet protocols and technologies as a basic knowledge of Web-based learning system. Then this course introduces basic and advanced technologies and learning theories for a Web-based learning system. I will explore network protocols, fundamental application protocols, and guidelines to develop effective multimedia contents based on learning theory.

II. Contents

1: Introduction

2: Introduction to the Internet

3: Network Layer

4: Transport Layer

5: Domain Name System

6: E-mail System

7: World Wide Web

8: Web Interaction Technologies (1): CGI, Cookie

9: Web Interaction Technologies (2): Ajax, DOM

10: Web Interaction Technologies (3): HTML5

11: Guidelines for effective e-Learning contents (1)

12: Guidelines for effective e-Learning contents (2)

13: Guidelines for effective e-Learning contents (3)

14: Advanced e-Learning (1)

15: Advanced e-Learning (2)

Note: Fundamental knowledge on computer system and programming language of Perl, JavaScript, and HTML is recommended, but not mandatory.

65066

Introduction to Bayesian Statistics

Spring Semester (1-0-0)

Prof. Shinichi MAYEKAWA

I. Objective

Starting from mathematical presentation such as probability distribution, linear algebras, we will study the theory of Bayes and its extension, natural conjugate distribution, hierarchical Bayes, numerical resolution such as MCMC, other logit profit models and Bayesian network.

The credit of this course can be used to complete the International Human Economic Science Special Course that commenced in April 2009.

65061

Introduction to Brain Science and fMRI

Autumn Semester, Intensive Course (1-0-0)

Assoc. Prof. Hiroyuki AKAMA

I. Objectives

As a new functional magnetic resonance imaging (fMRI) environment will be established in Tokyo Tech, this subject provides skills in neuroimaging data acquisition and analysis using the fMRI scanner (Signa HDxt 3.0T, GE Healthcare) in the O-okayama campus. In the control room of the fMRI laboratory, students will get the basic knowledge about the cognitive brain science from a guest lecturer, fMRI specialist who will be invited from abroad.

II. Contents

1. Basic concepts of brain science
2. }
3. } Neurological techniques for brain science (TBA)
4. }
5. }
6. } Advanced themes (TBA)
7. }

III. Comments

Attention: This course is subject to further revisions.

Feel free to contact Prof. Akama (akama@dp.hum.titech.ac.jp)

65067

Computational Brain Science and Complex Networks with Matlab (SPM)

Spring Semester (0-2-0)

Assoc. Prof. Ken WAKITA, Assoc. Prof. Hiroyuki AKAMA, and others

I. Objectives

Matlab is a high-level programming language which provides us effective computational methods with matrices and vectors as well as fantastic tools of image analysis and visualization. This has made this software package very useful for the sciences of complex networks as well as the neural sciences targeting the most important example of complex networks, the brain of an animal. Especially Matlab is considered as crucial for the fMRI (functional magnetic resonance imaging) studies that we are now expecting to enhance at Tokyo Tech all the more because the Graduate School Decision Science and Technology has installed an fMRI scanner (Signa HDxt 3.0T, GE Healthcare) in the O-okayama campus. This course provides trainings for Matlab, using the GSIC Educational System and the Tsubame II Grid Cluster, so that students can develop essential knowledge for analyzing human networks, neural networks and finally fMRI brain image data with SPM (statistical parametric mapping), Matlab based package offering plenty of neuroimaging techniques. Students will also learn in the fMRI laboratory the basic literacy of fMRI experiment based on the introductory skills of Matlab programming.

II. Contents

1. Computer literacy and Matlab
 - (1) Procedures for obtaining a Tsubame II account and introduction to Tsubame II literacy
 - (2) File manipulation techniques
 - (3) Basic operations with Matlab
 - (4) Computation of data matrices with Matlab
 - (5) Complex networks with Matlab
2. fMRI with Matlab (SPM)
 - (1) Installation of SPM and basic usage
 - (2) fMRI literacy: experiment design
 - (3) fMRI literacy: stimulus and trigger signals
 - (4) fMRI literacy: experiment
 - (5) fMRI literacy: data analysis

III. Comments

Attention: This course is subject to further revisions.

This lecture course will be held in one of the Practical Rooms in the Global Scientific Information and Computing Center (GSIC) (3rd floor) and the fMRI laboratory of the Graduate School of Decision Science and Technology. The access information can be found at the following URLs.

<http://www.gsic.titech.ac.jp/contents/campusmap.html.ja>

<http://www.gsic.titech.ac.jp/contents/campusmap.html.en>

No special knowledge about Matlab is required.

Please feel free to contact Prof. Wakita (wakita@is.titech.ac.jp)

70020

Rural Telecommunications

Autumn Semester (2-0-0)

Prof. Jun-ichi TAKADA and Assoc. Prof. Takahiro AOYAGI

I. Objective

Information and communication technologies enable the transfer of information instantly between any points in the world. Moreover, it has become common understanding that the ICT infrastructure is indispensable for the development of the industry and economy. However, the reality is very severe in the developing world, especially in rural and remote areas. Imbalance of the distribution of ICT infrastructure in the world has been intolerable for the long time. This lecture overviews the history, technologies and applications of ICT infrastructure in rural and remote areas, both in the social and the technical aspects.

65060

Presentation Skills

Autumn Semester (1-1-0)

Prof. Kahoko MATSUMOTO and Prof. Shin-ichi MAYEKAWA

I. Objective

The objective of this course is to provide students some basic skills for making academic presentations in English using visual aids.

[Important]

Following the education reform in April 2016, in principle, new courses equivalent to those currently available will be offered.

Regarding the newly offered courses, please check the cross-reference table that will be available on Tokyo Tech's website at a later date.