

"Advanced Design and Technologies for Human Science" Syllabus

2019 Summer School, Department of Human Science

Date	Time	Professor	Topic	Contents
Sep-03	8:40-10:10	Remijn	1. Audiovisual Integration	We simultaneously process information from different senses (e.g., the eyes, the ears). We will look at some examples of how the brain accomplishes this and how we can qualitatively and quantitatively measure this.
	10:30-12:00	Maeda	2. Environmental Ergonomics	1) Human environment system, 2) Human physiological regulation system to various environments, 3) Introduction of some studies for environmental adaptability and lifestyle.
	13:00-14:30	Ito (Hiroyuki)	3. Visual Illusions	Our visual world is not a copy of the physical world. Through a lot of visual illusions, we can learn how our brain works to construct the visual world that is virtually corresponding to the physical world. What these illusions imply is the main topic of this lecture.
Sep-04	8:40-10:10	Nakajima	4. Sounds of English	The student will learn how and with what kind of sounds English syllables are constructed. Multivariate analysis of spectral change of English speech leads to a subspace with a dimension indicating how likely each sound is to be or to be adjacent to a syllable nucleus. A possibility to connect English phonology and auditory psychology will be discussed.
	10:30-12:00	Maruyama	5. Bayesian inference	Bayesian inference is a method of statistical inference in which Bayes' theorem is used to update a probability distribution for hypotheses from a current probability distribution. We will learn the usefulness of the Bayesian inference through examples.
Sep-05	8:40-10:10	Ueda	6. Speech Analysis and Synthesis: How Can We Perceive Degraded Speech?	One of the characteristic aspects of speech is that it is extremely robust against various distortions and loss of information. It has been revealed that we can perceive speech with only a small number of channels, which transmit just power fluctuations. We will explore how these channels can be connected with basic functions of the auditory periphery.
	10:30-12:00	Muraki	7. Ergonomics for all Ages and Abilities	1) The fact of the super-aging society in Japan, 2) Social changes by population aging, 3) Importance of assisting devices and barrier-free environment in homes, 4) Design problems in the living environment and equipment for the elderly, 5) Examples of designs for the living environment and equipment for the elderly.
Sep-06	8:40-10:10	Hiramatsu	8. Evolution and diversity of color vision	Diversity is the fundamental aspect of organisms and color vision is not the exception. In this lecture, we will explore the evolutionary processes that have shaped primate color vision and how it is diverse in humans.
	10:30-12:00	Sunaga	9. Measurement of Color	1. What is color? 2. How can we describe color?
Sep-09	8:40-10:10	Ito (Hiroshi)	10. An Introduction to Biological Rhythms	The topic of this lecture is oscillatory phenomena in nature. We will see examples of biological rhythms; circadian rhythms, flashing of fireflies, heart beating, neural firing, and so on. In particular, we will focus on synchronization of oscillators from a mathematical point of view.
	10:30-12:00	Seno	11. What is Vection?	In this lecture, visually induced self-motion perception (vection) will be fully explained. A lot of important studies of vection will be introduced.
Sep-10	8:40-10:10	Takagi	12. Interactive Evolutionary Computation	Following a basic introduction of fuzzy systems, neural networks, and evolutionary computation (EC), we learn of EC's applications, interactive EC (IEC), which optimizes a target system based on human subjective evaluations. Through many IEC applications in a wide variety of areas, we learn its wide applicability and consider how to apply IEC to our research. Slides and a tutorial paper can be downloaded at http://www.design.kyushu-u.ac.jp/~takagi/
	10:30-12:00	Loh	13. Assistive Technology and Science for Life Activity	1. This course introduces the usage of assistive technology (AT) and the science in relation to life activity. 2. Focuses on multi-disciplinary perspectives in AT such as ergonomics, rehabilitation, etc.
Sep-11	10:30-12:00	Participants	14-15. Presentations of Field of Study and Lab Work	All participants are required to make a short presentation about their field of study and topic of research at their home university, as well as a short overview of their lab work during the Summer School. Students already enrolled in the Human Science course are required to give a presentation about their field of study and write a report on the "Advanced Design and Technologies for Human Science" lecture course and how it relates to their research (>1000 words English).
	13:00-16:00			