

Outline of 2012 Ochanomizu Summer Program

Theme II: Science on Form and Color

Period: July 23 (Mon) – 27 (Fri), 2012

Venue: Ochanomizu University (Otsuka, Bunkyo-ku, Tokyo)

Teaching staff: Dr. Tetsuyuki KOBAYASHI, Professor
Dr. Yoshihito MORI, Associate Professor
Dr. Kei YURA, Professor
Dr. Masahiro MORIKAWA, Professor
Dr. Takayuki ITO, Professor
Dr. Rumi KONDO, Lecturer
Dr. Masayuki HATTA, Associate Professor
Dr. Toshihiro KONDO, Professor

* Lecture capacity for Theme II : 30 eligible students

** If there are more than 30 eligible applicants, they may be subject to a selection process.

Program Summary

Nature is filled with structurally diverse or differently-colored substances and living creatures. The physical nature of form (structure or assembly) and color is figured out by the sciences, especially mathematics, physics, chemistry, biology and information science. The lectures examine and explain the science on form and color, and are given in English by teaching staff in the Faculty of Science. Each lecturer will present, in simple terms, the latest areas of interest in their own field of expertise. This will ensure an overall comprehensive approach.

Schedule

Date	Period 1 & 2 (9:00~10:30)	Period 3 & 4 (10:40~12:10)	Period 5 & 6 (13:20~14:50)	Period 7 & 8 (15:00~16:30)
July 23 (Mon)			Tetsuyuki Kobayashi	
24 (Tue)	Yoshihito Mori		Kei Yura	
25 (Wed)	Masahiro Morikawa		Takayuki Ito	
26 (Thu)	Rumi Kondo		Masayuki Hatta	
27 (Fri)	Toshihiro Kondo			

Lecture Summary

“Molecular structures are determined from their weights”

Lecturer: Tetsuyuki Kobayashi

Living organisms consist of a variety of biological molecules and life phenomena are based on their integrated, well-ordered interactions. An individual biomolecule has a unique structure and can be distinguished in the complex biological mixture by precise determination of its weight. This lecture gives a brief overview of general principle of mass spectrometry followed by the practical application in basic medicine.

“Time Evolution”

Lecturer: Yoshihito Mori

We can see many types of time evolutions. They are, diffusion of a droplet, increase of microorganism population, proceeding of a chemical reaction and so on. I talk about those with graphical presentation.

“Protein Structure: From its folding through static and dynamic structure”

Lecturer: Kei Yura

Protein plays a major role as an element in forming structure of organisms. Protein is a single chain molecule and its blueprint is encrypted in DNA. Recent studies in computational and molecular biology unveiled how information in DNA converted into a structure of protein and how proteins perform function in a cell. This lecture gives a brief overview of the information flow and mechanisms of protein function through its structure

“Cosmic structures”

Lecturer: Masahiro Morikawa

Variety of recent telescopes and satellites has explored very deep inside the universe and have revealed extraordinary structures completely unexpected before. Active observational research brings plenty of unsolved problems in front of us. In this lecture, we will have informal discussions on these problems of interesting structures in the universe.

“Shapes and Colors Represented by Computers”

Lecturer: Takayuki Ito

Computer graphics is a technology that calculates and displays shapes and colors of objects and scenes. The former part of this lecture briefly introduces fundamental techniques of computer graphics which has been applied to computer games and animation, and industrial designs. The latter part of this lecture introduces “information visualization” which represents daily information by extended techniques of computer graphics.

“How do our shape and color change?”

Lecturer: Rumi Kondo

Organisms on earth possess various morphological traits. Our own face has its individual characteristics. What is behind this remarkable diversity of organism morphology? We will look into genomic variation and evolution and discuss how it may link to changes in morphological traits.

” Axes and Symmetries in Animal Body Plans”

Lecturer: Masayuki Hatta

Diverse animals are derived from a single ancestor in evolution. This fact suggests that various animal forms are all derivative and that a common ancestral body plan should be hidden in their morphological diversity. What is the principle of animal form, the body plan ? Animals are moving organisms in the planet Earth. This condition has given the axis and symmetry to animal forms. We try to extract the simple principle of animal body plan from diverse animal morphogenesis by focusing on the axis and symmetry.

“Nanoworld: Shape and Color of Atoms”

Lecturer: Toshihiro Kondo

Contents: "Nano" world means very very small one, namely world of atoms and/or molecules. How do you think that atoms and molecules have shape and colors? In this lecture, "nanoworld" is briefly explained as a first, simple experiments about atoms and molecules are carried out by several groups, and then, those results and shape and color of atoms and/or molecules are discussed.