The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2017
Course Outline
CUSA2023 Introduction to Bionics
仿生學淺談

Introduction:

Bionics is the branch of science dedicated to the studying of the characteristics, structure or functions of bio-systems for innovations in developing new technology, it is also known as "Biomimicry" or "Biomimetics". Since 1960s, bionics has developed quickly and applied widely in various fields of science and technology. This course aims to introduce to the students the methodology and major applications of bionics. Students will also gain hands-on experience through participating in laboratory activities and in the group projects.

仿生學又稱為「模擬生物學」或「生物模仿學」，是一門研究生物系統的特質、結構及功能原理的科學，主要用以研發各種新機械及創新科技。自六十年代開始，仿生學的迅速發展使其在各個科學及技術範疇中普及。本課程旨在介紹仿生學的原理及仿生學在各方面的應用，學生將從各個實驗課及活動，親身了解仿生學的基本原理。

Course Content:
Lecture / Tutorial Topics:
1. Biology + Electronics = bionics: the story of the "Six Million Dollar Man";
2. Biomaterials science and application of bionics in architecture;
3. The secret of flying: how animals and plants apply fluid dynamics;
4. Use of sound by animals and how human beings learn from the insight;
5. The contributions of Bionics in medical sciences; and
6. Bionics: from past to future.

Laboratory Work:
1. Surface structure and dynamic friction;
2. Relationship between the number of setae in Gecko foot & its holding force;
3. The Lotus Effect;
4. The swimming olympiad; and
5. How to build stronger bones?

Group Project:
1. Practice flying with a Pterosaur model (homework);
2. Designing the best glider plane.

Medium of Instruction: Cantonese supplemented with English

Organising Unit: Biology Programme, School of Life Sciences, CUHK

Teacher: Dr. Chung Kwok Cheong
Biology Programme, School of Life Sciences, CUHK
Rm. EG01D, Science Centre, CUHK
Tel: 3943-6169, Email: kcchung@cuhk.edu.hk

Course content:

5 August 2017 (Saturday)	**Lecture:** • Introduction: history, methodology and scope of Bionics • Application of Bionics: structures / materials / architecture **Activities:** • Surface structure and dynamic friction • Relationship between the number of setae in Gecko foot & its holding force • The Lotus Effect
12 August 2017 (Saturday)	**Lecture:** • Principle of animal flight & fluid dynamics • Use of sound by animals • Application of Bionics: art / energy / management **Activities:** • Fog harvesting competition • The Swimming Olympiad • Find out the golden ratio: Constructing the "Golden Section Gauge"
19 August 2017 (Saturday)	**Lecture:** • Application of Bionics: medicine / health **Activities:** • How to build stronger bones? • Designing the best glider plane • Glider plane competition
26 August 2017* (Saturday)	Make up Class

Duration	3 whole day sessions (total 21 contact hours)
Date	5, 12, 19 August 2017 26 August 2017* (make up class)
Time	9:30am – 5:30pm (with 1 hour lunch break)
Venue	The Chinese University of Hong Kong
Enrollment	25
Expected applicants	S2 – S3 students
Tuition Fee	HKD 2,900.00
Credit	1.5 Academy Unit Certificates or letters of completion will be awarded to students upon completion.

* This date is reserved for make-up classes in case there is any cancellation of classes due to bad weather or other factors.