



PKU ENGINEERING PRESENTS

2015 GLOBEX JULMESTER @

PEKING UNIVERSITY, BEIJING CHINA



WELCOME TO CHINA & GLOBEX FAMILY



Program Intro & Benefit

The Globex julmester aims to promote international academic exchange in engineering education. It is designed to provide students with a study-abroad experience by allowing them to take 1-2 courses over a period of about 3 weeks in July and getting 3-6 university credits. The program consists of a suite of English-language based classes linking PKU Engineering to a broad range of leading engineering colleges around the world.

Class Start-End Dates & Flight Routes

- First day of class: Monday, July 6, 2015 and last day of class: Friday, July 24, 2015.
- Final exams are scheduled for Saturday, July 25, 2015.
- You can arrive in BJ as early as July 1st and stay on until July 31st (1 month stay).
- You can visit Shanghai or Guangzhou at the end of the program by taking a bullet train from BJ and depart for home directly from SH or GZ without having to return to BJ. Please ensure your airticket reflects this routing.

Pre-Globex Orientation: BJ City Tour (July 3-5, 2015): USD 130

- The 3-day BJ city tour is optional and scheduled for July 3-5, 2015.
- Itinerary: Great Wall, Tiananmen Square, Forbidden City, Summer Palace, Wangfujin, Beihai, Bird's Nest, Water Cube, Temple of Heaven, Hutong Tour, 798 Art District.

Field Trip: A - USD 80, B - USD 600 & C - No Charge

- Trip A: China Economy: 3 Beijing Company Visits, 8 AM-1 PM, Wed: July 8, 15 & 22
- Trip B: China Past and Present: Xi'an (Terracotta, Shaanxi Museum, City Wall), Luoyang (Shaolin Temple, Longmen Grottoes), and Zhengzhou (The Yellow River). DEP: July 26th; RET: Jul 30th.
- Students who register only for the above class but not for the field trip will be awarded 2 credits. Conversely, students who do not register for the class but would like to join the field trip will NOT be given any course credits.
- Trip C: Cross-Cultural Design for an Eco-Responsible Business Model: Travel to Yichang (DEP: Jul 7 and RET: Jul 14). All trip expenses will be paid for by the sponsor.

Application & Contact info

- To apply for the program, you can submit your application online to the following:
- Globex Website: <http://en.coe.pku.edu.cn/globex/index.htm> (path: PKU => COE => Globex)
 - Application Deadline: **April 30, 2015**
 - Email: pkuglobex@163.com (Daisy or Jingjing)

Estimated Cost of Attendance for 1 month stay (Jul 1-31, 2015) in Beijing

Item	Cost USD (CNY)	Description
Accommodation	575 (3565)	<ul style="list-style-type: none"> • CNY 115/day X 31 days; double or triple occupancy @ Beijing Post & Telecom Conference Center located near PKU. • Pro-rate your accommodation if you stay less than 31 days.
Meals	310 (1920)	<ul style="list-style-type: none"> • CNY 60/day X 32 days (meals at PKU cafeterias). • Pro-rate your meals if you stay less than 32 days.
Public Transport	80 (500)	Taxi, bus and subway
Miscellaneous	100 (625)	Recommended minimum
SUB-TOTAL	1065 (6610)	Expenses may vary significantly from student to student
BJ Tours	130 (806)	A 3-day Beijing city tour scheduled from July 3-5, 2015
Field Trip	80 & 600 (500-3720)	<ul style="list-style-type: none"> • Trip A: 3 Beijing Company Visits (USD 80). • Trip B: Xi'an, Luoyang and Zhengzhou (USD 600). • Trip C: Yichang, Hubei (free for registered students).
Internet Access	20-50 (120-300)	<ul style="list-style-type: none"> • CNY 120 for 1-month PKU on-campus WIFI access. • CNY 300 for 1-month Beijing City-wide 4G access.
Globex Tuition	0-2000 (0-12,400)	<ul style="list-style-type: none"> • Full Waiver (you may still need to pay tuition to your school) • Partial Subsidy • Full Cost Recovery
TOTAL	≈1300-3900 (8000-24000)	<ul style="list-style-type: none"> • All expenses are estimates; your actual cost may vary. • Airfare is not included. • The hotel accepts MasterCard & Visa credit cards.

*Average exchange rate is used in the currency conversion

2015 Globex Summer Course Matrix (all courses are 3 credits unless otherwise indicated)

Mo, Tu, Th, Fr	Mo, Tu, We, Th, Fr
8:00-10:30 AM (see Field Trip info) China Economy A (without Field Trip, 2 credits) China Economy (with Field Trip A, 3 credits)	8:00-11:00 AM Bioinformatics Smart Materials and Structures Speech and Audio Processing: Theory & Applications Cross-Cultural Design for an Eco-Responsible Business Model (Field Trip C, 4 credits)
2:00-4:30 PM (see Field Trip info) China Past & Present A (without Field Trip, 2 credits) China Past & Present (with Field Trip B, 3 credits)	2:00-5:00 PM Bio-Transport Phenomena Advanced Control Systems Neural Prosthetic Engineering Computational Multiphase Flows

Instructor & Course Abstract



China Economy A (without Field Trip A – 2 credits)
China Economy (with Field Trip A – 3 credits)

Professor Susan Mays, University of Texas Austin, Austin, USA

Suitable for All Levels of Engineering & Non-Engineering Students

This course addresses business and economic development in China, in global context. Through class time, case studies, and visits to companies and other organizations, the course examines key business sectors as well as trends in trade, foreign investment, ownership (i.e., public vs. private), finance, the workforce, and consumption. The class also considers challenges and opportunities in China in the areas of environment, energy, education, and healthcare. In all these topics, the course considers China's unique history, culture, and business context, as well as global partnerships and influences. The readings and case studies are by business leaders, scholars, and journalists.



China Past and Present A (without Field Trip B – 2 credits)
China Past and Present (with Field Trip B – 3 credits)

Professor David Sena, University of Texas Austin, Austin, USA

Suitable for All Levels of Engineering & Non-Engineering Students

Geographically, linguistically, ethnically, and economically, China today is a land of diversity, characterized by striking regional variations. Yet underlying this diversity is a shared cultural heritage: a unifying set of historical, literary, and artistic traditions, philosophical and religious ideas, political institutions, and a common writing system. This course introduces the study of Chinese society and culture through an examination of the cultural unities and diversities, continuities and discontinuities that comprise the historical development of Chinese civilization. The course begins with an overview of the land, language, and people of China. The second unit of the course leads students through a sketch of Chinese history from the prehistorical through the modern period, with an emphasis on the development of fundamental cultural features of Chinese civilization. Topics include philosophy and religion; cosmology and the life cycle; literature and arts; science, technology and medicine; power and authority; gender, ethnicity, and cultural identity. The third unit of the course focuses on contemporary China, examining recent developments in society and culture, the evolving Chinese economy, and China's changing role in an increasingly intertwined global environment.



Bio-Transport Phenomena

Professor Lidan You, University of Toronto, Toronto, Canada

Suitable for 3rd and 4th Year Engineering Students

The course introduces the physical factors governing the transport of momentum, heat and mass, and how they operate in biological systems. Students will learn how to quantify the transport of these quantities by using basic equations of fluid mechanics (mass conservation, Bernoulli, generalized Bernoulli) and of heat and mass transfer (convection-diffusion equation). The course covers examples such as gas exchange in lung, inter cellular signal transport in bone, blood flow in cardiovascular system, heat exchange in human body, and chemotransport and momentum transport in several in vitro experimental systems. Student will be assigned pertinent research papers on bio-transport and to present their understanding and analysis of the work done.



Bioinformatics

Professor Li Liao, University of Delaware, Newark, USA

Suitable for 3rd and 4th Year Engineering Students

Bioinformatics, as its name suggests, is to use informatics/computing approaches to solve biological problems. This course introduces basic concepts, methodologies, and tools in bioinformatics. The goals are 1) to pick up the concepts and vocabularies; 2) to become familiar with various bioinformatics resources (tools and databases); and most importantly, 3) to master basic algorithms and models. No prior knowledge of molecular biology is assumed; the course has a primer on molecular biology, covering some basic concepts, including: Central dogma of molecular biology; Cellular processes—transcription regulation, signaling transduction, metabolism, cell cycles; Genetics and Evolution; and Structures of proteins and RNA. We will also briefly introduce some major experimental technologies, including: Clone, PCR, DNA Sequencing, DNA chips (Microarray), Yeast 2 hybrid system, 2D gel and Mass Spec. These high throughput technologies enable studies of biological systems at an ever large scale, and the huge amount of data from experiments utilizing these technologies however present a grand challenge for interpretation – bioinformatics is thus emerged as a new discipline to meet the challenge. In its short history, bioinformatics has made great progresses towards answering important, fundamental questions in biology. From this course, students will learn some major computational methods and techniques, including: Dynamic programming; Pairwise and multiple sequence alignment; Phylogenetic tree reconstruction; Hidden Markov models; K-mean clustering.



Smart Materials and Structures

Professor Hani Naguib, University of Toronto, Toronto, Canada

Suitable for 3rd and 4th Year Engineering Students

Smart materials are a novel class of materials characterized by new and unique properties that can be altered in response to environmental stimuli. They can be used in a wide range of applications since they can exceed the current abilities of traditional materials especially in environments where conditions are constantly changing. This course is designed to provide an integrated and complete knowledge to smart materials and structures, which makes a strong foundation for further studies and research on these materials. Topics include: structure, processing, properties of smart materials; Dependence of properties on structure; Processing and design; Mechanical, thermal, electrical, magnetic and optical smart materials systems; such as shape memory materials, electrostrictive materials, Piezoelectrics, Ferroelectrics, Dielectrics, magnetostrictive materials, superconductors, self-healing and polymer gels; Design, modeling and optimization of smart materials systems and case studies.



Advanced Control Systems

Professor Iven Mareels, Dean, University of Melbourne, Melbourne, Australia
Professor Ying Tan, University of Melbourne, Melbourne, Australia

Suitable for 3rd and 4th Year Engineering Students

This subject provides an introduction to modern control theory with a particular focus on state-space methods and optimal control. The role of feedback in control will be reinforced within this context, alongside the role of optimization techniques in control system synthesis. Having completed this subject it is expected that the students are able to:

- Apply fundamental state-space-techniques in the analysis and design of linear feedback control systems, as they arise in a variety of contexts
- Formulate and solve constrained optimization problems for control system synthesis
- Use software tools to simulate and design the linear behaviour of automatic control systems



Speech and Audio Processing: Theory and Applications

Professor Tan Lee, Chinese University of HK, Hong Kong

Suitable for 3rd and 4th Year Engineering Students

Speech is inarguably the most preferred and natural way of communication for humans. Speech is transmitted from a speaker to a listener in the form of an acoustic signal. The signal carries abundant information, including the linguistic content, the speaker's voice characteristic, the speaker's health and emotional conditions, and the ambient environment. Speech signals have many distinctive features that are not found in other signals from the natural world. In the first part of this course, students will study the fundamental theory of digital processing of speech signals. Important time-domain and frequency-domain properties of speech signals will be investigated. Other types of audio signals, namely music and noise, will also be covered in our discussion. Students will gain hand-on experience in acquiring, analyzing, manipulating and synthesizing different types of speech and audio signals. The second part of this course will be focused on a few selected applications of speech and audio processing, which include automatic speech recognition, music classification, hearing and speaking aids. The basic principles of system design will be introduced and the major technological challenges will be discussed. Students who take this course are expected to have fundamental knowledge in signals and systems and experience in using MATLAB.



Neural Prosthetic Engineering

Professor Sung June Kim, Seoul National University, Seoul, Korea

Suitable for All Levels of Engineering Students

The aim of this course is to understand the principles and state-of-the arts development of the Neural Prosthesis. Neural prosthesis is an electronic implant that interfaces with nervous systems. Through direct electrical stimulation of nerves, it can help restore damaged or lost sensory or motion functions. Typical examples include cochlear implant and retina implant recently developed for severely hearing and vision impaired patients respectively. More recently interfacing with neurons in brain draws more attention for both therapeutic and scientific purposes. In this lecture we will cover all engineering aspects of the auditory, visual prostheses, and deep brain stimulation.



Cross-Cultural Design for an Eco-Responsible Business Model (Field Trip C required: 4 credits)

Professor Marc Lucas, Assoc. Dean, Mines Paris Tech, Paris, France

Suitable for 3rd and 4th Year Engineering Students

In this course, you will learn how to analyze and design an eco-responsible business model. It involves teamwork with students from MINES ParisTech, France in a cross-cultural environment on a project provided by a World leading manufacturer, which seeks to implement an ambitious and long-term environmental plan to curtail Green House Gas (GHG) emissions. It offers you an opportunity to improve on an eco-responsible industrial model by learning how to collect and interpret scientific data in GHG of a realistic engineering system, in contrast to the textbook models taught in class. You will be invited to spend some time in a carbon free plant in China to develop a computational model for a realistic method of reducing energy consumption. At the end of the course you will gain real-life professional experience, interaction skills to deal with students of different training, language capabilities and cultures, and a better awareness of the fragile biosphere we all must sustainably live in.



Computational Multiphase Flows

Professor Eric Climent, Institute of Fluid Mechanics, Toulouse, France
Professor Dominique Legendre, Institute of Fluid Mechanics, Toulouse, France

Suitable for 3rd and 4th Year Engineering Students

Multiphase flows are ubiquitous in the industry (particles, drops and bubbles in petroleum, nuclear engineering and energy transformations) and also in environmental applications (sediment and pollutant transport). The numerical simulation has proven to be an efficient tool for engineers and researchers to understand and model the complex interplay between the continuous phase and the dispersion of discrete elements. The purpose of lectures is to introduce numerical simulations of dispersed two-phase flows and advanced topics in computational fluids mechanics, including particle suspensions, bubbly liquids and droplet sprays to develop an understanding of the physics of two-phase dispersed flows. The students will be trained to the specificity of particles, drops and bubbles dynamics in order to have a better ability to develop numerical modeling. Numerical simulations of complex industrial configurations will be discussed. Students will be trained to program some classic examples of important phenomena. Students will work on projects using Matlab to simulate particle suspension flows, bubble and droplet dispersion.

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