The Undergraduate and Graduate Courses Taught in English and Opened to the International Visiting/Exchange Students at Tsinghua University
(Spring Semester, 2018)

Note:
(1) The course information provided herein may be subject to change before course registration.
(2) The courses of a department/school are preferentially open to the exchange students of the department/school.
(3) The graduate courses in the School of Economics and Management are open only to the exchange students majored in Economics.
(4) The Elementary Chinese courses in ICLCC are preferentially open to the university-level exchange students.

1. School of Architecture

(1)【Course Title】Academic Frontier of Urban and Rural Planning
城乡规划学术前沿
【Course Code】 Y0000111
【Credits】1
【Credit Hours】16
【Semester】Spring
【Capacity】35 Graduate Students
【Instructor】Hok-Lin Leung 梁鹤年
【Course Description】
The lecture will examine how Western cultural concepts explain urban phenomena and planning theories of the west, draw parallels and contrasts from contemporary Chinese contexts, and derive lessons for theory and practice development in China. (5 sessions)
Introduce meta-methods in public policy analysis, comparative study, and aradigmic analysis, and illustrate their application with international examples. (3 sessions)

(2)【Course Title】Introduction on Contemporary Urban Planning and Design
当代城市规划与设计
【Course Code】80000841
【Credits】1
【Credit Hours】16
【Semester】Spring
【Capacity】25 Graduate Students
【Instructor】LIU Jian 刘健
【Course Description】
An introduction to the contemporary urbanization process, the theory and practice of urban development in China and abroad. Analysis some urban and regional development planning cases, including Beijing and Shanghai metropolitan areas, Yangtze River and Purl River Delta urbanizing regions and urban agglomeration development, as well as the new town development in the Shenzhen special economic zones.

(3)【Course Title】Practice and Theory in Green Building Design
绿色建筑理论与实践
【Course Code】80000861
【Credits】1
【Credit Hours】16
【Semester】Spring
【Capacity】25 Graduate Students
【Instructor】SONG Yehao 宋晔皓
【Course Description】
The course lasts eight weeks and consists of eight lectures. The first three lectures will be given by Prof. Thomas Herzog, former dean of Department of Architecture

in TUM. He will concentrate on the using of solar energy in architecture and urban planning. Besides, he will introduce briefly the new trends of green building design and research. The forth lecture will be given by Prof. Qin Youguo, former dean of School of Architecture, Tsinghua University, he will show the students the overall view of the development of green building design in China. The fifth one will be given by Prof. Zhu Yingxin, which is about the recognition of the built environment. The sixth one will be given by Associate Prof. Song Yehao, which concentrates on green building design for farmers in the rural area in China. The seventh one will be given by Associate Prof. Zhou Zhengnan, which concentrates on the green building design in the urban area. The last one will be given by Associate Prof. Lin Borong, which concentrates on computer simulation in green building design. There are several seminars in the course and one paper is asked to each student at the end of course.

(4)【Course Title】Design Studio III
　　　　　　 设计专题三
　　【Course Code】80001063
　　【Credits】3
　　【Credit Hours】48
　　【Semester】Spring
　　【Capacity】20 Graduate Students
　　【Instructor】ZHANG Yue 张悦
　　【Course Description】

The design studio will investigate the potentials of the YongDing River, Beijing's most important native waterway. We will research, map, and analyze historic, current, and future scenarios of the river in order to propose a new urban relationship between Beijing and its waters in general, and the relationship between the various neighborhoods and districts of western Beijing with the YongDing River specifically.

(5)【Course Title】Design Studio IV
　　　　　　 设计专题四
　　【Course Code】80001073
　　【Credits】3
　　【Credit Hours】48
　　【Semester】Spring
　　【Capacity】20 Graduate Students
　　【Instructor】LI Xiaodong 李晓东
　　【Course Description】

From 1949 to 2000, a large amount of public housing was developed in Beijing under the planned socialistic welfare housing distribution system. Those former public housing areas have started to face the challenge of deterioration in terms of ageing, lack of maintenance/management, increasing mobility of residents, etc. But those areas still keep their values to a certain extent due to their central locations,

easy access, convenient public spaces/facilities, or existing conditions of mixed-use, and in the collective memory of a special historical era. Within this context, urban sustainable renewal would be a potential solution for the urban problems of the former public housing area. Therefore, we chose Block 1 of Sanlihe Neighborhood 1 in Beijing Xicheng District, which was designed and constructed in 1950s, constituting a typical representative of the former public housing areas in Beijing, as the study case.

2. Department of Automation

(1)【Course Title】How to Report Research Results in English and the Related Issues
英文科技论文写作与学术报告
【Course Code】60250101
【Credits】1
【Credit Hours】16
【Semester】Spring
【Capacity】150 Graduate Students
【Instructor】GUAN Xiaohong 管晓宏
【Course Description】

Chinese scholars and students become more and more active in international academia and publications and professional participations have become a key measure of scholarly accomplishment. With this new trend, it becomes increasingly important that Chinese scholars and students get familiar with, and abide by the international standard when writing papers, submitting them for publication, dealing with editors, and applying for funding. This course intends to give some advice to the new scholars on the etiquette of writing a paper, proper citing of reference, and giving attribution. The "conventions and protocols" of international academia are discussed together with the cultural differences between the East and the West. The norms of serving academic communities as reviewer, associate editor and programming committee member are also introduced. The advice is given for engaging in the most important activities in academic career development such as choosing research topics and writing proposals for applying for research funding.

(2)【Course Title】Enterprise and Information System Modeling and Analysis
企业与信息系统建模分析
【Course Code】40250942
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Undergraduate Students
【Instructor】LI Qing 李清
【Course Description】

Enterprise engineering and information system modeling and analysis techniques are introduced in this course. These techniques are basic methods of system design/realization, industrial engineering, management and IT consulting for graduated students from industrial engineering, management engineering, and information engineering department.

(3)【Course Title】Network Security Essentials
网络安全基础
【Course Code】40251052

【Credits】1
【Credit Hours】16
【Semester】Spring
【Capacity】16 Undergraduate Students
【Instructor】LI Jun 李军
【Course Description】

This is a research oriented seminar course on special network security topics. Featured with small class and take-home experiments, it provides insights on industrial background and technical trends to inspire students' interest and innovation. The lectures are all in English. Homework review and discussions are sometimes mixed in English and Chinese for the convenience of TA and students.

3. Department of Automotive Engineering

(1)【Course Title】Mechatronic Systems in Automotive Engineering

汽车机电系统

【Course Code】70150163
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】30 Graduate Students
【Instructor】LI Jianqiu 李建秋
【Course Description】

(2)【Course Title】Automotive Engineering II

汽车工程 II

【Course Code】70150333
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】30 Graduate Students
【Instructor】ZHENG Sifa 郑四发
【Course Description】

The contents in Automotive Engineering II include:1) fundamentals requirements and analysis of vehicle vertical and lateral dynamics, excitation characteristic of the road, 2) structure and character of tires, components of suspension system and steering system, 3)single wheel model, single-track model , two-Track model for vertical dynamics, 4) Single Track Vehicle Model, Four-Wheel Vehicle Model for lateral dynamics, 5)the influence of the parameters of tires, suspension system and steering system to the vehicle vertical and lateral dynamics.

(3)【Course Title】Internal Combustion Engine II

内燃机 II

【Course Code】80150183
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】30 Graduate Students
【Instructor】WANG Zhi 王志
【Course Description】

This course is suitable for the postgraduate students majored in Vehicle Engineering and Power Machinery Engineering. The course mainly focuses on the working process of internal combustion engines, including gas exchange in internal combustion engine, gasoline engine and diesel engine combustion process, special combustion processes (such as HCCI, etc), supercharging for internal combustion engine, as well as the generation of pollutants formation and emission control.

(4)【Course Title】Detonation and Supersonic Combustion

激波和超声燃烧

【Course Code】80150532

【Credits】2

【Credit Hours】32

【Semester】Spring

【Capacity】30 Graduate Students

【Instructor】Remy Mevel

【Course Description】

The propagation modes of flames will be first described (chapter 1). Then the detonation theories will be detailed (chapter 2). The detonation structure (chapter 3) as well as the dynamics parameters (chapter 4 to 6) of detonations will be described along with the associated empirical or semi-empirical correlations and theoretical aspects. The possible applications (chapter 7) of detonations will be examined along with the main experimental techniques employed for their study (chapter 8).Finally, the possible effects of thermal non-equilibrium processes will be examined (chapter 9). Class of 5 to 15 students is anticipated.

4. Department of Chemical Engineering

(1)【Course Title】Surface Science and Heterogeneous Catalysis
          表面科学与多相催化
    【Course Code】80340112
    【Credits】2
    【Credit Hours】32
    【Semester】Spring
    【Capacity】30 Graduate Students
    【Instructor】WANG Dezheng 王德峥
    【Course Description】
    Solid-State Chemistry and Surface Chemistry of Catalysts; Fundamental Catalysis: Bonding and Elementary Steps in Catalysis; Characterizing Catalysts and Their Surfaces; Poisoning, Promotion, Deactivation and Selectivity of Catalysts; ……

(2)【Course Title】 Advanced Biological Science and Engineering
          现代生命科学与生物工程进展
    【Course Code】80340502
    【Credits】2
    【Credit Hours】32
    【Semester】Spring
    【Capacity】30 Graduate Students
    【Instructor】ZHANG Chong、XING Xinhui、WANG Zhao、LU ZHI 张翀、邢新会、王钊、鲁志
    【Course Description】
    This course will introduce current development in the field of modern life science and biological engineering, which could give students advanced knowledge and thinking mode in biological science and engineering. The content includes four parts: 1, Basic knowledge: overview of modern biological science and engineering, review of classical molecular biology and basic biological engineering; 2, Current topics: bioinformatics, synthetic biology and metabolic engineering, modern biological pharmaceutical; 3, Case study: case study for previous current topics, most cutting-edge research cases from Tokyo Institute of Technology offers; 4, course summary: final reports by the students. Evaluation: homework and final report. This course will specially emphasis on case study, which could allow students to understand not only current development in the field of biological science and engineering, but also the logic behind it, and finally cultivate critical thinking in scientific research.
    【注】清华-东工大项目课程

(3)【Course Title】Recent Advances in Separation Processes
          分离技术最新进展
    【Course Code】80340512
    【Credits】2

【Credit Hours】32

【Semester】Spring

【Capacity】20 Graduate Students

【Instructor】骆广生、刘铮、陈健、王运东、王保国 LUO Guangsheng、LIU Zheng、CHEN Jian、WANG Yundong、WANG Baoguo

【Course Description】

The course of Recent Advances in Separation Processes will mainly introduce the development of solvent extraction,adsorption,absorption, membrane separation, bio-separation, and microscale separation. Total 10 lectures will be provided by the professors from Melbourne University and Tsinghua University.

【注】与澳大利亚墨尔本大学合作开设的 C-campus 课

(4)【Course Title】Principles of Transport Processes of Chemical Engineering 化工传递过程原理

【Course Code】70340073

【Credits】3

【Semester】Spring

【Capacity】30 Graduate Students

【Instructor】 王运东 WANG Yundong

【Course Description】

A review of the mechanisms of momentum, energy and mass transport. Momentum transport: Derivation of equations of continuity and motion (Navier-Stokes). Application to laminar flow problems. Energy transport: Derivation of energy equation. Application to heat transfer problems involving conduction, forced and free convection. Mass transport: Derivation of species conservation equations for binary and multi-component mixtures. Application to mass transfer problems with and without chemical reaction. Transport in turbulent flow: Fluctuations and time-averaged quantities. Time averaged form of the governing equations of momentum, energy and mass transport. Expressions for the Reynolds stresses, turbulent energy and mass flux. Temperature and concentration distribution in turbulent pipe flows.

5. Department of Civil Engineering

(1)【Course Title】Structural Mechanics (1)

结构力学 (1)

【Course Code】20030134

【Credits】4

【Credit Hours】64

【Semester】Spring

【Capacity】60 Undergraduate Students

【Instructor】LI Quanwang 李全旺

【Course Description】

This course is intended to provide the student majoring in civil engineering skills of structural analysis at an elementary level. It mainly consists of structural geometric construction rules, computational methods for internal forces and deformation. The three major relations: equilibrium, deformation compatibility and stress-deformation conditions are used to study the behavior of structural components under various external loads. Emphasis is placed on the two major methods: the consistent displacement (force) method and the displacement method. The course serves as the basis for further exposure of structural theories to the student majoring in civil engineering.

(2)【Course Title】Construction Contracts

工程合同管理

【Course Code】30030482

【Credits】2

【Credit Hours】32

【Semester】Spring

【Capacity】40 Undergraduate Students

【Instructor】LI AO Binchao 廖彬超

【Course Description】

Legal aspects of construction contracts and specifications; contract formation, interpretation, rights and duties, and changes; legal liabilities and professional ethics of architects, engineers, and contractors.

(3)【Course Title】Programming Analysis of Structures

结构矩阵分析

【Course Code】40030702

【Credits】2

【Credit Hours】32

【Semester】Spring

【Capacity】40 Undergraduate Students

【Instructor】YUAN Si 袁驷

【Course Description】

(4)【Course Title】Advanced Experimental Soil Mechanics
高等实验土力学
【Course Code】80030332
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Graduate Students
【Instructor】XU Ming 徐明
【Course Description】

Students will learn principles and methods of typical advanced geotechnical laboratory and field experiments in the course, as well as the latest development in soil mechanics achieved through these experiments. At the mean time, training will be given for data interpretation and analysis. Furthermore, some of the leading research projects in soil mechanics will be introduced as case studies, in which experiments are playing key roles.

6. Department of Computer Science and Technology

(1)【Course Title】Human Computer Interaction Technology
人机交互技术
【Course Code】80240533
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】30 Graduate Students
【Instructor】SHI Yuanchun 史元春
【Course Description】

This course covers the basic understanding of human perception and cognition, interaction styles development, design and evaluation of GUI, and natural human computer interface technologies. Computer output mediums will include graphics, music, and 3-D sound. Input technologies are emphasized. Multimodality about visual, acoustic and touch sense channels are introduced with new input interfaces. Signal processing, feature extraction, and mapping schemes will also be covered. Measure methods are for the efficiency of interaction. Hands-on laboratories and independent projects, which can potentially continue as further researches.

(2)【Course Title】Web Information Retrieval
Web 与信息检索
【Course Code】80240573
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】30 Graduate Students
【Instructor】ZHANG Min 张敏
【Course Description】

This course gives a survey to the new research branches, introduces the state-of-the-art technologies, and discusses on open problems and challenges on Web information retrieval (Web IR). At the same time, the course focuses on the real applications in the Internet environment, making case study and detail analysis on commercial search engines (SE). The main topics of the course includes (but not limited to): IR in Web environment, such as link analysis, anti-spam, etc; question answering; opinion / sentimental analysis; social media and IR; personalized IR and recommendation; user behavior analysis; online advertisement; mobile search; and IR and SE evaluations. The course is composed of lectures and student-conducted discussions.

(3)【Course Title】Fundamentals of Computer Graphics
计算机图形学基础
【Course Code】80240593

【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】30 Graduate Students
【Instructor】LIU Yongjin 刘永进
【Course Description】

This course gives an introduction to computer graphics, by intergrating various skills in computer science such as programming, data structure and algorithm design. With the aid of new human-computer interface, students will learn these fundamental knowledges in computer science in terms of fancy graphics effects that reduce the learning load through abstract data visualizationn. The content of this course includes raster graphics, interative graphics, matrix representation of 3D transformation, curve and surface design, ray tracing and visual realism, all with OpenGL source code.

(4)【Course Title】Foundation of Object-Oriented Programming
　　　　　　　　　面向对象程序设计基础
【Course Code】30240532
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Undergraduate Students
【Instructor】YAO Hailong 姚海龙
【Course Description】

（5）【Course Title】Machine Learning
　　　　　　　　　机器学习
【Course Code】3024053280245013

The course introduces the advanced theory of machine learning and its related algorithms. The course will first review the state-of-the-art machine learning algorithms and the course's content mainly consists of probabilistic generative learning and probabilistic discriminative learning. Based on the theoretical analysis and algorithmic application, we plan to introduce the following subtopics:

（1）　Probabilistic topic model
（2）　Restricted Boltzmann machines
（3）　Factor graph model
（4）　Bayesian nonparametrics
（5）　Semi-supervised learning
（6）　Scalable machine learning

The course requires all students to design and implement an algorithm for advanced machine learning, and validate the algorithm on the our provided platform

（6）【Course Title】Introduction to Big Data System

大数据系统导论

【Course Code】80240693

The course starts with an overview of the big data analytics, clustering and distributed programming. We will also cover methods for processing big data as well as optimization techniques. Graph processing and visualization of big data will be covered. There will be labs and projects which allow students to experiment with real data and apply the knowledge of what they learnt in class.

（10）【Course Title】Advanced Network Management

高级网络管理

【Course Code】80240663

This course is a graduate course and is primarily project-oriented. It will cover three major of aspects of IP network management: networks, objectives and methodologies. There will be 12 lectures given. Students are expected to form a team of two and finish a project on the THU-INM (Tsinghua University IP Network Management) platform.

（11）【Course Title】Distribute System

分布式系统

【Course Code】80240613

This is an introductory course on distributed systems. This course introduces the principles of distributed systems as well as some of the current influential large-scale distributed systems such as Google file system, MapReduce, Amazon Dynamo etc. To make the course more concrete, this course uses a series of labs requiring the students to build real distributed systems. This course emphasizes on the general principles of building distributed systems in addition to introducing important practical distributed systems. For example, the various kinds of distributed consistency protocols will be discussed and such principles can be adopted in many kinds of real distributed applications. The current systems used by Googe, Amazon, Microsoft will be introduced.

7. School of Economics and Management

(1)【Course Title】Econometrics （1）
　　　　　　　　计量经济学（1）
【Course Code】30510973-1/2
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】HONG Shengjie 洪胜杰
【Course Description】
The purpose of this course is to help students understand how to interpret economic data. It will focus on the issues that arise in using this type of data, and the methodology for solving these problems. The focus of the course is on regression analysis. Specific topics and extensions will include multivariate regression, dummy variables, heteroskedasticity, serial correlation, and instrumental variables. Problem sets will provide exercises on proving theoretical results, and will also provide practical experience in handling actual economic data with STATA. Chapter 1-8 and selected material in Chapter 10-15 will be covered. In addition, basics of hypothesis testing will be covered.

(2)【Course Title】Management Information Systems
　　　　　　　　管理信息系统
【Course Code】30510202
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Undergraduate Students
【Instructor】CHEN Guoqing 陈国青
【Course Description】
The objectives of the Management Information Systems (MIS) course are to provide the students with (1) a understanding of MIS essentials and prospects from a combined perspective of technology and management, in the context of big data; (2) a mastery of some classical MIS theories and methods; (3) a mastery of some new MIS concepts and techniques; and (4) a understanding of certain key issues of and thoughts on information technology (IT) management.
In light of rapid advances in information technology (IT) and Internet applications, the course covers a series of related materials as follows: (1) Gaining competitive advantages with IT (e.g., supply chain management and ERP, customer relationship management, business intelligence); (2) Business analytics for decision support (e.g., knowledge types, knowledge discovery techniques, associative patterns); (3) Modeling and decisions in having information systems (e.g., in-sourcing cycle, data modeling, business descriptions,

outsourcing); (5) Emerging trends (e.g., big data/cloud computing and data-centric businesses).

The content of the course also includes case discussions (e.g., Digital China, CSC and General Dynamics), lab studies (e.g., SAP ERP, Weka, Node XL) etc

(3)【Course Title】Accounting Information System
　　　　　会计信息系统
【Course Code】30510643
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】WEN Zhong 闻中
【Course Description】

Application of information systems (IS) has become the necessary weapon for enterprises to improve business processes, enhance management effect, innovate business models and build up core competitiveness. Also, IS application brings huge challenge to every aspects of business organizations. Accounting is generally concerned with the identification, collection, processing, analysis and communication of economic information about an organization. Accounting information systems (AIS) is the important part of IS. Accounting departments and accounting professionals are facing the big opportunity and challenge of contemporary IS application. This course introduces the main content of AIS from the technical and managerial points of view. It consists of 4 parts. Part 1 introduces AIS concepts and tools, including introduction to AIS, business processes and AIS data, documenting AIS, and identifying risks and controls in business processes. Part 2 introduces the components of AIS, including database management methods and software systems, design of accounting data, queries & reports, and forms. Part 3 introduces fundamental business processes combined with utilization of an AIS software system, including the purchase/payment cycle, sale/reception cycle and financial cycle, etc. Part 4 covers two special topics on IS application. One is about IS application and evolution in enterprises, the other is managing and controlling IS.

(4)【Course Title】Intermediate Macroeconomics
　　　　　中级宏观经济学
【Course Code】30510763
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】40 Undergraduate Students
【Instructor】OUYANG Min 欧阳敏
【Course Description】

The primary purpose of this course is to introduce students the modern approach to macroeconomics and how to apply it to analyze macroeconomic issues such as: the determination of national income and price levels in the closed and open economy, the cause of economic growth, the source of unemployment, and the origin of business cycles. A substantial amount of time will be devoted to studying the impact of fiscal and monetary policies.

We will study the economic issues within a unified framework as possible as we can. At the same time, we will also try to introduce alternative theories and models. The main purpose is to introduce the method to study macroeconomics, not the facts and the theories. We will start with the basic facts and issues in macroeconomics. Then we will introduce the modern approach to address these issues. We will study how different markets work together in general equilibrium. Markets for labor, saving and investment, and financial assets interact to determine the economy's long-run growth and its fluctuations.

(5)【Course Title】Marketing Management
营销管理
【Course Code】30510812
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】50 Undergraduate Students
【Instructor】LIU Xia 刘霞
【Course Description】
The objective of this course is to introduce students to the concepts, analyses, and activities that comprise marketing management, and to provide practice in assessing and solving marketing problems. The course is also a foundation for advanced electives in marketing as well as other business/social science disciplines. We will explore the theory and applications of marketing concepts through a mix of cases, discussions, lectures, guest speakers, individual assignments, and group projects. We will draw materials from a variety of sources and settings including services, consumer and business-to-business products.

(6)【Course Title】Developmental Economics
发展经济学
【Course Code】30510863
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】SHI Xinzheng 施新政
【Course Description】

Development economics is a course involving economic problems and policies of those countries that have not yet reached the level of economic well being observed in the western world. At the completion of this course, students will be familiar with theories of development and their applications in the real world. Students will have a better understanding of a number of topics that shed light on the development process, including poverty, inequality, education, international trade, the role of the government, and population issues. Students will also be trained to conduct their own research by using theories learned in class and analyzing real world data. They will also present their research results in class, which can improve their ability of public speaking and intellectual interactions.

(7)【Course Title】Architecture of Computer Hardware and Systems Software
计算机系统原理
【Course Code】30511043
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】GUO Xunhua 郭迅华
【Course Description】
This course provides the hardware and software technology background to enable systems development and management personnel to understand tradeoffs in computer architecture for effective use in a business environment. A systematic view of computer systems will be utilized in examining the components, structures, and characteristics of computer hardware and software as the infrastructure of modern information technology.

(8)【Course Title】International Economics
国际经济学
【Course Code】40510763
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】40 Undergraduate Students
【Instructor】MA Hong 马弘
【Course Description】
This course aims to provide students with a survey of fundamentals in international economics, in both theory and empirics. The course consists of two parts: international trade and international finance, with an emphasis on the former. The first part includes topics on why countries trade, what they trade, the benefits and costs of trade, and themotivations for and the effects of government trade policies. The second part contains topics on how exchange rates are determined and the effects of global imbalance.

(9)【Course Title】Theory of Industrial Organization
产业组织理论
【Course Code】40510943
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】40 Undergraduate Students
【Instructor】Alexander Cowles White
【Course Description】

Under what circumstances should telecommunication firms be allowed to merge? When are hotel room prices "too high", such that public authorities should intervene to make them lower? Is it ok for nightclubs to charge an entry fee for men but to let women in for free? Industrial Organization Theory is a set of tools that seek to provide economic answers to these and many other questions. Ranging from one extreme of monopoly to the other of perfect competition, this course will provide an introductory exploration of the rich set of models of imperfect competition, with a focus on business strategy and policymaking applications.

Or, if you prefer, this a description of the subject from Prof. GAO Ming, who another section of this course at Tsinghua SEM: Industrial Organization (IO) is the sub-field of microeconomics that studies firm behaviour and strategy in market competition, as well as the induced industry characteristics. Not only useful for economists, the theory of IO also provides the basic theoretical framework for researchers and practitioners in many other business subjects, including corporate finance (e.g. merger and acquisition), marketing (e.g. pricing) and strategic management (e.g. competitiveness analysis).

(10)【Course Title】Econometrics (2)
计量经济学（2）
【Course Code】40511133
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】ZHU Lin 祝林
【Course Description】

This course aims to equip students with modern econometric tools and modeling methods for them to set up suitable econometric models to do data analysis. Hence the approach of this course will be model-driven and data-driven, which focuses on econometric applications without pursuing technical details. This course will cover some modern topics in both macro-econometrics and micro-econometrics. For macro side, we will introduce the concept of non-stationarity and study the problem of unit-root tests and co-integration test,

as well as the famous ECM model. We will also study the vector autoregression models which play an important role in macro applications. For microeconometrics, we will cover several important models in application, namely, binary choice model, discrete choice model, models for count data, sample selection model, and the panel data model. For each model introduced, we will discuss its applicability, limitation, and estimation methods together with inference tools. Since this course focuses on applied side, we will also provide training in econometrics softwares, e.g. STATA/Eviews/R.

(11)【Course Title】Investment
　　　　　　　投资学
【Course Code】40511423-1/2
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】LI Minwen 李旻文
【Course Description】

This course will introduce and delineate basic concepts and techniques in investments by examining such topics as risk-return tradeoff, optimal portfolio construction, Capital Asset Pricing model, APT, Market efficiency, bonds and futures. On the theoretical side, this course introduces fundamental knowledge for investment strategies and portfolio management. On the practical side, this course covers recent topics that are related to the investment strategies and portfolio management. Some projects of portfolio management are specially designed to let you apply the theoretical knowledge to practice.

This course introduces the theory and practice of investment management. It provides you with fundamental knowledge of financial markets and asset pricing, and recent development of investment tools and strategies. This course is highly recommended for students who intend to pursue a finance career or further studies in derivatives, fixed income securities, or portfolio management.

By the end of the class, you will have a basic grasp of the following topics:

1. The risk-return tradeoff in financial markets; computing security risk and return and equity indices.

2. Basics of investing mechanism, including buying securities on margin, selling short securities, asset allocation strategies, and active versus passive investment management.

3. Overview of different asset classes such as equity, fixed-income securities and derivatives; introduction to the concepts of fixed-income securities and derivatives.

4. Measuring portfolio risk and return, forming optimal portfolio using mean-variance analysis, portfolio diversification, deriving efficient frontier.

5. The security market line and capital asset pricing model (CAPM)

6. Understanding the concepts of financial market efficiency and anomalies; examining evidence on profitable trading strategies in US and around the world.

7. Investigating different types of mutual funds; developing performance measures of mutual funds; using these measures to evaluate mutual fund performance in the U.S..

(12)【Course Title】Financial Statement Analysis
　　　　　　　　财务报表分析
【Course Code】30510893
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】LI Dan 李丹
【Course Description】
The objectives of this course are to gain a more thorough understanding of financial accounting techniques and to explore the accounting theory underlying such techniques. Assets, revenue recognition, and income items, investments in other companies and stockholders' equity will be covered in this course. Students will also learn how to apply the skills of financial analysis to realistic situations, such as, valuations decisions or forecasting.

(13)【Course Title】Management Accounting(1)
　　　　　　　　管理会计（1）
【Course Code】40510343
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】25 Undergraduate Students
【Instructor】ZHANG Haiyan 张海燕
【Course Description】
This is the first course of the management accounting sequence. It introduces concepts, methods, and analytical techniques related to managerial accounting. Topics include fundamental cost concepts, Cost Volume Profit (CVP) analysis, activity-based costing (ABC), job-costing and process-costing systems, marketing and production decisions, budgets, management control system, and related decision-makings. The objective of this course is to enable you to solve real world managerial problems by applying managerial accounting concepts and techniques.

(14)【Course Title】Strategic Management
　　　　　　　　战略管理
【Course Code】30510992
【Credits】2

【Credit Hours】32
【Semester】Spring
【Capacity】50 Undergraduate Students
【Instructor】GUO Yidi 郭依迪
【Course Description】

This course introduces the concepts and tools of strategy formulation. You will learn about why some firms survive and prosper while others do not, and develop critical analysis and communication skills to create and implement firm strategy. The course focuses on the analyses, organizational processes, skills and business judgment managers must use to craft strategies, position their businesses so as to maximize long-term profits upon uncertainty and competition.

Strategic Management is an integrative and interdisciplinary course, which takes a general management perspective. It views the firm as a whole, and examines how policies in each functional area (such as accounting, economics, finance, marketing, and organizational behavior) are integrated into an overall competitive strategy. It is intended that you develop a "general management point of view" in this course. This point of view is the best vantage point for making decisions that lead to sustainable business performance. The key strategic business decisions of concern involve determining organizational purpose to evolving opportunities, creating competitive advantages, choosing competitive strategies, securing and defending sustainable market positions, and allocating critical resources over long periods. Decisions such as these can only be made effectively by viewing a firm holistically, and over the long term.

This course is intended to help you develop skills for formulating strategy. The strategy formulation process demands the mastery of a body of analytical tools and the ability to take an integrative point of view.

(15)【Course Title】Elementary Chinese
　　　　　　　　初级汉语
【Course Code】60610162
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】
【Instructor】YUE Yao 岳瑶
【Course Description】

(16)【Course Title】Advanced Financial Accounting
　　　　　　　　高级财务会计
【Course Code】40510073
【Credits】3

【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】XIE Deren 谢德仁
【Course Description】

This course mainly addresses the international convention about advanced financial accounting. Its teaching objectives include both mastering advanced financial accounting knowledge and developing sense of accounting. It covers (1) the classification of business combinations and their accounting treatment methods; (2) the equity and cost methods of accounting for investments in common tock; (3)the role, limitations and preparation methods of consolidated financial statements; (4) accounting for foreign currency transactions and hedging; (5)translation of foreign currency financial statements.

(17)【Course Title】 **Corporate Mergers and Acquisitions(M&A)- Master Course**
【Course Code】80512682
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】
【Instructor】LU yao 陆瑶
【Course Description】

Mergers and acquisitions (M&As) have become topics of great importance in the global corporate arena. They also have become world-wide phenomena to achieve strategic and financial objectives. This course is designed to introduce basic M&As concepts and decision making framework. It provides methodological overview of the concepts in M&As. The course will aid students to comprehend more clearly the complexity of the dynamics inherent in the M&A process, as well as the synergies involved in it.

(18)【Course Title】 **Fixed Income Securities and Interest Rate Modeling- Master Course**
【Course Code】 80514233
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】
【Instructor】Prof. Hao WANG 王浩
【Course Description】

The course is for students who consider careers practicing fixed income trading and modeling, and those who are interested in academic or regulatory research in the areas of fixed income and credit risk management. It provides an overview of fixed income markets, and introduces tools to price fixed income instruments. Although the topics are quantitative by nature, the course will not focus on technical issues *per se*. The goal is to help students understand fixed income markets, learn trading

strategies, and prac**tice p**ricing skills.

(19)【Course Title】 **Risk Management- Master Course**
　　【Course Code】 80513822
　　【Credits】2
　　【Credit Hours】32
　　【Semester】Spring
　　【Capacity】
　　【Instructor】Dr. XIE Qun 谢群
　　【Course Description】

Risk management is the core competence of modern financial institutions, and it becomes even more important during financial crisis period. Upon completion of this course, students are expected to understand the essence of risks, learn how to identify, measure and manage various types of risks by applying appropriate techniques and tools. One feature of this course is that we cover both the credit risk and market risk in a systemic approach, which are usually concurrently present in financial institutions.

We mainly focus on credit risk management, first by introducing the classic credit risk analysis methods, followed by stochastic modeling and statistical pattern recognition, as these are the most common techniques in managing investment and commercial banks' bond issuance/purchase and credit lending. We selectively discuss two popular credit modeling methodologies, i.e. market price-based Merton models, and accounting-based statistical regression models, and we will design rigorous validation procedure, in compliance with regulatory requirement as well as making good business sense. Furthermore, beyond individual loan basis, we also introduce credit asset portfolio management by incorporating default correlation, and extending its use to regulatory capital (Basel II and III). We relate the banks' ongoing Basel compliance projects to banks' practical management needs, both benefits and challenges.

The course then covers market risk, interest rate risk, liquidity risk and asset liability management in banks, including VaR methods, and valuation of financial institutions in the context of asset liability management. Finally, we selectively introduce a few financial assets including ABS and COD, and how to integrate risk to business and be part of profit equation via risk-based pricing and portfolio limit management. If time permits, we'll also introduce the Fintech landscape in China and its risk management.

Throughout the course we'll use actual data and some statistical analytic tool (Excel add-on or SAS) to develop some risk models.

(20)【Course Title】 **Marketing Analytics- Master Course**
　　【Course Code】 80516623
　　【Credits】3
　　【Credit Hours】48
　　【Semester】Spring

【Capacity】

【Instructor】 LIANG Yitian 梁屹天

【Course Description】

The vast amount of available internal and external data have created unprecedented challenges as well as opportunities for today's marketing practitioners. Firms are increasingly relying on data analytics to stay competitive in the market. The ability to understand the role of analytics in identifying marketing problems and seizing opportunities, and further to apply data analytics to enhance marketing performance has also become a key asset for managers.

This course provides a comprehensive introduction to the concepts, techniques and applications of marketing analytics. In particular, we will introduce the state of the art machine learning and big data techniques. The class will equip students with a managerial overview of marketing analytics and related concepts, a basic understanding of statistics and economics foundations, a general exposure to real-world applications and trends, and hands-on practices of analytics software.

The course consists of a mix of lectures, discussions, software tutorials and a team project. All class sessions will be interactive, requiring you to actively participate in and contribute to the class.

8. Department of Electronic Engineering

(1)【Course Title】Signals and Systems
　　　　　信号与系统
　　【Course Code】30230654
　　【Credits】4
　　【Credit Hours】64
　　【Semester】Spring
　　【Capacity】60 Undergraduate Students
　　【Instructor】SONG Jian　宋健
　　【Course Description】

This course covers the signal representation/analysis, especially how to represent the complex signals in simple format either in time or frequency domain. Based on that, it also covers how signals behave after passing through various linear, time-invariant systems. This course consists of following individual yet highly related sessions such as Introduction, time-domain analysis on the linear, time-invariant systems, signal representation in frequency domain (Fourier analysis/Fourier transform), Laplace Transform, Discrete time-domain signals, Z-Transform, Discrete/Fast Fourier transform, the state space analysis of the linear systems, and etc.

(2)【Course Title】Case Study on the Design of the Communication Networks
　　　　　通信网络设计实例研究
　　【Course Code】40230952
　　【Credits】2
　　【Credit Hours】32
　　【Semester】Spring
　　【Capacity】20 Undergraduate Students
　　【Instructor】SONG Jian　宋健
　　【Course Description】

PLC networks and PLC-specific network layers are then defined before modulation schemes and various possibilities for realization of error handling in PLC systems are discussed. The different solutions of multiple-access schemes and various MAC protocols for PLC applications are introduced together with several solutions for traffic control in PLC networks. In the end, comprehensive performance evaluation of reservation MAC protocols, suitable for broadband PLC applications are evaluated by comparing various signaling MAC protocols under different traffic and disturbance conditions. Fundamental concepts are the major focus of this course, and the students are required to do the literature investigation with a group and present their results by the end of the course.

(3)【Course Title】Probability Theory and Random Processes
　　　　　概率论与随机过程 (1)
　　【Course Code】30230742-3

【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Undergraduate Students
【Instructor】SHEN yuan 沈渊
【Course Description】

This course will introduce undergraduate students to the modeling, quantification, and analysis of uncertainty. Topics covered include: formulation and solution in sample space, random variables, transform techniques, simple random processes and their probability distributions, limit theorems, and Markov chains. The tools of probability theory are the keys for being able to analyze and make sense of data. These tools underlie important advances in many fields, from the basic sciences to engineering and management. Although this is not a mathematics course, it does rely on the language and some tools from mathematics. It requires a level of comfort with mathematical reasoning, familiarity with sequences, limits, infinite series, and the chain rule, as well as the ability to work with ordinary or multiple integrals.

9. Department of Engineering Physics

(1)【Course Title】Introduction to High Energy Physics
高能物理导论

【Course Code】
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Undergraduate Students
【Instructor】CHEN Shaomin 陈少敏
【Course Description】

This course provides an up-to-date and comprehensive introduction to modern particle physics, including all the recent developments in elementary particle physics, as well as its connections with cosmology and astrophysics. The balance between experiment and theory is emphasised. The stress is on the phenomenological approach and basic theoretical concepts rather than rigorous mathematical detail. Short descriptions are given of some of the key experiments in the field, and how they have influenced our thinking. Although most of the material is presented in the context of the Standard Model of quarks and leptons, the shortcomings of this model and new physics beyond its compass (such as supersymmetry, neutron mass and oscillations, GUTs and superstrings) are also discussed.This course is suitable for the 3rd and 4th-year undergraduate students.

10. School of Environment

(1) 【Course Title】Treatment Technologies for Safe Drinking Water

饮用水水质安全保障工艺

【Course Code】40050622
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Undergraduate Students (Junior and Senior Students Preferred)
【Instructor】WANG Xiaomao 王小毛   XIE Yuefeng 解跃峰
【Course Description】

The course is structured with a main line pertaining to drinking water qualities, and is mainly composed of the removal of individual impurities and contaminants in the conventional treatment process and the advanced treatment process, focusing on the principle and applicability of each unit operation. Case studies and invited speech by renowned professors will also be included in the course. By taking this course, students should have the "multiple barrier" concept and would be able to select appropriate treatment processes for particular cases.

(2)【Course Title】Low-carbon Technology and Management

低碳技术与管理

【Course Code】40050752
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 Undergraduate Students
【Instructor】ZHAO Ming 赵明
【Course Description】

The whole world is currently committed to adaptation against climate change, extreme disasters, environmental pollutions and exhausting fossil energy by means of establishment of a low-carbon society. Such transmission is certainly necessitated in China, the largest carbon emitter and 2nd biggest economy of the world. Development of low-carbon technologies and management system will be the key approach.

This course is aimed to train the undergraduate students of SOE in terms of both technological and management knowledge. It is thus a cross-disciplinary course that encourages students to learn independently and collaboratively with the purpose to address complicated issues in energy, resource, environmental, economy and policy areas under the globalization circumstance.

This course is not merely lecture and also includes quite a number of curriculum projects that require students to learn more after class and collaborate with team members. In course of the project design, students will be enhanced of abilities including but not limited to scientific writing, public speaking, literature hunting and communication skills.

This course will be delivered in pure English environment. Furthermore, the students will be fortunate to stay with world famous experts in low-carbon fields and experience the cutting-edge research. The guest professors may come from Imperial College London, Cambridge, Columbia Uni, Stanford, Ohio State, etc.

Students will also enjoy the impressive industrial field trips. They will experience how low-carbon technologies are implemented in various companies. This will be a perfect compensation to the coursework learning, providing information and ideas for the curriculum project. If lucky, students may also find exciting opportunities for internship in industries.

Low-carbon technology and management is a fast developing field with frequently updated knowledge and information. This course extremely encourages students to challenge the conventional viewpoints and existing database of knowledge. The lecturer has the responsibility to lead students to think and behave in such creative and originative ways.

(3)【Course Title】Advanced Environmental Chemistry
高等环境化学
【Course Code】70050323
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】25 Graduate Students
【Instructor】HUANG Jun 黄俊　YU Gang 余刚
【Course Description】

By learning Advanced Environmental Chemistry, the students will grasp the methodology of studying the transport, transformation and fate of pollutants using chemical principle and approaches, with the concept of multimedia in their mind. Also they will get good understandings about the environmental problems especially for those current hot issues - case studies will illustrate their chemical mechanism as well as the latest progress. The course mainly contains four parts: (1) Environmental pollution chemistry, which mainly talks about the main environmental problems and their chemical mechanism, and the transport, transformation and fate of pollutants. (2) Environmental analytical chemistry, which mainly talks about the monitoring and analysis methods for priority pollutants with important environmental significance. (3) Environmental toxicological chemistry, which mainly talks about the dose-response relationship, kinetics, and the mechanism for teratogenesis, mutagenesis and carcinogenesis. (4) Environmental Engineering Chemistry, which mainly talks about the technical principles of chemical approaches of pollution control.

(4)【Course Title】Advanced Wastewater Treatment
高级废水处理工程
【Course Code】80050233
【Credits】3

【Credit Hours】48
【Semester】Spring
【Capacity】25 Graduate Students
【Instructor】WEN Xianghua 文湘华
【Course Description】

This course provides various kinds of engineering issues related to water environment in English, which cover fundamental knowledge, the latest technologies, including wastewater reuse & disinfection, anaerobic biological treatment technologies, membrane technology, biological nutrient removal technology, and etc., and regional application examples. These lectures, will also arrange English presentations by students, and discussions to enhance English capability and internationality of students.

(5)【Course Title】Restoration Ecology and Applications

恢复生态学及其应用

【Course Code】80050243
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】25 Graduate Students
【Instructor】LIU Xuehua 刘雪华
【Course Description】

Theoretic and practical research of restoring the degraded ecosystems is the hot topic in the modern ecological development. This course mainly contains the following contents: the degraded ecosystems under human disturbance, contents and development of restoration ecology, general introduction of global ecological restoration, restoration of degraded forest ecosystem, restoration of wetland ecosystem, restoration of grassland ecosystem, restoration of ocean and coast zone ecosystems, restoration of abandoned-land ecosystems, restoration of urban ecosystem. Restoration ecology is one of the key courses in Ecology. The students in Ecology, Ecological conservation and Environmental protection are requested to select it for credit.

(6)【Course Title】Global Environmental Issues

全球环境问题

【Course Code】80050253
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】25 Graduate Students
【Instructor】WANG Can 王灿
【Course Description】

The course will target to five important global environmental issues, including 1) global climate change, 2) Persistent Organic Pollutants, 3)

curriculum-transboundary movement of hazardous waste and international chemicals management, 4) biodiversity and conservation, and 5) global and regional air pollution. On the global climate change, the following aspects will be introduced: the scientific envidence and courses of global climate change, the impacts of and adaption to climate change, the social economic impacts of mitigation, the UNFCCC and its negotiation progress, the global carbon market, the global energy issues, and so on. Several discussion topics will be identified amonge the afforemention issues. Regarding the issue of Persistent Organic Pollutants (POPs), the course will firstly introduce the Origin of POPs as an environmental concern, followed by Properties and global transport of POPs, Process of developing the nternational treaty, Main POPs included in the Stockholm Convention, Obligations required by the Stockholm Convention, Existing barriers for developing coutries to implement the Convention, Obligation of developed countries in fianacial and technology transfer, Trend and main problems of the Stockholm Convention. The discussion topics will focus on listing new POPs into the Stockholm Convention. The part on curriculum-transboundary movement of hazardous waste and international chemicals management will cover the following issues: International Conventions related to transboundary movement of hazardous waste and international chemicals management will be introduced and discussed in this course. Based on the introduction of hazardous waste, origin, main content and development trend of Basel Convention will be instructed, with an emphasis on hot topics.

(7)【Course Title】Hazardous Waste Disposal
　　　　　　　　危险废物处置技术
【Course Code】80050263
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】25 Graduate Students
【Instructor】LI Jinhui 李金惠
【Course Description】
Solid waste pollution control and reclamation is one of the most popular topics in the field of environmental protection. Concerning solid waste, emphasis is laid on the sound environmental management of hazardous wastes and municipal wastes. Many universities aboard have set up courses of hazardous waste management, including management policy, methodology, technology, engineering and practices. Although a different course name is used here, the overall outlook is the same, including contents as follows. 1. Introduction on hazardous waste, including the history, important incidences and future endeavors of the hazardous waste management, and the definition, typology and sources of the hazardous waste. 2. The legal framework of hazardous waste management, including Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Stockholm Convention on Persistent Organic Pollutants, introduction on

laws and regulations of hazardous waste management in EU, USA and China, and cutting-edge information about hazardous waste management. 3. Hazardous waste minimization and management plan, including hazardous waste minimization, waste exchange, project planning and audits. 4. Hazardous waste treatment methods, including physical chemical processes, biological methods, stabilization and solidification. 5. Hazardous waste facility development and operation, including facility types, facility operations, needs assessment, site selection, public participation, permitting. 6. Hazardous waste thermal treatment methods, including regulations, combustion, liquid injection incinerators, solid waste incineration, storage and feed systems, air pollution control, continuous emission monitors, trial burns, mobile systems. 7. Hazardous waste land disposal methods, including landfill operations, site selection, liner and leachate collection systems, cover systems, contaminant transport through landfill barriers, landfill stability, etc.

(8)【Course Title】Social Practice
社会实践
【Course Code】69990041
【Credits】1
【Credit Hours】16
【Semester】Spring
【Capacity】30 graduate Students
【Instructor】DENG Shuo 邓述波
【Course Description】

In this course, the oversea students visit Chinese History Museum, Memorial Museum of Chinese People's Anti-Japanese War, Military Museum, Yuanmingyuan Park to know the Chinese history; visit exhibition such as China grow up to know Chinese culture and achievements in past 30 years; participate in community service to foster service consciousness; participate one of the in-situ social practices such as cycling economy, nationality culture, water environmental problems, teaching in west china to further know China change as well as the related environmental problems. Finally, the results of social practice are submitted in hard copy and orally presented.

(9)【Course Title】Environmental Transport Processes
环境传质学
【Course Code】70050332
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】30 graduate Students
【Instructor】ZHANG Fang 张芳, Bruce E.LOGAN
【Course Description】
This course covers the fundamentals of mass transport of chemicals between air, water, soil, and biota. Material is divided into three subject areas: mass transfer

theory, transport processes related to engineered reactors, and transport in the natural environment. The focus of the course is on chemical calculations particular to dilute systems, with emphasis on quantifying chemical transport rates and distributions in natural and engineered environments. Special topics of interest to Environmental Engineers include biofilm models, bioreactors, chemical partitioning in thin fluid films, and fate of anthropogenic chemicals from spills and discharges into the environment (rivers, lakes, and groundwater).

11. Department of Hydraulic Engineering

(1)【Course Title】Integrated River Management

河流综合管理

【Course Code】80040103

【Credits】3

【Credit Hours】48

【Semester】Spring

【Capacity】30 Graduate Students

【Instructor】WANG Zhaoyin 王兆印

【Course Description】

12. Department of Industrial Engineering

(1)【Course Title】Engineering and Technology Management
工程与技术管理
【Course Code】80160363
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】55 Graduate Students
【Instructor】HE Fang 何方 WANG Chen 王琛
【Course Description】
-Engineering and Management
-Functions of Technology Management
-Human Aspects of Organizing
-Leading Technical People
-Engineers in Marketing
-Globalization
-Engineering Economy

(2)【Course Title】Enterprise Information Management
企业信息资源管理
【Course Code】80160033
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】40 Graduate Students
【Instructor】CAO Hui 曹晖
【Course Description】
This graduate course leads students to systematically explore the fast expanding field of information systems and their applications in enterprises. Students will investigate the organizational and technical impact between enterprise management strategies and information system/technologies.

The course aims at getting students to think about the overall picture of enterprise information systems, match up the relationship between the production problems and corresponding IT solution, and at the same time, understand the methodologies of system analysis and design for enterprise information systems.

The course will help students choose from various information systems and development/integration strategies in an enterprise context. Strategies include Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management and Product Lifecycle Management will be investigated, and the methods of system analysis, enterprise modeling and enterprise integration will be discussed.

(3)【Course Title】Logistics & Supply Chain Management

物流与供应链管理

【Course Code】80160223

【Credits】3

【Credit Hours】48

【Semester】Spring

【Capacity】55 Graduate Students

【Instructor】HUANG Simin 黄四民 ZHANG Chi 张弛

【Course Description】

Develop a knowledge and understanding of the issues and technologies underlying supply chain management with a focus on analysis and design skills for Logistics systems, including demand management, inventory management, logistics network design, supply chain risk, etc.

(4)【Course Title】Manufacturing in China

中国制造

【Course Code】80160423

【Credits】3

【Credit Hours】48

【Semester】Spring

【Capacity】30 Graduate Students

【Instructor】ZHANG Chi 张弛 ZHENG Li 郑力 XIE Xiaolei 谢小磊

【Course Description】

Competence after taking this course: capable of analyzing and diagnosing complex production systems Knowledges to deliver: 1. Fundamental knowledge on production system modeling and analysis; 2. Production automation and its developing trends 3. A whole picture of Manufacturing in China integrated with logistics and supply chains 4. relationship between Manufacturing in China and Global manufacturing.

Methods: 1. Lectures on production systems; 2. Tours and on-site lectures in different production lines.

(5)【Course Title】China Studies: Industry, Society and Culture

中国研究：产业、社会与文化

【Course Code】80160433

【Credits】3

【Credit Hours】48

【Semester】Spring

【Capacity】50 Graduate Students

【Instructor】ZHU Wanshan 朱万山 MA Liang 马靓

【Course Description】

China is in the process of transforming from a society dominated by agriculture to one by modern industries. However, this transformation process is not a simple replication of the industrialization process that revolutionized the western world in

the first half of the twentieth century because the Chinese culture and the new technologies make this process distinct and bring many new challenges. This course teaches students the new trends and challenges in various industries that the industrial engineering may make the highest impact，and discuss the reach problems in these industries. The students will also learn the tools that have been used to solve these research problems. The focus industries include supply chain and logistic, transportation, energy, retail, medical service, and e-commerce. Emphasis is on the impact of the Chinese culture on the trends and challenges of these industries and on the difference between the Chinese and western industries. The course consists of learning the industry background in class room and on-site visiting & investigation, equally splitting in total learning hours.

13. Institute of Interdisciplinary Information Sciences

(1)【Course Title】General Physics (1)
　　　　　　　　　普通物理（1）
　　【Course Code】20470024
　　【Credits】4
　　【Credit Hours】64
　　【Semester】Spring
　　【Capacity】40 Undergraduate Students
　　【Instructor】Xiongfeng Ma
　　【Course Description】

Calculus-based first physics course for physics majors and students with a serious interest in physics. Students are required to actively participate during the lectures, asking questions, and having questions asked. This class will provide you with an enhanced opportunity to acquire a good understanding of fundamental mechanics and thermodynamics and to learn how to apply this understanding to physics and beyond.

(2)【Course Title】Mathematics for Computer Science
　　　　　　　　　计算机应用数学
　　【Course Code】30470023
　　【Credits】3
　　【Credit Hours】48
　　【Semester】Spring
　　【Capacity】45 Undergraduate Students
　　【Instructor】Andrew Chi-Chih Yao
　　【Course Description】

This course aims to introduce the fundamental mathematical techniques useful for computer science undergraduate majors, illustrated with a rich spectrum of applications. Modern computer science education requires the students to be equipped with broad knowledge in mathematics, so that they could cope with current and future technological challenges handily and innovatively. In this course, mathematical techniques from algebra, geometry, probability theory, stochastic modeling, and information theory will be covered. These techniques will be applied to algorithmic and design problems in various topics, including internet, cryptography, distributed systems, wireless sensor network, optimization, etc. Finally, this course introduces the students to deep scientific issues in the foundation of computing such as undecidability, complexity, and quantum computers.

(3)【Course Title】Operating System
　　　　　　　　　操作系统
　　【Course Code】30470084
　　【Credits】4

【Credit Hours】64

【Semester】Spring

【Capacity】55 Undergraduate Students

【Instructor】XU Wei 徐葳

【Course Description】

In this course, student will learn the design principles of operating systems, and techniques to build a complex software systems. Topics covered in this course include operating systems structure, multi-programming (processes, inter-process communication, and synchronization), memory management (virtual memory, segmentation, and paging), scheduling, file systems, system security, basic computer networking (switching, protocols), and basic concept on database management systems (transaction). In addition to classroom instruction, the students are required to complete a substantial programming project.

(4)【Course Title】Computational Biology

计算生物学

【Course Code】30470093

【Credits】3

【Credit Hours】48

【Semester】Spring

【Capacity】40 Undergraduate Students

【Instructor】ZENG Jianyang 曾坚阳

【Course Description】

To introduce various computational problems for analyzing biological data (e.g. DNA, RNA, protein sequences, and biological networks) and the algorithms for solving these problems. Topics covered include: biological sequence analysis, gene identification, regulatory motif discovery, genome assembly, genome duplication and rearrangements, evolutionary theory, clustering algorithms, and scale-free networks.

(5)【Course Title】Theory of Computation

计算理论

【Course Code】30470134

【Credits】4

【Credit Hours】64

【Semester】Spring

【Capacity】45 Undergraduate Students

【Instructor】Ran Duan

【Course Description】

This course gives an introduction to the basics of computation theory, including: Finite Automata, Regular language, Pushdown Automata, Context-Free Grammars, Turing machine, undecidablity, and computational intractable topics (NP complete, PSPACE, BPP etc).

(6)【Course Title】Combinatorics
组合数学
【Course Code】40470232
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】40 Undergraduate Students
【Instructor】Xiaoming Sun
【Course Description】

The course includes the following two parts: (I) counting-related topics, (II) special topics in combinatorics. In part (I), we will systematically introduce the basic concept related to counting, including permutation, binomial coefficients, recurrences, generating functions, Striling numbers and Catalan numbers, Inclusion–exclusion principle, Möbius inversion formula, and Polya theorem etc. In part (II), we will introduce basic knowledge about Number Theory, Pigeonhole Principle, Ramsey Theory, Probabilistic methods, Fixed points theorem etc.

(7)【Course Title】Autonomous Driving
自动驾驶
【Course Code】40470262
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】40 Undergraduate Students
【Instructor】Longbo Huang
【Course Description】

This course covers the design principles and implementation essentials of the various functional modules of an autonomous driving system: 1. Overview: architecture of autonomous driving system, and overview of the autonomous driving industry; 2.Hardware: sensors (sensor fusion), computational hardware and gps ; 3. Perception: computer vision and deep learning; 4. Map: roadgraph and 3D model of the static elements of the driving environment; 5. Localization: localization based on differential GNSS systems and computer vision; 6. Planning: global route planning and local trajectory planning; 7. Control: accurately execute the planned maneuvers through feedback control mechanisms 8. System and simulation: reliable, scalable and real-time system, including testing in both physical world and simulation.

(8)【Course Title】Distributed Computing (Fundamentals and Systems)
分布式计算（基础与系统）
【Course Code】40470034
【Credits】4
【Credit Hours】64
【Semester】Spring

【Capacity】40 Undergraduate Students
【Instructor】CHEN Wei 陈卫
【Course Description】

Through this course, students will learn fundamental algorithms and principles in distributed computing systems, such as logical clocks, consensus problem, failure detection, Byzantine agreement, distributed locking, and gossip protocols. They will also learn how to design and analyze distributed systems using these fundamental algorithms and principles through the study of a number of advance distributed systems.

(9)【Course Title】Network Science
　　　　　　　　网络科学
【Course Code】40470104
【Credits】4
【Credit Hours】64
【Semester】Spring
【Capacity】45 Undergraduate Students
【Instructor】Chenye Wu
【Course Description】

Network science is a new and emerging scientific discipline that examines the interconnections among diverse physical or engineered networks, information networks, biological networks, cognitive and semantic networks, and social networks.In this course, we examine the many facets of internet from the algorithmic perspective, including for instance the mathematical modeling of large-scale networks, information retrieval algorithms for massive data sets, algorithmic game theory and electronic commerce. Specific topics include small world phenomena, power law distributions, rank aggregation, web crawling, hubs and authorities, clustering large data sets, streaming algorithms, network routing, Nash equilibrium, market clearing, mechanism design, auction theory, social networks, etc.

(10)【Course Title】Introduction to Computer Networks
　　　　　　　　计算机网络基础
【Course Code】30470223
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】40 Undergraduate Students
【Instructor】HUANG Longbo 黄隆波
【Course Description】

This course aims at giving a comprehensive introduction to the fundamentals of computer networks and network performance analysis. The course contains two parts. The first part covers various networking topics including network principles, Ethernet, WiFi, routing, inter-networking, transport, WiMax and LTE,

QoS, and physical layer knowledge. The second part presents mathematical techniques for modeling, analyzing and designing computer systems, including convex optimization, queueing theory, game theory and stochastic analysis. This course is intended for junior or senior undergraduate students in computer science or electrical engineering.

(11)【Course Title】Advanced Theoretical Computer Science
　　　　　　　高等理论计算机科学
【Course Code】80470214
【Credits】4
【Credit Hours】64
【Semester】Spring
【Capacity】10 Undergraduate Students, 10 Graduate Students
【Instructor】LI Jian 李建
【Course Description】
The course will cover the following topics: NP completeness, PSPACE, L Space, IP system, BPP, derandomization, PCP, classical communication complexity, circuit complexity, Decision tree complexity.

quickly recall basics about convex optimization and machine learning: linear/logistic regression, regularization, newton method, stochastic gradient descent (asychronized, variance reduction method), generative vs discrimitive, variance vs bias.

Off-the-shelf machine learning and prediction algorithms: k-nn, SVM, kernel trick, clustering, Adaboost, gradient boosting, random forest.

Online learning and sequential prediction. Multi-armed bandit, Universal portfolio, Multiplicative weighting method, online convex optimization, basic time series

linear algebra-based learning algorithms: SVD, principle component analysis (PCA), independent component analysis (ICA), Nonnegative matrix factorization (NMF), topic modeling, matrix completion, dictionary learning, tensor method, spectral clustering.

(12)【Course Title】Advanced Quantum Information Theory
　　　　　　　高等量子信息学
【Course Code】80470163
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】10 Undergraduate Students, 30 Graduate Students
【Instructor】Kihwan Kim
【Course Description】
This course provides an overview of the latest advancements in quantum information theory and quantum computation. Starting from the foundation of the framework of density matrices and open system dynamics, the course gradually

transitions into two main chapters, the first about the quantum theory of information compression and transmission and the second on the topological models of quantum computation. The first chapter will deal with quantum entropies and quantum typicality, providing useful tools also for students interested in quantum thermodynamics. The second chapter will deal with anyons and geometric phases, showing the features of anyonic statistics can be used to perform stable and efficient quantum computations.Students who take this course will develop the mental discipline needed to identify and discuss critically these questions and will be provided with the sharpest theoretical tools to address these questions.

(13)【Course Title】Selected Topics in Information Physics
　　　　　　　　信息物理学
【Course Code】80470182
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】10 Undergraduate Students, 10 Graduate Students
【Instructor】Luyan Sun　孙麓岩
【Course Description】

This course aims at introducing graduate students to the rapidly developing field of information physics. Thecourse will highlight how the most important concepts in computation and complexity theory are physical, and howsome of the most puzzling question in physics can be answered through information theory. We review classicalinformation theory, and how to must be generalized with the discovery of quantum mechanics. The ramifications ofthis to information storage, energy extraction and computational complexity are discussed.

(14)【Course Title】Topics in Large-Scale Data Analysis
　　　　　　　　大规模数据分析专题
【Course Code】80470113
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】10 Undergraduate Students, 20 Graduate Students
【Instructor】Changle Lin　林常乐

(15)【Course Title】Quantitative Financial Credit and Risk Models
　　　　　　　　量化金融信用与风控分析
【Course Code】80470193
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】10 Undergraduate Students, 30 Graduate Students

【Instructor】Ling Huang & Jike Chong 黄铃，种骥科

【Course Description】

Internet brings significant impacts on finance industry, starting with the credit models. On the positive side, new technology enables new markets that potentially benefit more people in the society. However, the technology calls for a complete new credit model, which is still a state-of-the art research problem. Even worse, the fraudulent activities on the Internet bring more challenges to the finance industry. In this course, we present recent academic and industry practice in this area, to get students started on this cutting-edge research direction. There are three modules: 1) Credit models and architecture; 2) Anti-fraud architecture and design; and 3) Case studies. The students are expected to read 2 recent publications per week on average, and complete two significant course projects. On project is based on an open dataset and the other is open-ended.

(16)【Course Title】Security Technologies in Cyberspace

网络空间中的安全技术

【Course Code】80470233

【Credits】3

【Credit Hours】48

【Semester】Spring

【Capacity】10 Undergraduate Students, 30 Graduate Students

【Instructor】Wenfei Wu 吴文斐

【Course Description】

Cyberspace security consists of three parts – information security, system security, and application security. Information security leverages cryptographical mechanisms to guarantee data privacy; system security leverages sandboxing, program analysis etc. to guarantee the authentication and privacy of system usage; application security leverage anomaly behavior detection to recognize malicious user and software. In this course, we would discuss typical security issues and solutions in each section, and require students to practice them in course projects. We would also research into new security issues in latest scenarios and new technologies (e.g., machine learning, trusted execution environment) that can be used to solve security problems.

(17)【Course Title】Algorithrn economics

算法经济学

【Course Code】80470223

【Credits】3

【Credit Hours】48

【Semester】Spring

【Capacity】10 Undergraduate Students, 20 Graduate Students

【Instructor】Yang Yu 于洋

【Course Description】

Algorithm design has deeply involved into the operation of the platform economy, the dispatch economy, and the sharing-and-renting economy. The algorithm designs shape the market equilibriums, decide the welfare-distribution, and affect the environments and global climate change, Symmetrically, the future human society also eagerly expects the research about how government can develop "smart regulations" for the algorithm economy. All these topic are the frontier of the interdisciplinary research of economics and computer science.

Thus, the course will include two sections. The first section discusses the algorithm design in the modern economy, such as the algorithm designs and associated economics theories for the platform economy, dispatch economy, and sharing-and renting economy. In particular, we will introduce the dispatch algorithm designs of the electricity economy.

14. International Chinese Language and Culture Center (ICLCC)

(1)【Course Title】Elementary Chinese

　　　　　　初级汉语

　　【Course Code】60610162 (2)

　　【Credits】2

　　【Credit Hours】32

　　【Semester】Spring

　　【Capacity】25

　　【Instructor】ZHANG Yi　张怡

　　【Course Description】

　　For Exchange Students (Beginner).

15. School of Journalism and Communication

(1)【Course Title】Media Management
　　　　　　　　媒介管理
　【Course Code】80670572
　【Credits】2
　【Credit Hours】32
　【Semester】Spring
　【Capacity】45 Graduate Students
　【Instructor】Richard S. Dunham
　【Course Description】

(2)【Course Title】Feature Writing in English
　　　　　　　　英语特稿写作
　【Course Code】80670612
　【Credits】2
　【Credit Hours】32
　【Semester】Spring
　【Capacity】45 Graduate Students
　【Instructor】WANG jiaquan 王家全
　【Course Description】

This course aims to integrate reading and writing of feature journalism. By reading the canonic texts of feature writing from British and US newspapers and magazines, the instructor will help students know its notion, genre, and format. The students will practice the different styles of feature writing (political, economic, social and cultural) with the instructor's guidance.

(3)【Course Title】News Writing and Multi-media Reporting
　　　　　　　　新闻写作与多媒体报道
　【Course Code】80670793
　【Credits】3
　【Credit Hours】48
　【Semester】Spring
　【Capacity】30 Graduate Students
　【Instructor】Richard S. Dunham
　【Course Description】

This course contains two main modules: news writing and multi-media reporting. In the news writing module, students are trained with basic knowledge of writing and reporting, with a focus on business news. In the multi-media reporting module, students are trained with basic skill of applying multi-media devices for business report.

(4)【Course Title】Business News Data Mining and Analysis
　　　　　　　　财经新闻数据挖掘与分析

【Course Code】80670833
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】45 Graduate Students
【Instructor】Lee J. Miller
【Course Description】
A key asset of the class will be students' use of the Bloomberg Professional Terminal. TSJC has more terminals of any university in the world. Students will have the opportunity to learn data mining on the platform that is used by the world's leading business journalists, financial analysts, economists and consultants will provide a competitive advantage upon graduation and during their careers.

16. School of Law

(1)【Course Title】International Law 国际法
　　【Course Code】70660452
　　【Credits】2
　　【Credit Hours】32
　　【Semester】Spring
　　【Capacity】
　　【Instructor】JIA Bingbing 贾兵兵
　　【Course Description】
This is a seminar course in English. The subject matter is concerned with dispute settlement mechanisms in the international legal order. The course will introduce the development of methods for dispute settlement, the growth and maturing of institutions, the work and case law of the major institutions, and the impact of case law on the development of international law. The course will also examine current problems of the mechanisms and introduce China's contributions, where suitable.

(2)【Course Title】Advanced Topics on Law and Technology 科技法讲座
　　【Course Code】80660602
　　【Credits】2
　　【Credit Hours】32
　　【Semester】Spring
　　【Capacity】
　　【Instructor】Randall R.Rader
　　【Course Description】

(3)【Course Title】Foreign Copyright Law 外国版权法
　　【Course Code】80661783
　　【Credits】3
　　【Credit Hours】48
　　【Semester】Spring
　　【Capacity】
　　【Instructor】Joseph P.Liu
　　【Course Description】

　(4)【Course Title】Advanced Topics on Foreign Intellectual Property Law 外国知识产权法专题
　　【Course Code】80661452
　　【Credits】2
　　【Credit Hours】32
　　【Semester】Spring
　　【Capacity】
　　【Instructor】Heinz Goddar
　　【Course Description】

(5)【Course Title】Preparation and Presentation of Case in International Arbitration
国际仲裁案例研修
【Course Code】80661803
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】
【Instructor】Teresa Cheng 郑若骅
【Course Description】

(6)【Course Title】Enforcement of Arbitral Awards 国际仲裁裁决的执行
【Course Code】80661812
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】
【Instructor】Albert Jan Van Den Berg
【Course Description】

The New York Convention is the most important treaty in the context of international commercial arbitration. The module will examine the cases on recognition and enforcement of arbitration agreements and arbitral awards under the New York Convention in various jurisdictions. The jurisprudence emanating from the court decisions on the way as to how various jurisdictions interpret this Convention will be studied and discussed.

(7)【Course Title】WTO Dispute Resolution WTO 的争端解决机制
【Course Code】80661933
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】
【Instructor】LU Xiaojie 吕晓杰
【Course Description】

The course provides a basic understanding in WTO law and the practice and procedures of the Appellate Body of the WTO. An overview of WTO disputes resolution procedures will also be presented.

(8)【Course Title】Arbitration in Asia 亚洲国际仲裁
【Course Code】80661944
【Credits】4
【Credit Hours】64
【Semester】Spring
【Capacity】

【Instructor】Justin D Agostino
【Course Description】

(9)【Course Title】Foundations of Common Law 4 普通法精要 4
【Course Code】80660673
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】
【Instructor】GAO Xiqin 高西庆
【Course Description】

(10) 【Course Title】Foundations of Common Law 2 普通法精要 2
【Course Code】40661794
【Credits】4
【Credit Hours】64
【Semester】Spring
【Capacity】
【Instructor】Jane Willems
【Course Description】

(11) 【Course Title】Chinese Banking Law
【Course Code】80669022
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】
【Instructor】GAO Simin
【Course Description】

(12) 【Course Title】International Intellectual Property Treaties
【Course Code】80661193
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】
【Instructor】FENG Shujie
【Course Description】

(13) 【Course Title】Chinese Securities Law
【Course Code】80669142
【Credits】2
【Credit Hours】32
【Semester】Spring

【Capacity】
【Instructor】TANG Xin
【Course Description】

(14) 【Course Title】Legal Debate and Negotiation 法律辩论与谈判
    【Course Code】40661653
    【Credits】3
    【Credit Hours】48
    【Semester】Spring
    【Capacity】
    【Instructor】Jane Willems
    【Course Description】

17. School of Life Sciences

(1)【Course Title】Topics in Tumor Biology
　　　　　　　　肿瘤生物学专题讨论课
　【Course Code】90450041
　【Credits】1
　【Credit Hours】16
　【Semester】Spring
　【Capacity】15 Graduate Students
　【Instructor】CHEN Yeguang 陈晔光
　【Course Description】

(2)【Course Title】Biochemistry (1)
　　　　　　　　生物化学（1）
　【Course Code】30450203
　【Credits】3
　【Credit Hours】48
　【Semester】Spring
　【Capacity】165 Undergraduate Students (Course number 1), 165 Undergraduate Students (Course number 2)
　【Instructor】LIU Dong 刘栋
　【Course Description】
The main purpose of this course is to teach the students the basic concepts in biochemistry, which includes the structures and functions of proteins, nucleic acids, carbohydrates, lipids and biomembranes. We will also put the emphasis on enzyme kinetics and molecular mechanisms of signal transduction of the cells.Besides lectures, we will also discuss the problems and answer the questions to the students through the websites or one-to-one meeting. There are will be some homework assignments to students after each lecture. We will also recommend some original research articles for students to read to further raise their interests in biochemistry.

(3)【Course Title】Genetics
　　　　　　　　遗传学
　【Course Code】30450303
　【Credits】3
　【Credit Hours】48
　【Semester】Spring
　【Capacity】280 Undergraduate Students
　【Instructor】ZHOU Bing 周兵
　【Course Description】
This course is designed to introduce genetic principles to students of biology major. It aims to cover comprehensively all fields of classical and modern genetics, but skips most topics that have been taught in biochemistry and microbiology.

(4)【Course Title】Molecular Biology
　　　　　　分子生物学
【Course Code】30450453
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】160 Undergraduate Students (Course number 1), 160 Undergraduate Students (Course number 2)
【Instructor】XI Qiaoran　郗乔然
【Course Description】

Molecular Biology is to study the activity and function of genes at molecular level. In this class, I will introduce the key points in molecular biology, focusing on the basic theories and major techniques with current development and emerging discoveries of molecular biology. The main topic in this class includes: 1) the major tools to study genes and their activities, 2) Transcription and transcriptional regulation in prokaryotes, 3) Transcription and transcriptional regulation in eukaryotes, 4) DNA and protein interaction during transcription, 5) Post-transcriptional modification of RNA, 6) DNA recombination and transposition, 7) DNA damage repair, 8) Small RNAs, 9) Omics (genomics, transcriptomics and proteomics).

18. School of Materials Science and Engineering

(1)【Course Title】Introduction to Metallic Functional Materials
金属功能材料导论
【Course Code】20350102
【Credits】2
【Credit Hours】32
【Semester】Spring
【Capacity】20 Undergraduate Students
【Instructor】GODFREY ANDREW WILLIAM
【Course Description】

This is an introductory level course aimed at giving a basic introduction to the key relationship between structure and properties in material science, and on a wider level to encourage students to think about the role of materials in modern society. The course content will focus predominantly on metallic materials, but for completeness will also cover other classes of material (including ceramics, composites and semi-conductors). The first half of the course will cover the atomic structure of materials and then review different meanings of the mechanical "strength" of a material. Following this some key functional properties will be covered, including electrical conduction, semi- and super-conduction, and magnetism. The final lecture will give students an insight into the materials science of carbon-based materials. This is a Freshman Seminar course – where all students will be expected to participate in class discussions on topics raised during the lecture periods, and where the emphasis is not on learning technical details, but on developing an awareness of key concepts. The course is open to students from all backgrounds – in the past students with study majors as diverse as economics and medicine have taken part, and actively contributed to the course. Course assessment will be based on a combination of a group presentation (groups of 3-4 students depending on class size), a final written paper (4 pages typically), and class participation. Note that the class will be conducted entirely in English, so students should be comfortable with this. The final written paper will however not be graded based on the quality of the written language (as long as the key points presented are clear).　There is no textbook for the course – lecture handouts in PDF format and additional reading materials will be provided as required.

19. Department of Mechanical Engineering

(1)【Course Title】Welding Technology I: Welding and Cutting Technologies

　　　　　　　焊接技术 I：焊接与切割方法

　　【Course Code】80120253

　　【Credits】3

　　【Credit Hours】48

　　【Semester】Spring

　　【Capacity】30 Graduate Students

　　【Instructor】ZHAO Haiyan 赵海燕

　　【Course Description】

(2)【Course Title】Numerical Simulation of Manufacturing Processes

　　　　　　　制造过程数值模拟技术

　　【Course Code】80120692

　　【Credits】2

　　【Credit Hours】32

　　【Semester】Spring

　　【Capacity】20 Graduate Students

　　【Instructor】RONG Yiming 融亦鸣

　　【Course Description】

The course is designed by Professor Yiming Rong. The course has been designed to focus on fundamentals and numerical modelling technology for manufacturing processes. The newest commercial CAE software packages have been provided for projects and exercises. The content of this course includes the fundamentals, complete procedure and state-of-art on applications of numerical simulation technology in modern manufacturing engineering. The goal of this course is to help students to grasp basic concepts and main steps in numerical simulation for manufacturing processes systematically, to connect the manufacturing theory with modelling technology, to understand the state of art and tendency of the technology, to extend the capability of analyzing and solving problems. It will be foundation of digitalization of manufacturing processes that has been developing rapidly.

(3)【Course Title】Manufacturing Technology II

　　　　　　　制造技术（2）

　　【Course Code】80120723

　　【Credits】3

　　【Credit Hours】48

　　【Semester】Spring

　　【Capacity】15 Graduate Students

　　【Instructor】SHI Wei 石伟

　　【Course Description】

Manufacturing Technology II is one of courses belonging to the joint master degree program of RWTH Aachen in Germany and Tsinghua University, and open

of international students. The main purpose of this course is to teach postgraduate students materials forming mechanism, and production procedure, productivity and cost about material forming techniques which consist of casting, sintering, and metal forming technology. Besides metallurgy and the processing method knowledge, the course also teaches students how to analyze and compare different manufacturing methods by considering dimension accuracy, production efficiency and costing of these methods, and using methods of technology planning. Forming technology is the main part of this course, which includes metallurgical basics in plastic deformation, bulk forming, blanking, and forming tools and tribology. The course is given in English and offered to international students whose majority is Production Engineering, Industrial Engineering, or Mechanical Engineering. The course is given in every week, 3 units per week.

(4)【Course Title】Engineering Materials
工程材料
【Course Code】20120293
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】20 Undergraduate and Graduate Students
【Instructor】CHANG Baohua 常保华
【Course Description】

This course combines the fundamentals of engineering materials with their applications. By means of lectures, discussion, and lab exercises, the students are enabled to understand the relationships among the four elements of materials science and engineering, i.e., composition and processing, microstructure, property, and performance.

The lectures consist of mainly three parts. The first part briefs the atomic-level structures of engineering materials, including the interatomic bonding, crystalline and noncrystalline structures, crystal defects, crystallization, and atomic diffusion. In the second part, the basic relationship between structures and mechanical properties is introduced. The stress-strain behaviors and strengthening mechanisms of metallic, ceramic and polymeric materials, as well as the fracture failure are correlated with the structures. In addition, the development of equilibrium microstructures in binary alloys (including Fe-C alloys) and ceramics is analyzed with reference to the phase diagrams. Furthermore, the heat treatments of steels and nonferrous alloys are introduced, and the metastable microstructural development and mechanical property alteration are described. The third part gives a general introduction about the typical compositions, processing, and applications of structural materials, covering metal alloys, ceramics and glasses, polymers, and composites. The necessity of corrosion and wear control for metal alloys is also included. The physical properties of functional materials are briefed, with a focus on their applications in thermal, semiconducting, dielectric, piezoelectric, magnetic, superconductive, and optical devices.

The course is given in every week, 3 units per week.

(5)【Course Title】Machine and Manufacturing I

设计与制造 I

【Course Code】30120324
【Credits】4
【Credit Hours】64
【Semester】Spring
【Capacity】30 Undergraduate Students
【Instructor】ZHAO, Jingshan 赵景山，MA, Liran 马丽然
【Course Description】

This course focuses on cultivating the creativity of student for mechanical system and structure design. Design is the core, and analysis and calculation server the design. This course mainly introduces the engineering design method of mechanical system, mechanism innovation and creative conceiving method, process and the theory, and the design and calculation of general mechanical structures. After studying the course and practicing in fabricating engineering, the student will not only grasp the primary knowledge of mechanical engineering design but also improve his or her knowledge from design to manufacturing and the practice ability.

20. School of Medicine

(1)【Course Title】Management on Public Health Services

卫生事业管理

【Course Code】74000283
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】10 Undergraduate Students, 50 Graduate Students
【Instructor】LIU Tingfang 刘庭芳
【Course Description】

Management on Public Health Servicesis a subject that explores the development rule of health service, the allocating mechanism of health resource, health policy in step with the situation of China, organization management or work method, and the experiences from other countries based on the theory, method and technology of modern management science to improve the people's health status. This course covers the framework of the health organization, health resource management, health policy analysis, health insurance system and all kinds of health affairs.

(2)【Course Title】Epidemiology

流行病学

【Course Code】74000293
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】10 Undergraduate Students, 50 Graduate Students
【Instructor】ZHANG Linqi 张林琦
【Course Description】

Epidemiology is a population level research on diseases and health science. Course content includes general and special theory. Its general theory describes the basic concepts, basic knowledge and general theory of the Epidemiology. The special part aims to the introduction on the application of epidemiology in disease prevention and control, mainly involving large current human health hazard of infectious diseases and chronic non-infectious diseases, such as cardiovascular diseases, cancer, the respiratory system and the digestive system diseases, sexually transmitted diseases, AIDS, injuries etc.

21. Department of Microelectronics and Nanoelectronics

(1)【Course Title】PLL Design and Clock/Frequency Generations

PLL 设计与时钟/频率产生

【Course Code】80260042

【Credits】2

【Credit Hours】32

【Semester】Spring

【Capacity】40 Graduate Students

【Instructor】LI Yugen 李宇根

【Course Description】

This course gives insights into phase-locked clock generation as well as the ability of gaining system perspectives and circuit design aspects of phase-locked loop (PLL) for wireless and wireline communications. In the first half of the course, basic theoretical analysis of the PLL and system/circuit design considerations will be discussed. The second half of the course consists of extensive lectures covering practical design aspects in various PLL applications and more advanced topics; frequency synthesis, clock-and-data recovery, delay-locked loops, on-chip testability and compensation, coupling in SoC design, and future challenges.

22. Department of Physics

(1)【Course Title】Physics (1)

　　　　　　　大学物理（1）

　　【Course Code】10430344

　　【Credits】4

　　【Credit Hours】64

　　【Semester】Spring

　　【Capacity】150 Undergraduate Students

　　【Instructor】BI Kaijie 毕楷杰

　　【Course Description】

(2)【Course Title】Physics (2)

　　　　　　　大学物理（2）

　　【Course Code】10430345

　　【Credits】4

　　【Credit Hours】64

　　【Semester】Spring

　　【Capacity】150 Undergraduate Students

　　【Instructor】BI Kaijie 毕楷杰

　　【Course Description】

23. School of Public Policy and Management

(1)【Course Title】Economic Development and Policy in China
　　　　　　中国经济发展与政策
　　【Course Code】70590603
　　【Credits】3
　　【Credit Hours】48
　　【Semester】Spring
　　【Capacity】50 Graduate Students
　　【Instructor】HU Angang 胡鞍钢 GAO Yu'ning
　　【Course Description】

This course offers an introduction to key issues in China's economic development and policy since People's Republic established six decades ago. Emphasis is placed on the political economy of economic development, economic reform and the current challenges facing the Chinese economy. The course does not presume that students have prior experience studying China or that they have completed graduate-level training in economics; however completion of an introductory economics course is highly recommended.

(2)【Course Title】Science & Art of Leadership
　　　　　　领导科学与艺术
　　【Course Code】80590213
　　【Credits】3
　　【Credit Hours】48
　　【Semester】Spring
　　【Capacity】50 Graduate Students
　　【Instructor】WANG Youqiang 王有强
　　【Course Description】

Leadership is a complex phenomenon involving the leader, the followers, and the situation. In this course, leadership is defined as "the process of influencing an organized group toward accomplishing its goals". The course will critically review the major theories of leadership as well as provide practical advice about improving leadership, and pay special attention to leadership practice for international development. The students will learn certain conceptual frameworks for thinking about leadership and practice several dozen specific leadership skills. This provides students with relevant knowledge and tools to recognize their own leadership traits and styles, and design their own leadership development plan and start improving their leadership skills, and behavior. Thus, the course can help students finding an effective way for making sustainable leadership development with their own experiences as a particularly valuable part.

(3)【Course Title】Chinese Constitutional and Administrative Law
　　　　　　中国宪法与行政法
　　【Course Code】80590773

【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】50 Graduate Students
【Instructor】YU An 于安
【Course Description】

This course introduces the jurisprudential framework of Chinese constitutional law and administrative law which provide primary legal foundation for Chinese government. The constitutional law, as the first part of this course, involves the following topics: (1) General principle of Chinese constitutional law; (2) the fundamental institution of the state and basic principles of economy and society; (3) the system and structure of central and local government, which are based on the doctrines of democratic centralism and the unitary state; (4) human rights, citizen's basic rights and obligations. The key theme of this part is relationship between the state and citizens in terms of constitutionalism. The administrative law is the larger part of this course. It studies a number of subjects on the executive body's establishments and functions. The topics will be divided into four groups: (1) General principle of Chinese administrative law; (2) the organization of the executive body : formation and legal competence, the range of its functions, and the system of civil servant; (3) the act of the executive body: form and process to make decision with legal effect, means to implement decision; (4) supervision over the executive body and legal remedies to the aggrieved individuals, focusing on the administrative review ,the judicial review and the state liability. The Chinese model of administrative law, namely the development-orientated administrative law will be explored in-depth, based on the fact that the development dominates operation of Chinese government at all levels and on full scale.

(4) 【Course Title】**Technology Innovation and Entrepreneurship**
技术创新创业
【Course Code】**80590793**
【Credits】3
【Credit Hours】48
【Semester】Spring
【Capacity】50 Graduate Students
【Instructor】Yuan Zhou
【Course Description】

Technological innovation is a key driver of change in several increasingly inter-connected industries. This module will seek to familiarize the students with basic concepts in innovation management, entrepreneurship strategy, and how firms seek to build their competitive advantage on technology. We will focus in particular on the dynamics of technological evolution, entrepreneurial competition, and technology/industrial policy around the innovations in the New Economy. The module will help students understand how firms such as Microsoft, Nuctech

or some Chinese university spin-offs are able to develop sustainable competitive advantages based on their technologies, while other, equally innovative firms fail to capitalize on their innovations. In addition, this module will also help students to understand how entrepreneurial firms strategize their incubation and growth. Further, this module introduces what innovation policies are required for innovation.

(5)【Course Title】**Globalization & Governance**
　　　　　　　　全球化与治理
　　　【Course Code】**80590693**

　　　【Credits】3
　　　【Credit Hours】48
　　　【Semester】Spring
　　　【Capacity】50 Graduate Students
　　　【Instructor】**Sara J. Bice**
　　　【Course Description】
This interactive course introduces students to the key dimensions of globalization relevant for public policy analysis and decision-making. It does so by exploring theoretical debates and empirical cases within the context of 'the Asian Century'. Students will be encouraged to interrogate the ongoing public debate about globalization, to explore how it may shape the content (i.e. what does public policy include/exclude), construct (i.e. what are the differences in terms of how public policy is viewed) and conduct (i.e. how public policy is made and realised) of current and future public policy and governance, including progress against the SDGs. This course aims to provide students with the necessary foundations for creating, analysing and implementing public policy at various levels, within a global context.

About the Instructor

Sara Bice is Co-Director Research Translation, Melbourne School of Government and Deputy Director, Melbourne Energy Institute, The University of Melbourne. She is President-Elect for the International Association for Impact Assessment and is a Westpac Bicentennial Foundation Fellow. She developed and coordinated the Melbourne School of Government's 'Public Policy in the Asian Century' research program with Professor Helen Sullivan and is co-editor of a book by the same title. Sara's research focuses on optimal governance and policy decision-making for natural resource management and delivery of major engineering projects.

(6)【Course Title】**Frontier on Public Policy Study**
　　　　　　　　公共政策研究前沿
　　　From Industrial to Innovation Policy -The role of Technology and Innovation Policies in National Growth
　　　【Course Code】**90590023**
　　　【Credits】3
　　　【Credit Hours】48

【Semester】Spring
【Capacity】50 Graduate Students
【Instructor】**Alessandro Golombiewski Teixeira**
【Course Description】
Industrial policy has been a cornerstone of economic policy in Europe, Asia, and the United States of America after the Second World War. This has been true most notably in those economies which had been most devastated by the war, to support a more rapid structural change of their economies towards internationally stronger, large industrial sectors and help to transform agricultural based economies into industrial economies.

During the 1970s and 1980s, industrial policy shifted toward supporting the birth of high-tech industries in developed economies and gained supporters in developing economies represented in different economic models such as an import substitution in Latin America and export-led economic models in South Korea and Japan, for example. During the '80s, the importance of a more systemic view came up, and the policy had to address the specific weaknesses of the innovation system. From the '90s, the industrial policy framework changed to be science and technology based, such that innovation became one of the main pillars of economic growth.

There is probably not one concept in the economic policy field which raises as much controversy as industrial and innovation policy. Its results, scope, policy choices, designing methods and effectiveness have been debatable for decades. Governments around the world are searching for ways to foster industrial and economic development through the power of science, technology and innovation.

This Course is specially designed for the Tsinghua University School of Public Policy and Management to raise, analyse and discuss, in depth, such issues.

(7)【Course Title】**Guest Lecture Series II**
   National Security Strategy of China: Policies and Practices
   【Course Code】**80590902**
   【Credits】**2**
   【Credit Hours】36
   【Semester】Spring
   【Capacity】50 Graduate Students
   【Instructor】Xin'ning GUO
   【Course Description】
This course is designed to introduce and explore the evolution of China's national security strategy, its past and current policies, practices as well as future trend since the PRC was established in 1949. It is aimed at giving a general overview of China's striving for national survival and development in the past 68 years so as to help students get a better understanding of China's experiences and policy practices in safeguarding her national security.

The topics of the lectures will include introduction of international and Chinese theories on national security, China's policies and practices in national security

related fields. The lecturer will provide his own understandings and analyses on the topics.

24. School of Social Sciences

(1)【Course Title】Fundamentals in International Political Economics
国际政治经济学基础
　　　【Course Code】40700573
　　　【Credits】3
　　　【Credit Hours】48
　　　【Semester】Spring
　　　【Capacity】30 Undergraduate Students
　　　【Instructor】CHEN Maoxiu 陈懋修
　　　【Course Description】

This introductory undergraduate course provides an overview of the field of international political economy (IPE) to students who have little to no previous background knowledge. The main aim is to help students to understand the interaction between international political and economic systems, forces and actors. The course asks two main questions: first, how do states, social forces and various kinds of institutions affect the flow of economic resources across national boundaries? Second, how do economic forces constrain the behavior of political actors at the international level? The course will also emphasize the importance of economic and political ideas in understanding both international and domestic political and economic systems.