

30000072 English Summer Camp for Built Environment 2 credits 32 hours

To improve English level, especially for listening and speaking. To obtain some basic knowledge on the background of this major, and corresponding expression in English. To improve comprehensive ability, including teamwork, communication, speech and so on.

00030272 Transportation for Tomorrow(C-Campus Course) 2 credits 32 hours

“Transportation for Tomorrow” course included in Tsinghua-KTH course “Creative Learning” is hosted by both Tsinghua University and KTH. The course is innovative in the teaching mind and approach. Different from the conventional teaching pattern that focuses on transferring knowledge to students, the course is based on exploring and researching by interaction between teachers and students. Students would gather knowledge through discussion in class and self-learning. Teaching group consists of five teachers from Tsinghua – Jianping Wu, Qing Zhou, Runhua Guo, Li Li and Yiman Du – and six teachers from KTH - Niki Kringos, Sebastiaan Meijer, Staffan Hintze, Susanna Toller, Anders Wengelin, Mikael Nybacka.

15 students will be selected from Tsinghua University and KTH respectively. Language capability, capability of independent observation and thinking, teamwork ability constitutes the judging criterion in the selection.

The course aims at training the capability of creative learning within this specific teaching environment. Likewise, the course will build a new type channel of communication between teachers and students providing chances for professors and students to communicate with each other. Teaching pattern is mainly made up by discussion. During the course, training of capability of observation, raising questions, analysis and solving question is focused on.

In the course, students would be categorized into 5-6 groups. Each group has 5-6 students, including 2-3 students from KTH and 2-3 students from Tsinghua University, and they will have a topic related to future transportation. The course lasts 8 weeks. In first 2 weeks, students should raise a question through observation and investigation. In weeks 3-6, the topic will be accomplished by discussion in the whole team. Finally, in weeks 7-8, seminar and examination in class will be hosted.

It's a brand new exploring course and significant in training of creative learning of students.

20030142 Structural Mechanics(2)(in English) 2 credits 32 hours

This course is intended to provide the student majoring in civil, architectural and other related areas skills of structural analysis at an intermediate level. It consists of three major topics: Matrix analysis of structures, Plastic limit analysis and dynamic behavior of structures. The matrix analysis part exposes the student to the elementary skills and procedures in large-scale problems that can only be dealt with using computers. The second topic covers the essential concepts in plastic design of structures. In the third topic, emphasis is placed on the dynamic response analysis of discrete parameter (lumped mass) systems. The behavior and elementary skills of dynamic analysis of discrete parameter systems are studied.

30030482 Construction Contracts 2 credits 32 hours

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.

30030493 Steel Structure (1) (in English) 3 credits 48 hours

This course is one of the most important specialised courses for undergraduates majoring in civil engineering. It mainly introduces principles of mechanism and design methods by means of lectures. More specifically, the contents include: i) characteristics and advantages of steel structures, their development and application as well as basic requirements for their design; ii) manufacturing process, mechanical properties and selection of steel

structural materials; iii) connections in steel structures, and fundamental behaviour, mechanical analysis, design method and configuration requirements of both welded and bolted connections; iv) failure modes of steel members subjected to axial loadings, design theories of their strength, stiffness, overall and local buckling, as well as design and checking of their cross-sections; v) flexural behaviour of steel members including calculation of their strength, stiffness, flexural-torsional buckling and local buckling within flanges and web, as well as design of cross-sections and configuration requirements of hot-rolled and welded steel beams; vi) mechanical performance of steel members subjected to bending with tension or compression in combination, including calculation method of their strength and buckling and configuration details; vii) typical joints in steel frame structures and their loading capacities, configurations. National standards are also incorporated in this course, including the China's one and the European and American ones.

40030702 Programming Analysis of Structures(in English) 2 credits 32 hours

This course is about the computer-oriented analysis theory and method for skeletal structures. It covers the constraint matrix method for structural geometry stability analysis; the balance matrix method for the computation of internal forces in static determinate structures; the direct stiffness method for structural static analysis; the dynamic stiffness method for structural free vibration analysis and the direct method for the solution of influence lines of internal forces in structures.

40030902 Building Materials 2 credits 32 hours

This course offers a broad introduction to materials used in civil engineering, including cement, concrete, steel, masonry, asphalt concrete, wood and composites. The characteristics of each type of material are discussed in terms of the following aspects: basic structure and properties of the materials, mechanistic behavior of the material and physical properties, environmental influences, engineering applications etc. Acting as a bridge linking fundamental principles to engineering practice, this course emphasizes on the engineering behaviors of these material systems. Understanding of these behaviors will be approached through detailed examination of the materials' microstructural characteristics and the associated structure performance. The students will derive benefit from this course in terms of fundamental principles, experiences, and skills.

40030942 Traffic Analysis and Design 2 credits 36 hours

The course systematically introduces traffic survey methods, road capacity, traffic flow theory, transport modeling, traffic assignments, traffic flow management and traffic simulation theory and technologies, and preliminary introductions of intelligent transport systems, traffic safety and sustainable development of transport. The course will be given with application examples and coursework to deepen and consolidate knowledge, and through reference reading and interactive classroom discussion to increase students' independent thinking and self-learning ability.

40031041 Design of Timber Structures 1 credits 16 hours

This course teaches design of timber structures. It is established based on the undergraduate course taught at university of British Columbia, Canada, and important knowledge needed in the engineering practice of china are supplemented. The major contents in this course includes but not limited to: properties of timber material, commonly used timber structural system, analysis of timber members, and analysis of connections. Finally, The students are required to accomplish a real time engineering projects based on the design code of timber structures.

30040362 Foundation Analysis and Evaluation(in English) 2 credits 32 hours

This course, together with Soil Mechanics 1 describes the behaviour of engineering soils and simple geotechnical structures such as shallow and piled foundations, retaining walls and slopes.

This course simply introduces students to the subject of geotechnical engineering standing one of the major disciplines in civil engineering analysis (the other being structures, hydraulics) using an up-to-date approach: a simple framework of critical state soil mechanics plus the theoretical methods for stability problem of foundations and geotechnical structures, i.e. upper bound, lower bound (LA) and limit equilibrium methods (LEM). Simple theories and idealization for soil behaviour are maintained throughout this course for the purposes of teaching fundamental principles to students.

30040393 Hydraulics(2) 3 credits 48 hours

Open Channel Steady Flow

Flow classification, uniform flow, specific energy, subcritical flow, supercritical flow.

Gradually varied flow, water surface profiles, numerical simulation.

Rapidly varied flow, momentum principle, hydraulic jump.

Open Channel unsteady Flow

One-dimensional continuity and momentum equations, The method of Characteristics, finite difference method, application.

Two-dimensional shallow water equations

Two-dimensional flow property, Coriolis force, eddy viscosity.

Hydraulic Structures

Weirs, sluice gates, spillways and energy dissipation.

30050302 World Environmental and Cultural Practice 2 credits 32 hours

This course is completely taught in English, which is designed to enhance the English practical ability of undergraduates, improve the understanding of the world environment and culture, and improve the ability of self-learning, active communication and public speaking. This course also aims to help the students build their international vision and team spirit. The whole course consists of 3 programs, Global Environment, World Culture, and International Action. Programs will be conducted in various formats, which include: (1) lectures to introduce not only western cultural and historical knowledge but also state of the art technologies in environmental areas; (2) case studies to enable students to understand well and learn how to solve problems in English; (3) group discussions or activities to enhance the ability of utilizing English in professional fields and communications with people; (4) free-style group exhibitions to emphasize responsibilities in team work.

40050622 Treatment technologies for safe drinking water 2 credits 32 hours

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 by appropriate unit operations in the conventional treatment process and the advanced treatment process, focusing on the principle as well as the application conditions and treatment performance 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.

40050712 Study Abroad Program 12 credits 320 hours

The undergraduate students in Global Environment Program of School of Environment, Tsinghua University are required to attend the Study Abroad Program during their junior year and complete at least four core courses.

40050752 Low-carbon Technology and Management 2 credits 32 hours

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. Development of low-carbon technologies 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. 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 originitive ways.

40050762 Introduction to International Environmental Law 2 credits 40 hours

This is a five days intensive course on international environmental law, using Beyerlin and Marauhn's work (International Environmental Law) as a textbook. The course covers the following major themes: History of international environmental law; source of international environment law; major Principles of environmental law; topic Studies (Current international law on Ocean and Marine resources, and Climate Change); law-making and enforcement processes; relationship between international environment law and trade law.

40050773 Sustainability: Environment, Energy and Personal Choices 3 credits 48 hours

With the growing requirement on environmental resources for the development of human society, global environmental problems have become increasingly prominent. A sustainable society involves not only rethinking of personal choices and behaviors, but also reconfiguring the carbon-based energy economy. The challenges posed by regional environmental problems and global climate warming implies a sustainable society would need to gradually reduce its dependence on fossil fuels, especially the coal and oil. This course is intended to explore the theories and methods toward a sustainable society from three perspectives, namely environment, energy and personal choices. The course will be taught in English, aiming at training students to think critically to solve the problems innovatively using a variety of approaches from interdisciplinary perspectives. The course will take advantage of internet technology and multimedia classroom to combine onsite classroom teaching and remote interactive teaching from the University of Washington (UW) led by Dr. Kristina M. Straus. Students from Tsinghua are encouraged to communicate with the UW Students, to collaborate with them on the course projects. The overall goal is to stimulate student interests in learning from both books and practical experiences, and to improve their comprehensive skills of teamwork, communication, critical thinking.

This course is divided into two parts. The first one involves students to interact with local and remote teaching teams in class and in their course work. Courses will cover fundamental theories of sustainability, natural capitalism, sustainable food choices, product life cycle analysis, energy consumption, water crisis in the United

States, low-carbon economy, development of new energy in China, low-carbon transportation system and other relevant topics. The second part mainly refers to field trip activities either in Beijing or in Seattle.

20120293 Engineering Materials 3 credits 58 hours

This course combines the fundamental 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 the following 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.

Finally, case studies are implemented to help the students acquire a comprehensive understanding of the selection of appropriate engineering materials in such challenging areas as aircrafts, spacecrafts, vehicle engines, and gas turbines, etc.

30120324 Design and Manufacturing (I) 4 credits 96 hours

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 not only grasp the primary knowledge of mechanical engineering design but also improve his or her knowledge from design to manufacturing and the practical ability.

30120403 Micro-Computer Control for Mechanical System 3 credits 48 hours

This course combines software training with hardware training together, which makes it not only focuses on the practice research of typical parts of

electromechanical control system but also help students to acquire knowledge. In a word, it is a both integrated and practical course which combines the usage of knowledge with the ability to produce knowledge. Additionally, this course focuses on students' self-learning, supplemented with teaching by professors. Students spend 2/3 of credit hours in the practicable manufacture, while professors participate during the process and discuss with students in order to help them solve practical problems, which can improve students' abilities to self-learning, self-thinking and practice.

30140012 Speciality-reading in English 2 credits 32 hours

This course focuses on the specialized vocabulary and grammar structures for writing technical English. The instructor gives many typical writing examples of proper grammar and word choice for technical English writing (and for business letters). The students will read many technical papers that are mostly related to thermal engineering, including ASME news articles and research papers. For some of the assignments, students from other departments can select research papers in their fields. The course will also include many technical English writing assignments. The course project is to write a short technical research paper related to their current research or their senior thesis. The course is very technical, so it should only be taken by science or engineering students.

30140362 Numerical Methods in Fluid dynamics and Heat Transfer(in English) 2 credits 32 hours

This course teaches the fundamentals of the finite difference method for modeling fluid dynamics and heat transfer problems. The course introduces steady-state and transient methods, the SIMPLE method, upwind versus central differencing, turbulence modeling, the effects of mesh quality and convergence characteristics. The course also teaches how to use Fluent to analyze fluid dynamics and heat transfer problems, including many of the special models in Fluent for modeling radiation, flows in porous media, periodic flows and the User Defined Functions. The course includes numerous homework assignments and a final project related to their research work so that the students are very experienced in the use of numerical methods.

30140444 Thermodynamics 4 credits 64 hours

The course material covers the following aspects: basic concepts and basic principles, properties of matters and the evaluation of properties, thermodynamic processes and cycles, and introduction to chemical-thermodynamics. The course content includes: thermodynamic systems, states and processes, state variables and process variables, equilibrium and quasi-equilibrium processes, energy and energy transfer, the first law of thermodynamics, properties of pure matter and the evaluation of properties, ideal gas equation of state, first-law analysis of closed systems, control volume and mass conservation, first-law analysis of control volumes, steady-flow devices, transient processes and analysis, the second law of thermodynamics, Carnot cycle, Clausius inequality, entropy and entropy balance, isentropic processes, thermodynamic property relations, reversible and irreversible processes, gas power cycles (Brayton cycle, Otto cycle, Diesel cycle), vapor power cycles, refrigeration and heat-pump cycles, ideal gas mixture, reacting gas mixture, enthalpy of formation, enthalpy of combustion and heating values, chemical equilibrium.

30140454 Fluid Mechanics 4 credits 64 hours

The course is divided into two parts. The first part is on fundamentals of fluid mechanics, whereas the second part is on advanced fluid mechanics. The objective of the first part is to provide an introduction to the beauty of fluid mechanics. The student will acquire knowledge of frequently encountered fluid phenomena, and has a thorough understanding of the basic equations of fluid flow and the ability of how to apply them to practical problems. The contents include characteristics of various fluids and flows, Fluid statics, Elementary fluid dynamics, Fluid Kinematics, Potential flow, viscous flow, and dimensional analysis. The objective of the second part is to acquire a deep theoretical base in classical fluid mechanics. The emphasis is mainly on analytical solutions and its physical implications. The contents are: Cartesian Tensors, Low Reynolds number flows, Vorticity dynamics, Gravity waves, boundary layers, instability, and turbulence.

10150022 Technical English Communication 2 credits 32 hours

The course trains the technical English communication skills through a series of simulated academic meetings.

Student practice will take up most of the time, with the instructors setting the stage, guiding and motivating the students. To alleviate the issue of large number of students and limited number of instructors, a combination of large/small classes and groups will be used: basic knowledge and common issues will be addressed in the large class, targeted instruction will be provided in the small classes, and students work in groups.

A series of four simulated meetings will be conducted, each focused on new techniques and skills. The first meeting will be performed by the instructors and the teaching assistants, serving as the model case for the later student-led meetings. The following three meetings will be led by the students under the guidance of the instructors.

30160152 Engineering Economy 2 credits 32 hours

Engineers make both technical and economic decisions in solving engineering problems. Engineering economy is the study of the economic decisions in engineering problems whose solutions are required to be optimal not only technologically, but also economically. In this course, the engineering students first learn a set of fundamental economic concepts including cost & revenue, time value of money, cash flow, economic decision criteria. Then, they study the impact on the economic decisions of a few important factors, such as, depreciation and income tax, price change & exchange rate, equipment replacement, and economic uncertainty. At the end of the course, by applying these economic concepts and by evaluating the impact of these economic factors, the students will be able to provide economically optimal solutions to engineering problems.

40160522 International Logistics(in English) 2 credits 32 hours

Discuss and study the issues related to international logistics, understand both the commonalities and differences between international and domestic logistics, and learn to apply these concepts in real world applications.

30220363 Modern Control Systems 3 credits 48 hours

This course provides the basic knowledge about classical control theory, modern control theory and discrete control theory.

For classical control theory, the following contents will be introduced: system modeling, transfer function and its transformation, concepts and criterion for system stability, time-domain and frequency-domain analysis method for control systems, control system design using time-domain and frequency-domain methods.

For modern control theory, the following contents will be taught: state space model of a control system, observability and controllability of a system, state feedback controller, state observer and implement of a state feedback controller using signals from a state observer, etc.

For discrete control theory, the following contents will be addressed: modeling and analysis methods for discrete control systems, design method for a discrete-data controller, etc.

This course is delivered in English.

30220434 Electric Machinery Fundamentals 4 credits 64 hours

Electric Machinery Fundamentals focuses on the basic electro-magnetic theory of electric machines. The course covers the fundamentals of transformers, synchronous machines, asynchronous machines and DC machines.

This course is one of the key fundamental courses for students in Electrical Engineering, and is a prerequisite course for many advanced courses.

30230654 Signals and Systems(in English) 4 credits 64 hours

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. It consists of following individual yet highly related sessions including 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.

This course focuses on the basic theory and analytical method from time-domain to transform domain, from continuous to discrete, from the description of single-input-single-output to the state variables. It will lay down a solid foundation for the further study for courses including Digital Signal Processing, Stochastic Process, Communication Circuit, Principle of Communication.

The requisite courses include calculus, linear algebra, complex variable functions, principles of electric circuits.

30230742 Probability and Stochastic Processes (1) 2 credits 32 hours

This course covers the basic knowledge of elementary probability without rigorous treatment via measure theoretical tools. It includes probability spaces (sample spaces, sigma fields and probability), random variables with its probability distribution, distribution functions and probability density, independence, conditional probability, discrete random variables (Bernoulli, Binomial, Poisson, Geometrical, Hyper-geometrical, Negative binomial), continuous random variables (Uniform, Exponential, Gaussian), numerical characteristic of random variables (expectation, variation, high-order moments, entropy), transformation of random variables with its derived distribution, conditional expectation and conditional distribution, characteristic functions and basic limit theorems.

40230952 Case Study on the Design of the Communication Networks 2 credits 32 hours

This course starts from basics for narrowband and broadband PLC systems, network structure with its elements and PLC-specific performance problems for the PLC broadband systems. The characteristics of the PLC transmission medium are then presented including a topology analysis of the low-voltage supply networks, description of the electromagnetic compatibility issue in the broadband PLC, noise characterization and disturbance modeling. Protocol architecture for 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.

30240532 Foundation of Object-Oriented Programming 2 credits 48 hours

This course introduces key Object-Oriented Programming (OOP) features and simple design patterns based on these OOP features. Using the design patterns based on OOP, this course trains students to design good software structures, which guarantee easy code reuse and adaptability to future change, as well as maneuverable extension for new user requirements. This course covers various topics including classes, objects, inheritance, polymorphism, design patterns, template, STL, etc. Students are required to use C++ programming language to finish weekly assignments. C++ is widely used both in industry and academic research projects. It is a powerful multi-paradigm programming language, which supports procedural programming, objected-oriented programming, generic programming, etc. This course is an advanced course aiming at further improving students' capability both in

programming skills and program designing skills using C . To take this course, students are required to have the basic programming skills especially in C programming language.

40250942 Enterprise and Information System Modeling and analysis 2 credits 32 hours

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.

40251052 Network Security Essentials 2 credits 32 hours

* IP Networking and Associated Security Issues

* Authentication

* Authorization

* Confidentiality

* Integrity

* Non-repudiation

* Engineering Issues in Network Security

30260112 Integrated Circuit Fabrication Processes 2 credits 32 hours

Integration density and performance of digital and analog integrated circuits have undergone an astounding revolution in the last few decades. Although innovative circuit and system design can account for some of these performance increases, technology has been the main driving force. This course will examine the basic micro fabrication process technologies that have enabled the integrated circuit revolution and investigate newer technologies. The goal is to first impart a working knowledge of the methods and processes by which micro and nano devices are constructed, and then teach approaches for combining such methods into process sequences that yield arbitrary devices. Although the emphasis in this course is on transistor devices, many of the methods to be taught are also applicable to MEMS and other micro-devices.

This course is designed for students interested in the physical bases and practical methods of silicon VLSI chip fabrication, or the impact of technology on device and circuit design.

40260173 Digital Integrated Circuit Analysis and Design(English) 3 credits 48 hours

The main contents of this course consist of the following items: 1) The quality metrics of digital integrated circuits, semiconductor device, CMOS Inverter 2) Analysis, design and implementation of the combinative and sequential logic circuit, arithmetic logic unit. 3) Analysis of the interconnection model and parasitic effect. 4) Design flow and methodology of the digital integrated circuit design, programmable logic devices.

40260223 Communication Systems and Circuits 3 credits 48 hours

This course gives insights into analog/digital communication systems with practical circuit design examples. Students are expected to learn both system and circuit design perspectives in modern communication IC design.

40260262 Introduction to Quantum Information Science 2 credits 32 hours

This course will introduce the main ideas and techniques of the field of quantum computation and quantum information. One will learn the background material in computer science, mathematics and physics necessary to understand quantum computation and information. Latest progress in quantum information process will be

introduced and discussed as well.

20310504 Theoretical Mechanics(in English) 4 credits 72 hours

A review of vector algebra. Concept of force. Equilibrium of particles. Moments about points and lines, couples and equivalent force systems. Equilibrium of rigid bodies. Analysis of simple structures such as trusses, frames, and beams. Centroids, centers of gravity, and moments of inertia. Dry friction with applications to wedges, screws, and belts. Method of virtual work, potential energy, and stability.

Vectorial kinematics of particles in space, orthogonal coordinate systems. Relative and constrained motions of particles. Dynamics of particles and the systems of particles, equations of motion, energy and momentum methods. Collisions. Two- and three-dimensional kinematics and dynamics of rigid bodies. Moving frames and relative motion. *Free, forced, and damped vibrations of particles and rigid bodies.

10320032 Practical English in Nuclear Field 2 credits 32 hours

This is class emphasis on oral communication in english for engineering physics students. The class format is flexible, including lecture, discussion, and multimedia presentations on scientific topics. The final goal is to have each student be able to engage basic scientific english conversation with foreign scientists.

00350102 Introduction to Metallic Functional Materials 2 credits 32 hours

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.

40350033 Electron Microscopy 3 credits 48 hours

The mechanical, physical and chemical properties of materials are determined by the microstructure, phase and composition of the materials. Electron microscopy is used to know the microstructure, phase and composition of the materials in a small area by use of the information generated by the interaction of electron and materials.

00420183 Game Theory 3 credits 48 hours

This is an introductory course on the basic concepts of Game Theory. Topics to be covered are: Combinatorial Game Theory,
 Games in Extensive Form,
 2-person 0-sum games,
 Bimatrix games,
 Nash Equilibrium,
 Correlated equilibrium,
 Evolutionary Game Theory,
 Repeated Prisoner's Dilemma,
 Bargaining Problems,
 Games in Coalition form,
 Shapley value,
 Nucleolus,
 2-side matching problem.

10421094 Linear Algebra(1) 4 credits 78 hours

Linear algebra course, intended primarily for mathematics, science and engineering students. The course covers matrix theory, systems of linear equations, vector spaces and quadratic forms etc., emphasizing topics useful in other disciplines. The successful student will be able to write clearly about the concepts of linear algebra, (definitions, counterexamples, simple proofs), and to apply the theory to examples. Some exposure to the practical nature of solutions of linear algebra problems is healthy. Due to its broad range of applications, linear algebra is one of the most widely taught subjects in college-level mathematics

Key words: Determinant, systems of linear equations, Gaussian elimination and elementary transformations, matrices, vector spaces, basis and dimension , linear maps, eigenvalues, eigenvectors, Jordan forms, Euclidean spaces, unitary spaces, quadratic forms.

10421102 Linear Algebra(2) 2 credits 42 hours

Linear algebra II is mainly composed of linear space and linear transformation, and appropriately increases the content of some modern algebra. This stage should be based on the first stage, focusing on cultivating abstract thinking ability and logical reasoning ability.

10430344 Physics(1)(in English) 4 credits 64 hours

We introduce Newtonian mechanics of both mass point and rigid body. After that a basic concept of Lagrangian mechanics will be introduced. Besides those, we will introduce the physics of oscillation, fluid, and waves including travelling wave, standing wave and Doppler effect. In the last several week, we will discuss thermodynamics.

10430354 Physics(2)(in English) 4 credits 64 hours

In the first half of the semester, we in this class focuses mainly on the theory on the electromagnetism, from Coulomb's Law to Maxwell equation. In the second half of the semester, we will introduce the basic concept of the physical optic, special relativity including Minkowski space-time diagram, and the quantum physics.

30430094 General Relativity 4 credits 64 hours

This course is designed to be an introduction to the theory of General Relativity (GR) as developed by Einstein and

those who followed him.

It is designed for advanced undergraduate students (or starting graduate students) who have already completed some basic physics courses, including an introduction to special relativity. I will develop most or all of the additional mathematical tools required basically from scratch.

This is NOT a course on current topics in GR or quantum gravity. Though I plan to touch on some aspects of current research, most of the material covered will be well-established concepts.

The textbook I will mostly follow for this course is “Spacetime and Geometry: An Introduction to General Relativity” by Sean Carroll. There is an Asian edition of this book available for about 70 yuan. I will also draw some material from “A First Course in General Relativity” by Bernard F. Schutz. I will NOT always follow either book line by line.

One semester is NOT long enough to cover well all topics considered standard in GR. So I will mainly discuss: review of special relativity, equivalence principle, manifolds and tensors, EM field tensor, curvature, formulation of Einstein’s field equations, Lagrangian approach, alternative theories to GR, perfect fluids, cosmological constant, Schwarzschild metric and applications, conformal diagrams, black holes in general.

30430224 Applications of General Relativity 4 credits 64 hours

This course assumes the students are already familiar with Einstein's Field Equation and the physical basis behind them. It is a logic continuation of the course “Introduction to General Relativity”. This course covers in details the most well-known applications of general relativity, such as black hole (including Kerr black hole, Penrose process, Komar energy, and black hole thermodynamics), gravitational lensing, gravitational wave, cosmology (including Robertson-Walker metrics, Friedman equation, inflation, CMB, dark matter, CV violation, and baryon asymmetry), and even quantum gravity.

30440202 Frontiers of Materials Chemistry 2 credits 32 hours

Advanced materials research has been listed as one of the most important strategic directions in almost all industrialized countries. The materials chemistry is the indispensable foundation for the technological development of all advanced materials. This course aims at introducing the students into some of the most competitive fields of materials chemistry. The students will get some fundamental ideas about, and motivated to participate in these highly challenging but interesting frontier researches on polymeric, inorganic, organic-inorganic hybrid, nano-structured, electro-optic-magnetic and biomedical materials.

40440301 Chemistry for Sustainable Society 1 credits 16 hours

This short course is designed specifically for the chemistry students of Tsinghua Elite Program. It is aimed to guide students to scrutinize the importance and contribution of chemistry to humankind and the development of society. It is hoped that the students, after studying the course, will strengthen their interest in chemistry, improve their innovative capacity, and choose chemistry research as their life-time career.

This course will discuss a few key issues of chemistry and sustainability of the economic and social development. The topics include: what challenges we are facing in terms of sustainable development, what chemistry can deliver to ensure enough foods and guarantee food safety; chemistry is the devil causing problems of our living environment, or chemistry is the angel to protect our ecosystem and environment; where we can find enough energy to drive our planet; what are the replacement of the fossil resources for chemical industry and manufacture; what chemistry can contribute to improve the quality of life; and the philosophy and the contents of sustainable chemistry.

40440321 Introduction to Computational Chemistry 1 credits 16 hours

In a time of computer revolution, chemistry has become a science with both experiment and theory due to the rapid developments of applying quantum mechanics and relativity mechanics to fundamental chemistry problems. In this course, we will introduce recent developments in theoretical and computational chemistry and the applications in experimental chemistry research.

30450203 Biochemistry(1)(in English) 3 credits 48 hours

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.

30450263 Microbiology(in English) 3 credits 48 hours

Microbiology is a compulsory course for students in biology department. This course covers multiple disciplines in microorganism, molecular biology, biochemistry, immunology and microbial diseases. Students taking this course will learn systematic knowledge of microorganism, as well as basic experimental skills. The most popular book Biology of Microorganisms for north American college students is used in this course. Biology of Microorganisms will be updated every two years. New knowledge and technique in microbiology will be added in each update. It is very helpful for student to improve their knowledge and scientific understanding of microbiology.

30450303 Genetics(in English) 3 credits 48 hours

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.

30450444 Biochemistry(2) 4 credits 64 hours

Biochemistry II is divided into two parts. The first part (Chapter 13-23) is bioenergetics and metabolism, which includes principles of bioenergetics (Chapter 13), catabolism of carbohydrates, lipid acids and amino acids (Chapter 14-18), oxidative phosphorylation and photophosphorylation (Chapter 19), biosynthesis of carbohydrates, lipids and amino acids (Chapter 20-22) and integration and hormonal regulation of mammalian metabolism (Chapter 23). The students are required to be familiar with the major catabolic and anabolic pathways of carbohydrates, lipids and amino acids, as well as the important enzymes and coenzymes involved in these pathways and the regulation of each pathway. The students are also required to know the interconnection and regulation between different catabolic and biosynthetic pathways.

The second part (Chapter 24-27) of this course is information pathways. It includes genes and chromosomes (Chapter 24), DNA metabolism (Chapter 25), RNA metabolism (Chapter 26), and protein metabolism (Chapter 27). The students are required to know the structure of genes and chromosomes, the pathways of DNA, RNA and protein metabolism.

In addition to lectures, there will be office hours every week to answer the questions the students may have.

There will be quizzes, homework and the final exam, which accounts for 20%, 20% and 60% of the final score, respectively.

30450453 Molecular Biology(in English) 3 credits 48 hours

Molecular Biology is focus with the fuction of biological systems of the molecular level.Molecular Biology is central to most studies in biology and life sciences and is directly ralated to biomedical research and biotechnology.In this subject,students are intoduced to gene structure and function,DNA replication, transcription and translation; molecular biology; protein structure and its relationship to protein function. Molecular biology techniques are common methods used in molecular biology, biochemistry, genetics and biophysics which generally involve manipulation and analysis of DNA, RNA, protein, and lipid, which will also be introduced in the course.

Upon successful completion of this subjest students should be able to:

- 1.use the basic vocabulory of molecular biology to describe the structures and functions of biological macromolecules, in order to demonstrate their knowledge and understanding of the concepts inderluing sutcture-function relationships in cell function,health and disease.
 2. apply molecular biology techniques, principlpes and methodologies in addressing research problems.
 3. write scientific reports that present coherent evidence-based explanations to communicate to peers.
 4. demonstrate indenpendent learing and research skills by locating, interrogting and evaluaing relevant scientific information.
- parcipate as an effective team member and collaborate effctively on selected learing exercises.

40450263 Molecular Basis of Human Diseases(in English) 3 credits 48 hours

This course aims to provide students with in-depth knowledge of the basic mechanisms of common human diseases such as cancer, diabetes, obesity, atherosclerosis, Alzheimer' s disease etc., and to prepare them for future translational research 。 The course focuses on the current molecular mechanisms underlying the pathogenesis of each disease。 There will be extensive discussion on results from current cutting-edge research。 Prospective students should have basic knowledge of biochemistry, molecular and cell biology and immunology before registering for this course。 Brief knowledge on human physiology and the pathogenesis of each disease will be introduced but students are expected to read extensive reference paper and textbook to understand the content of the lecture。

40450551 Scientific writing 1 credits 16 hours

This course, consisting mainly of lectures, but also practical work in class and homework, will teach students the characteristics of good academic writing with a specific focus in scientific writing for the life sciences. The course will also review the main mistakes committed by non-native English speakers and how to avoid them. There will be a discussion of the main parts of an academic paper and of the different functions they accomplish with practical examples and exercises. Finally, tips will be shared on how to approach other forms of scientific communication, such as emails to professors and colleagues, conference posters, presentation slides, letters to editors, etc.

20470024 General Physics(1)(in English) 4 credits 64 hours

General physics course for students majoring in science and engineering with interest in physics. This course is Calculus-based. Students are required to actively participate during the lectures. This class will provide with an opportunity to acquire a good understanding of fundamental mechanics and thermodynamics and to learn how to apply the physics knowledge and beyond. The main contents are, mechanical parts, mainly including: displacement, velocity, acceleration, etc; Force, Newton's three laws of motion, force analysis, the center of mass frame of reference, inertia force; Momentum and angular momentum, rigid body motion; Special relativity is

introduced, and so on. Thermal parts, mainly including: the temperature and the zeroth law of thermodynamics; Ideal gas state equation of constant pressure and constant volume, isothermal and adiabatic and other basic thermodynamic process; Molecular motion laws; The first law of thermodynamics. The second law of thermodynamics, the heat engine and refrigerator, Carnot cycle; Statistical physics are introduced.

20470034 General Physics(2)(in English) 4 credits 64 hours

This course is a follow-up course of General Physics I and for undergraduate students with serious interests in physics and interdisciplinary sciences. The main focus of this course is to cover the most important topics in classical electrodynamics including electrostatics, magnetostatics, Maxwell's equations for electromagnetic fields. This course will emphasize both basic concepts and solving practical problems. After completing this course, students are expected to gain a good understanding of basic classical electrodynamics.

30470013 Introduction to Computer Science 3 credits 48 hours

Designed to appeal to a diverse audience, this course examines some of the fundamental ideas of the science of computing. Lectures and hands-on assignments cover a wide variety of topics such as hardware organization, the Internet, computer programming, limits of computing, and graphics. No prerequisite.

30470023 Mathematics for Computer Science 3 credits 48 hours

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.

30470084 Operating System 4 credits 64 hours

The purpose of this course is to teach the principles and design of modern operating systems and distributed systems, as well as system programming.

Topics we will cover include concepts of operating systems, networking, database systems and systems programming, including multiple-programming systems (processes, inter-process communication, and synchronization), memory management (segmentation, paging), resource allocation and scheduling, file systems, basic networking (packet switching, file control, reliability), basic databases (transaction, SQL), basic distributed systems (consensus protocols), as well as special topics such as reliability, security, and cloud computing and block chain. Students are expected to complete set of major design and implementation projects.

30470093 Computational Biology 3 credits 48 hours

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.

30470104 Machine learning 4 credits 64 hours

Machine learning studies how computers can learn from experiences. Combining ideas from theoretical computer science and statistics, researchers have developed many learning methods and their applications to computer vision, bioinformatics, natural language processing etc. are highly successful. Machine learning theory addresses the fundamental problems in learning. It studies the power and theoretical limits of learning. The aim is to provide deep understand of learning and the guidance for the development of practical algorithms.

30470124 Algorithm Design 4 credits 64 hours

This course gives an introduction to the basics of algorithm, common algorithm design techniques, and the analysis of running time (complexity). The main contents include: tools of algorithm analysis, divide and conquer algorithms, dynamic programming, greedy algorithms etc. algorithm design techniques, and NP complete, randomized algorithms, approximation algorithms and other advanced topics.

30470134 Theory of Computation 4 credits 64 hours

This course gives an introduction to the basics of computation theory, including: Mathematical Logic, Finite Automata, Context-Free Grammars, Turing machine, undecidability, and computational intractable topics (NP complete, PSPACE, BPP, interactive proof, etc).

30470154 Game Theory 4 credits 64 hours

Part One: Normal-form games

Part Two: Extensive games

Part Three: Bayesian games

Part Four: Mechanism design

30470223 Introduction to Computer Networks 3 credits 48 hours

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.

30470232 The Physics of Information 2 credits 32 hours

The 21st Century has seen a string of profound discoveries that interface physics, information theory and computer science. This course will introduce undergraduate students this exciting frontier by connecting the various physics and computational ideas they learn in first year. After completion of the course, students will appreciate how information theoretical principles led to new understanding in physics, and how new physics facilitated new models of computation. Topics include physical consequences of the Church Turing thesis, unravelling Maxwell's Demon through information thermodynamics, and the information theoretic consequences of quantum mechanics.

30470272 Computational Modeling for Urban System Regulation 2 credits 32 hours

This course aims at giving students a comprehensive introduction on how to use computational thinking to solve real world problems in the core urban system disciplines of power systems, energy sciences, environmental sciences, etc. We expect the students to realize that computational thinking is an important tool to bridge the gap between different disciplines, and often beneficial to interdisciplinary research.

40470024 Fundamentals of Cryptography 4 credits 64 hours

Modern cryptography aims to protect information privacy, integrity and authentication. In this course, we first review basis of discrete probability, algebra and classical cryptography. Then there are three sections remaining: (1) symmetric key encryption (e.g., block cipher), (2) public key encryption, (3) cryptographic protocols (e.g., key exchange, digital signature) and applications (e.g., blockchain). Except for the cryptographic mechanisms, we would also introduce the related cryptanalytic methods and implementations. This course has course projects in group of two or three students, mainly about applications of cryptography or side channel attack to cryptographic system.

40470034 Distributed Computing(Fundamentals and Systems) 4 credits 80 hours

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.

40470094 Quantum Information 4 credits 64 hours

Quantum Information is a course offered to upper level undergraduate students (junior or senior students in the Yao Class, physics, computer science, and other physical science/engineering departments). The course will cover many topics at the forefront of the new field of quantum information science, including, for instance, quantum mechanics for quantum information: qubit representation, Kraus operator and quantum measurement; quantum entanglement and quantum resource theory: bipartite and multipartite entanglement quantification, entanglement witness, and quantum coherence; quantum communication theory: quantum Von Neumann entropy, bell-inequality and nonlocality, quantum teleportation and superdense coding; quantum cryptography: quantum key distribution and security analysis, quantum random number generator; quantum computing: quantum circuit model, quantum algorithms, and quantum error correction. Through the course, the students are expected to learn the basic knowledge of quantum information and have an overview of various topics in the field.

40470104 Network Science 4 credits 64 hours

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.

40470243 Artificial Intelligence: Principles and Techniques 3 credits 48 hours

This course will introduce the basic ideas and techniques underlying the design of intelligent computer systems. Specific topics include search, constraint satisfaction, game playing, graphical models, machine learning, Markov decision processes, and reinforcement learning. The main goal of the course is to equip students with the tools to tackle new AI problems you might encounter in life and also to serve as the foundation for further study in any AI area you choose to pursue.

40470262 Autonomous Driving 2 credits 32 hours

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.

40470302 Computation Modeling for Environment and Ecology Management 2 credits 32 hours

Computational and data-analytics methods have been implemented for the environmental and ecological managements. For the future sustainable development, it is important to establish a systematic approach of computational environmental research. This course is designed to help student develop the capabilities for initiating the computational and data research for environment and ecology management. The course systematically organizes the relative frontier computational and data research by the framework of the environment and ecology management. The course includes four main sections. Section 1 introduces modeling environment and ecology management issues by the computer science perspective. Section 2 discuss how to understand the environment and ecology management problems from the data. Section 3 include the operation-research approaches for environmental and ecology management issues. Section 4 explain the role of the mechanism designs in the environmental and ecology management.

00510493 Theory of Industrial Organization 3 credits 48 hours

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).

The first part of this course introduces monopoly market and discusses pricing strategies of single-product and multi-product monopolists. In the second part, we introduce interaction among firms and discuss oligopolistic market, where we use game theory to analyze firm competition, product differentiation, market entry and collusion among firms. The third part focuses on horizontal and vertical relationships among firms, and studies mergers, integration, as well as the closely-related antitrust policy framework. In the last part, we discuss special topics of recent developments in IO theory and “hot” topics in real-life industrial economy, including two-sided markets (e.g. credit card market), platform and network industries, etc (e.g. telecommunication, C2C online marketplace, and social networks).

20510082 Computer Network 2 credits 32 hours

This course provides a comprehensive introduction to the concepts and principles about data communication and

computer networking, including architectures, protocols, hardware, software, and applications. Emphasis is put upon the requirement analysis and design of networking applications in organizations, while topics such as management of communications networks, cost-benefit analysis, and evaluation of connectivity options are covered, in order to help students learn to evaluate, select, and implement different communication options within an organization.

30510053 Econometrics 3 credits 48 hours

This course is an introduction to econometrics. It introduces students to multiple regression methods for analyzing the relationship between two or more economic variables. It starts from the simple linear regression to multivariate regression, regression with discrete random variables, instrumental variables, and to regression with panel data, time series data. The objective is to help students understand, evaluate and conduct empirical studies in economics and related disciplines.

30510073 Public Finance 3 credits 48 hours

Public Finance studies the role of the public sector in the economy. In this course, we will study the economic foundations that justify the existence of the public sector, and the economic theory that describes what the role of the public sector should be. We concern when the governments should intervene the economy and how they should do so, including what options they have and what are the effects of the policies. The focus is on the government taxes and spending activities. We will also look at the governments' policies in the reality, and study how the policies affect individual and corporate decision-making and welfare.

30510123 Accounting Principles 3 credits 48 hours

Accounting is a dynamic subject which is evolving rapidly in recent times, especially after the financial crisis in 2008. It is also a highly political process with a number of players or interest groups involved in the process of setting the accounting standards. As the language of business, accounting plays a very important role in managing business organizations and in particular, large multinational corporations. Any person who wants to work for a business organization (or own a business as a proprietor, partner or shareholder) should have a thorough understanding of this language of business. Knowledge of accounting would also help those who want to deal with businesses (as suppliers, franchisees, etc.). Therefore, it is very important that you learn accounting by getting a good understanding of its basic concepts, principles, techniques and underlying logic as well as by actually solving problems. Do not learn accounting mechanically. Learn accounting by doing it.

30510202 Management Information Systems 2 credits 32 hours

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.

30510273 Data Structures and Algorithms 3 credits 48 hours

Now we are in an Information era, which roots on a basic fact that, Information Technology (IT) has deeply and widely reshape almost every areas, e.g., production, operation, business, society and personal life. One important characteristic of information era is storing, representing and processing of large-scaled structural data. How to represent and process large-scaled data is the key factor not only for information systems construction, but also for organizations to gain competitive advantages. This course will focus on constructing effective data models using standard data structures as well as efficient processing, which will cultivate the students with the abilities of efficient data modeling and data processing.

The course contents include:

- a) Introduction to Data Structures and Analysis;
- b) Analysis on Computational Complexity;
- c) List, Stack and Queue;
- d) Binary Trees;
- e) Graphs and Network;
- f) Search;
- g) Sorting;
- h) New techs.

By the end of the course, the students should:

- 1. Master the major data structures and efficient processing based on C programming;
- 2. Master the preliminary abilities to model and analyze some real-world applications.
- 3. Cultivate the ability for further information analysis, design and implementation.

To accomplish this global goal, lecturing is far from enough; case programming and analysis, assignment and Q&A are also important.

30510523 Money and Banking 3 credits 48 hours

This course presents basic concepts and theories in monetary and banking economics. Topics covered in the course include: the structure of financial system, financial market and financial institutions, definition of money and role of bank, Money supply and demand, interest rate such as the determination of short-term interest rates and the structure of interest rate, and exchange rate and determination of exchange rate including PPP, IRP, monetary approach, asset approach, and monetary policies.

30510643 Accounting Information System 3 credits 48 hours

Information systems (IS) have become a necessity for modern companies to improve business processes, enhance management, innovate business models and build up core competitiveness. Accounting is in general concerned with the identification, collection, processing, analysis and communication of financial information about an organization. Accounting information systems (AIS) is the core subset of IS and the infrastructure for accounting information procession. Accounting departments and accounting professionals are facing the huge opportunities and challenges of adopting and using contemporary AIS application.

This course introduces AIS from both technical and managerial perspectives. The course 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

understanding and design of accounting data, queries & reports, and forms. Part 3 introduces basic business processes combined with the utilization of an AIS software, including the acquisition cycle and the revenue cycle. Part 4 covers three topics on managing information technology and IS development: IS application and evolution in enterprises, managing and controlling IS, and the introduction to IS development.

The targeting audience of the course is the 3rd year college students majoring in accounting. It requires students to pay both heed to abstract concepts and knowledge as well as tools and skills related to AIS. The objectives of this course is to give students the fundamental knowledge and tools which could help them to understand the concepts and components of AIS, to master the methods and tools to analyse, design and evaluate AIS, to know about a typical AIS software, to comprehend the trend of contemporary AIS application and its effect to accounting professionals.

30510732 General Management 2 credits 32 hours

Organizations are all around us in society: we study in them, work for them, rely on them for goods and services, and we are often regulated and highly influenced by them. Understanding the management of organizations, therefore, is the key to becoming more effective actors of the organizations we are or will be part of. We will cover three traditional functions of management: planning, organizing, and leading. Overall, this course offers a comprehensive perspective for those interested in management and organizations.

By the end of the course, you will achieve the following:

- 1 Be familiar with key principles of management and organizations.
- 2 Develop analytical skills in the diagnosis of organizational & managerial (in)effectiveness.
- 3 Be able to apply basic principles of management to real-world practices.

30510743 Intermediate Microeconomics 3 credits 48 hours

The course presents basic theories of microeconomics and its applications. Topics covered include consumer theory, firm theory, market supply and demand, externality and public goods, industrial organization, game theory, information economics, and general equilibrium. The economic modeling methods and analytical tools are emphasized throughout the course.

30510763 Intermediate Macroeconomics 3 credits 48 hours

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 emphasize the micro-foundation, and use the neoclassical economics as the benchmark. Nevertheless, we also introduce the Keynesian economics by introducing some market imperfections such as sticky wage and search in labor market. #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.

30510812 Marketing Management 2 credits 32 hours

Marketing is the core of an operating business, and also the management process through which goods and services move from concept to the customer. Marketing is based on thinking about the business in terms of customer needs and their satisfaction. Marketing differs from selling because it has less to do with getting customers to pay for your product as it does developing a demand for that product and fulfilling the customer's needs. Marketing entails planning and executing the conception, pricing, promotion, and distribution of ideas,

goods, and services. It starts with identifying and measuring consumers' needs and wants, assessing the competitive environment, selecting the most appropriate customer targets and developing marketing strategy and implementation program for an offering that satisfies consumers' needs better than the competition. Marketing is the art and science of creating customer value and market place exchanges that benefit the organization and its stakeholders.

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.

30510863 Developmental Economics 3 credits 48 hours

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.

30510883 Economic Growth 3 credits 48 hours

The aim of the course is to provide students with a rigorous introduction to the empirical facts and theoretical models of economic growth. A recurring theme of this course is the question: "Why are some countries so rich, while some others are so poor?" To answer this question, we will look at various aspects of economic growth, starting from some characteristics and stylized facts of different countries across the world. We will then study some of the main theories and their predictions. Through the study of the course, the students will get familiar with the available cross-country data and use different models as a basis for understanding and distinguishing the various determinants of economic growth.

30510893 Financial Statement Analysis 3 credits 48 hours

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. Class meetings involve lectures, discussions and exercises. Class attendance is required in this class.

30510973 Econometrics(1) 3 credits 48 hours

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 practical experience in addressing some of these issues using actual economic data. Chapter 1-8 and selected material in Chapter 10-15 will be covered. In addition, basics of hypothesis testing and model selection methods will be covered.

30510992 Corporate Strategy Management 2 credits 32 hours

This course introduces the concepts and tools of strategy formulation and competitive analysis. 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.

30511033 Foundations for Financial Economics 3 credits 48 hours

This course intends to provide the foundations for the study of modern finance economics, especially concentrates our discussions on individuals’ consumption and portfolio decisions under uncertainty and their implications for the valuation of securities. It contains Expected Utility and Risk Aversion, Mean-Variance Analysis, CAPM, Arbitrage, and Linear Factor model, Consumption-Savings decisions and state pricing, and Multiperiod consumption, portfolio choice and asset pricing.

30511043 Computer Systems Architecture 3 credits 48 hours

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.

30511053 Corporate Finance 3 credits 48 hours

Firms compete in Consumer & Business Markets to sell their products & services, and they also compete in Capital Markets for the resources required to operate their business. Investors provide the capital (resources) to companies with the expectation that they will earn a competitive return on their capital and compensate them for risk. A consumer or business manager is continuously faced with financial choices and meeting the demands of both of these arenas of competition.

For the consumer these choices include, among others, financing a purchase, saving for retirement and evaluating investment products. For a business manager the choices include deciding which projects to pursue and alternative approaches to provide funds for these projects. Finance is the study of a framework that can be used to evaluate these choices consistent with the necessity of competing for investor capital. Regardless of your ultimate career, a solid understanding of the fundamentals of finance, will serve you well.

40510093 Topics on International Accounting 3 credits 48 hours

This course will explain the development of accounting and financial reporting models in the world, and to

evaluate the reasons and evolution of international accounting harmonization and convergence; To provide you with the key technical issues in international accounting area and their impact on financial reporting, such as accounting for foreign currency transactions, translation of foreign financial statements and accounting for changing prices; and To describe and analyze some management accounting issues in multinational operations, for instance, the establishment of management control and information systems, international taxation, and international transfer pricing.

Many of the topics in an international accounting course have a domestic counterpart. However, new factors and complications arise in the international arena. Some of these are (1) laws, practices, customs, cultures, and diversity of competitive circumstances; (2) risks associated with fluctuating exchange rates, and differential rates of inflation; and (3) variations in taxes and tax rates. International accounting discusses issues from the perspective of companies that have internationalized their finance and/or operations. It also has a comparative aspect, comparing accounting across countries. It also deals with convergence of worldwide financial reporting standards.

This course is designed to provide you with an understanding of the significant issues in international accounting. The teaching approach will be mainly classroom lectures with some discussions and presentations

40510193 Management Systems Simulation 3 credits 48 hours

Many analytical models and mathematical tools have been used in business decision to improve the operational efficiency and help seize the competitive advantage. Since, however, the real world business situation and environment, regarded as a system, is usually complex, which results into that the traditional analytical methods and tools cannot fit properly. This course introduces a new methodology – simulation – into the business management systems. As its name says, in complex systems, where the number of related variables is huge and they are also closely interdependent, simulation method is to mimic the real activities as well as operations in computer environment, using the time-advance mechanism, to generate the evolutionary results over time. In so doing, after enough replications of simulation, statistically reliable results could be derived. Clearly, the computational load is extremely high. But, with mainstream personal computer nowadays, this process could be performed efficiently. In this course, we will cultivate the students with the abilities of modeling, simulation and analysis with computer and software.

This course includes:

- a) Basic Concepts on Simulation Modeling;
- b) The Simulation Process;
- c) Simulation with EXCEL;
- d) Input Analysis using Statistics;
- e) Random Number Generator
- f) Random Variable Generation;
- g) Basis of simulation with ARENA;
- h) Advanced simulation with ARENA;
- i) Output Analysis;
- j) Lecture on system dynamics;

To accomplish this global goal, lecturing is far from enough; case programming, modeling and analysis, assignment and Q&A are also important.

40510323 Intermediate Financial Accounting(1) 3 credits 48 hours

This course will focus on U.S. accounting standards, and the underlying issues of accounting will be incorporated with its actual development in China and international accounting standards. We will also cover various ethical

issues related to the use and production of accounting information. All the materials will be taught in the class, and small cases will be discussed to get a better understanding. This course is divided into two parts: the first part gives a brief review of the standard setting process of U.S. GAAP and describes the financial reporting environment. Financial accounting framework and accounting system are also discussed; the second part illustrates the treatment of basic accounting elements, including cash, inventories property, plant and equipment and intangible assets.

40510333 Intermediate Financial Accounting(2) 3 credits 48 hours

Based on the Intermediate Accounting (1), this course covers detail problems related to liabilities, shareholders'equities, investment and revenue recognition. Meanwhile, this course introduces briefly the income tax, pension and lease problems and accounting treatments on them.

40510343 Managerial Accounting (1) 3 credits 48 hours

This course covers derivatives such as options, forward contracts, futures contracts, and swaps. By the end of the course you will have a good knowledge of how these contracts work, how they are used, and how they are priced. Derivatives have become an integral part of finance. Whether you end up working for a financial or a non-financial institution you will find the material you learn on this course important.

40510943 Theory of Industrial Organization 3 credits 48 hours

Under what circumstances should telecommunication firms be allowed to merge? When are hotel room prices

40510992 Enterprise Resource Planning 2 credits 32 hours

ERP systems are enterprise-wide information systems that integrate various functional operations and streamline business processes. This course aims to introduce the concepts of ERP systems as well as the application, implementation, and management of ERP.

In particular, the course will help you to obtain the knowledge of ERP at three levels.

1. At the system level. Through hands-on experience with SAP in lab sessions, you will learn SAP commands and functions. You will be able to handle basic business processes in the SAP environment.
2. At the business process level. You will learn how functional operations interact and coordinate to complete business processes and how ERP can enable and facilitate business process integration.
3. At the organizational level. You will be able to recognize and understand organizational and managerial issues associated with enterprise systems, such as planning, vendor evaluation and selection, as well as system implementation.

40511003 Environmental and Resource Economics 3 credits 48 hours

This course is an introduction of Environmental and Natural Resource Economics. The objective of this course is for students to learn how basic economic theory can be used to understand and analyze environmental pollution and resource degradation problems. The course covers both conceptual and methodological topics and recent applications. Examples of local, regional, national and international environmental and natural resource issues are presented and discussed. The first part of this course is an introduction to the basic principles of environmental and resource economics; cost and benefit analysis. In the second part the focus is on environmental economics and policy, including economics of pollution control, valuing the environment, regional and global air pollution, water pollution and so forth. The third part is focused on natural resource economics, both renewable and non-renewable resources. The last part is on sustainable development and macroeconomic aspect of environmental policy, and Green Accounting.

40511012 Business Case Analysis 2 credits 32 hours

This course is designed for future managers who will face the new, globalized, and borderless world economy. Globalization and technological advances have created exciting opportunities for managers to pursue strategies in markets around the world. These developments also present managers with enormous complexity in terms of understanding diverse economic, political and social environments, managing the organizational tension inherent in coordinating activities worldwide, fostering innovation and cross-national learning, and interacting with employees and partners from diverse cultures.

This course leverages the foundation built in other cornerstone courses to explore topics such as development of globalization, firms' foreign expansion strategies, the challenges of operating in different cultures, the difficulties of designing effective organizational structures for multinational operations, leadership in the global context, and so on.

A balanced approach is taken to this course: on one hand, this course aims to arm students with necessary knowledge and skills by covering key aspects of business case analysis and problem solving. Particularly, a global orientation is reinforced by drawing on worldwide cases or examples; On the other hand, this course will offer students the opportunities of applying the contents of this course through class discussion, case analysis, field study, and communication with diverse types of international institutions. I would strongly encourage active class participation. My experience has been that students generally tend to under- (rather than over-) estimate the worth of what they have to say. Thus, please note that probing questions are as useful a form of class participation as presentations of logical analyses.

40511093 Financial Management 3 credits 48 hours

Financial strategies encompass those financial decisions that affect the long-run value of the firm. The objective of this course is to build on the concepts of financial management learned in Corporate Finance (1) and other relevant courses to provide a bridge to understanding the underlying principles behind why these decisions are made and to offer explanations for observed behaviors on the part of financial decision makers. Focus will be placed on developing a comprehensive framework of conceptual knowledge that builds on the principle of value maximization. Capital budgeting, business valuation, investment analysis, capital structure, option theory, risk management, and long-term financing are integral parts of this conceptual framework.

40511103 Game Theory 3 credits 48 hours

Game theory is the foundation of almost all modern economic theory. It is one of the most interesting courses in undergraduate economics. Emerged originally as a field of mathematics, it has been successfully applied to all fields of economics. Furthermore, game theory also plays an increasing role in other social sciences such as philosophy, law and politics, and in natural science such as evolutionary biology and computer science, etc.

This course is an introduction to game theory, which puts emphasis in introducing basic game-theoretic analysis, including the conception, analytic techniques and applications for each type of games.

We will discuss static games with perfect information, static games with imperfect information, and dynamic games with or without perfect information.

Most class sessions will be delivered in English and will consist of both "hands-on" experiences in structured strategic situations as well as lectures about the theory underlying these situations. Student participation is strongly encouraged.

40511133 Econometrics(2) 3 credits 48 hours

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/Views/R.

40511202 International Business 2 credits 32 hours

International Business differs in important ways from business conducted within national borders. It poses additional challenges but also offers new opportunities. This course provides a framework for analyzing decisions made by firms in an international context. The analytical framework provides a basis for formulating strategies that will enable businesses to succeed in the international business environment. The course combines material from strategy, international finance, trade theory, trade policy, marketing, human resource management and other related areas. We emphasize the use of analytical tools and concepts but provide many real-world examples. Course projects help students develop their research and writing skills. The course is integrative by design, which leads to some overlap with material taught in other courses.

40511263 Fixed Income Securities Analysis 3 credits 48 hours

This course provides a systematic overview of fixed income securities and analytical tools. In the first part of the course, the students will become familiar with the basics of fixed income, interest rate models, and derivatives. The second part will focus on introducing corporate debts, credit risk modeling and derivatives, including CDS and CDO. The students will understand through practice the available modeling approaches. The course will catch the interaction between finance modeling and the practices in Chinese and overseas markets, such as the US sub-prime mor

40511342 The Business Cycle Analysis 2 credits 32 hours

This course builds upon the course of Intermediate Macroeconomics as a further exploration of the business cycle analysis of the macroeconomic study. It will introduce how developed and developing economies fluctuate in the short run. The course will combine theoretical and empirical analysis, and cover the business-cycle data analysis, consumption fluctuations, R&D fluctuations, labor(and wage) fluctuations, the role of financial market in the business cycle, as well as the relationship between short-run fluctuations and long-run growth.

40511373 Mathematics of Risk(1) 3 credits 48 hours

The course provides a rigorous introduction to the basic probability theory and models used in the study of insurance and risk finance. Students are expected to be proficient in differential, integral, and multivariate calculus, and some previous exposure to probability and/or statistics is desirable. The following specific topics will be covered:

- • Foundations of probability theory
- • Random variables in insurance

- • Parametric distributions (univariate and multivariate)
- • Common probability distributions for loss frequencies
- • Common probability distributions for loss severities
- • Convolutions of distribution functions; total-loss models
- • Alternative characterizations of random variables (survival functions, MGFs, etc.)
- • Risk measures (value at risk, expected shortfall, ruin probability, etc.)
- • Transformations of random variables
- • Effects of insurance-policy restrictions (deductibles, limits, copayments)
- • Heavy-tailed random variables

40511423 Investment 3 credits 48 hours

This course will introduce and delineate basic concepts and techniques in investments by examining such topics as risk-return trade off, optimal portfolio construction, Capital Asset Pricing model, APT, Market efficiency, topics related to bonds and futures. On the theoretical side, this course introduces fundamental knowledge for portfolio management and capital asset pricing. On the practical side, this course covers recent topics that are related to investment strategies and portfolio management. A project about portfolio management is specially designed to let students apply the theoretical knowledge into practice.

00641983 Introduction to Wittgenstein Philosophy 3 credits 48 hours

This course will have four foci: 1) a close reading of Tractatus Logico-Philosophicus and Philosophical Investigations, 2) an overview of the history of the reception of the two books and some of the most influential readings they have occasioned; 3) a discussion of a handful of recent debates in the secondary literature on some contested sections; 4) an assessment of how best to interpret the overall aims, methods, and teachings that confer unity on the work as a whole.

40641603 Reading Shakespeare 3 credits 96 hours

This course introduces students to seven Shakespearean plays, and acquaints students with the stage conventions and cultural trends in Shakespeare's time. Students read the plays closely and discuss the themes, characters, key passages and dramatic skills in class. The reading focuses on the flavor of Shakespeare in the original, and will be aided by major criticism of the plays and multimedia resources. Students are encouraged to find their own links with the Bard by discussing, showing, acting and writing. Teaching goals:

1. Students will be able to read Shakespeare's plays, discuss the major themes and feel the beauty of his language.
2. Students will be able to appreciate the plays as literary texts and analyze Shakespeare's poetic and dramatic techniques.
3. Students become aware of the relation between Shakespeare's plays and the social background of the Elizabethan and Jacobean eras.

Students learn to find their own ways of approaching and being attracted to Shakespeare, and create links between their reality and the dramatic world of Shakespeare.

40661373 The Law of the World Trade Organization(in English) 3 credits 48 hours

Economic interdependence between countries and across production chains continue to grow. In this context, stable rules on international trade are key. This course focuses on the rules established under the World Trade Organization (WTO) as well as selected regional trade agreements. What are the benefits and risks of trade

liberalization from legal, economic and political perspectives? How can trade liberalization go hand in hand with pursuing public policy goals such as protecting the environment and human rights ("non-trade concerns") or promoting the economic development of poor countries? The course will offer an in-depth, practical knowledge of substantive WTO law drawing heavily on case law from dispute settlement practice. It will address the basic principles of trade in goods and trade in services as well as more specific WTO agreements on, for example, health measures, subsidies, trade remedies and intellectual property rights. The course will also focus on the unique WTO mechanism for the settlement of trade disputes, and especially on how it balances trade liberalization with non-trade concerns as well as how it copes with increasing trade tensions between OECD countries and emerging economies like Brazil, China, India and Russia.

40661412 Moot Court Training 2 credits 32 hours

The Summer Intensive Legal English Course aims to introduce first-year law students to the world of American advocacy. Both the lecturer and tutors will closely work together to help students learn about the American legal system, legal research, case reading and analysis, statutory interpretation, legal synthesis as well as basics to trial advocacy and legal ethics. If time permits, students will also learn some legal translation and legal interpreting skills. Overall, students taking this course will experience enhancement in self-confidence, legal logic, and legal English.

40661512 Comparative Corporate Governance(in English) 2 credits 32 hours

This course is designed to familiarize students with company and securities laws and underlying policies in China, with an emphasis on the corporate governance structure of publicly-held companies. The course focuses on important governance issues such as controlling shareholders, board of directors, affiliated transactions, domestic and cross-border takeovers. To this end, it also covers securities and investment regulations, such as listing requirements, mandatory disclosure and foreign investment restrictions in the country.

In the beginning of the class, an overview of the regulatory framework and market conditions in Mainland China will be conducted. The other part of the class will be divided into the following units, each in three or four hours: I. Controlling Shareholders, Related-Party Transactions and

30670502 English News(1) 2 credits 32 hours

In this course, you will investigate some of the most-interesting companies, products and people -- and in the process learn how to be a more-effective reporter, investigator, analyst, consultant, PR professional, executive, lawyer or government official. Objectives of this class:

- * Improvement of critical thinking skills
- * Financial analysis of balance sheets and earnings reports. Students will learn such topics as basic accounting, supply-chain management, tax rules and relative value across a variety of businesses and industries.
- * Guest lectures by executives, fund managers/analysts and journalists who will share their personal experiences
- * Core competence on the Bloomberg Terminal, the financial world's top analytical platform
- * Knowledge about what makes people, companies and products succeed or fail
- * A fun, lively, entertaining class format.

This course will give you hands-on training with the Bloomberg Terminal. The Professor will be your coach and show you ways to

30670552 English News(3) 2 credits 32 hours

This course is planned to be given by proper foreign teachers. The foreign teacher will deliver the course in English, including (but not limited to) the media culture of UK and US, public relations and ads, speech and communication, etc.

10691193 An Exploration to the Original Spirit of Western Philosophy 3 credits 48 hours

It is a core course which belongs to the curriculum of humanistic quality-oriented education for all professional undergraduate. By telling ancient Greek and Roman philosophers' rich thoughts and ideas, to explore the origin of the western spirit of philosophy, to reveal the orientation of western national spirit, to expound characteristics of western national way of thinking, to help students grasp the basic spirit of western philosophy, cultivation of thinking ability, cultivate noble values and improve the humanistic quality in an all-round way.

It is also a fundamental course of the university (R&W), which put an emphasis on reading, thinking, speaking and writing.

It adopts the mixing way of teaching. The students who take it should watch the related video on time, complete the online exercises and to attend the tutorial classes in classroom). They will be divided into groups (each group of about 20 people), and lead by the tutor to discuss in classroom. All course students must take part in it.

The tutorial class time: 19:20-20:55p.m. the 4th, 7th, 10th, 13th weeks on Wednesday or Saturday 6 (students may choose one of two time)

30690524 Logic, Language, and Philosophy 4 credits 64 hours

This course is designed for students with backgrounds and interests in philosophy, and consists of two parts. The first part of the course introduces fundamental logical notions and methods that have applications in philosophy. Things to be covered include logical systems like propositional logic, predicate logic, epistemic logic, and dynamic logic, as well as issues like inter-translation of formal and natural languages, inference pattern and calculus, epistemic activity and information flow, and the interaction between logic and games. The second part of the course introduces the students to the application of logic in the study of natural language semantics. It gives an overview of the main tools and theoretical approaches, provides concrete examples of a number of phenomena, and discusses both historical backgrounds as well as some methodological assumptions.

30690552 Foundations of Logic 2 credits 32 hours

The course gives an overview of classical meta-logical results, in particular, Godel's completeness and incompleteness theorems, Church-Turing's proof of the undecidability of first-order logic, and Tarski's theorem on the undefinability of truth. After a recapitulation of the syntax and semantics of first-order logic, Henkin's proof of completeness, in terms of syntactic models and maximal consistent sets, is presented. Philosophical and logical consequences of the result and its proof are discussed, with some glimpses from model theory. The course then presents the notions of complete and incomplete theories, as well as decidability of theories. After an overview of the philosophical and mathematical background in the early 20th century, including Hilbert's Program, the incompleteness theorems and related results, and the ideas behind their proofs, are presented at an informal level. The remainder of the course fills in some of the details. The course presentation focuses on important concepts and ideas, philosophical as well as mathematical, but also gives pointers to the technical details.

30690562 Modal Logic and its Applications 2 credits 32 hours

Among branches of modern logic, modal logic provides a nice balance of expressivity and complexity, allowing it to be applied widely and extensively in many fields ranging from humanities to software design. In this course, ideas and methods of modal logic will be introduced along with its famous applications in modeling time,

knowledge, necessity, and social behaviors. In this thread, student will be led into environments similar to research, in which ideas and needs from theoretical side and practical side frequently interact. Pointers will be given to standard textbooks/handbooks as well as notable papers, and with knowledge and skills introduced in this course, students with further interests should in principle be able to explore by their own. This course aims to student who more or less have learnt some logic, but this is not strictly required.

00701271 Brief Introduction to Psychology 1 credits 16 hours

This course provides an introduction to the basic concepts that form the foundation of the field of psychology. Topics include history of psychology, research methods, biological bases of behavior, sensation and perception, consciousness, learning and memory, life-span development, intelligence, emotion, personality, psychological disorders and treatment. Class lectures emphasize an empirical approach to a scientific understanding of human behavior across these diverse domains. In addition to learning basic content information about psychology, students will learn how psychologists ask questions, evaluate evidence, and communicate with each other.

00701451 Advanced Philosophy of Specific Sciences 1 credits 16 hours

The course is co-organized with the Center for Philosophy of Science at the University of Pittsburgh. We will invite its fellows to teach advanced philosophy of specific sciences at Tsinghua. The coordinator is Professor WANG Wei.

The University of Pittsburgh has been ranked No. 1 in the philosophy of science for long time. The Center fellows includes professors from the Dept. of History and Philosophy of Science and the Dept. of Philosophy at Pitt and the Dept. of Philosophy at CMU. Since 2008, we have been organizing Tsinghua-Pitt Summer School for Philosophy of Science, which is now a top program in China. The course will be taught in English. We wish to educate students' theoretic approach and critical thinking, therefore to have deep understanding of science.

00701461 History and Philosophy of Life Sciences 1 credits 16 hours

The course is organized by LEI Yi and WANG Wei at Tsinghua University and Professor M. Weisberg, the Chair of the Department of Philosophy at the University of Pennsylvania. We invite a historian of biology to teach history of life sciences in odd years and a philosopher of biology to teach philosophy of life sciences. For example, M. Weisberg taught "Modeling in Biology" in 2014 and M. Dietrich at Dartmouth College taught "History of Genetics" in 2015. We wish to improve students' historical perspective, philosophical reflection, and critical thinking in life sciences.

00701491 Economics, Public Policy and Society 1 credits 16 hours

The aim of this series of lectures is to introduce students to a number of issues in social science concerning the evolutionary foundations of human behaviour. How has our evolutionary heritage shaped our current societies? Can the study of our evolutionary past help us to understand better current human behaviour? How can we integrate our growing body of knowledge of our evolved human nature with existing models of humans as rational actors? The topics examined in this series of lectures will intersect with a number of issues in the philosophy of social science (e.g., how are we to explain human behaviour?) and the decision sciences (e.g., how should we model the choices made by boundedly rational agents?).

Lecture 1. Geographical Determinism and the Shape of History. Some philosophers, such as Karl Popper, and some social scientists, such as Franz Boas, have argued against the idea that there were evolutionary determinants of society. In this lecture, I discuss the idea of "geographical determinism," as developed in Jared Diamond's book *Guns, Germs, and Steel*. Essentially, the idea is that the development of civilisations depends heavily on the

environmental endowment those persons found themselves faced with, as a contingent evolutionary outcome. After discussing the details of Diamond's argument, I then consider whether China's development serves to partially refute Diamond's argument. I then relate this to a recently discussed problem in the philosophy of science raised by P. Kyle

Stanford, known as the "problem of unconceived alternatives" .

10700073 Mind, Individual and Culture 3 credits 48 hours

This course provides an introduction to the core concepts that form the foundation of the field of psychology.

Topics include history of psychology, research methods, biological bases of behavior, sensation and perception, consciousness, learning and memory, life-span development, intelligence, emotion, personality, psychological disorders and treatment. Class lectures emphasize an empirical approach to a scientific understanding of human behavior across these diverse domains. In addition to learning basic knowledge about psychology, students will learn how psychologists ask questions, evaluate evidence, and communicate with each other. This course aims to inspire students to reason about current affairs and social phenomenon through the lens of a psychologist. That is, to critically evaluate evidence and to form one's own opinion based on sound reasoning and data.

30700603 Behavioral Economics 3 credits 48 hours

The purpose of this course is to inform students of decision rules and their associated biases. The course has two facets. First, it gives students a broad overview of important results from various behavioral sciences (e.g., behavioral decision research, social and cognitive psychology, consumer research) that clarify how people really make decisions. Second, it investigates how these results can be leveraged to design original and more effective marketing and business strategies. Knowledge of these issues can be a significant source of competitive advantage.

40700573 Fundamentals in International Political Economics (in English) 3 credits 48 hours

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

40910222 Sustainable Urbanization in an International Comparative Perspective 2 credits 32 hours

This course offers students a comparative approach to investigating sustainable cities, focusing on urbanization in the world's two largest economies and biggest emitters of greenhouse gases: China and the United States. Using project-based learning approach, we explore the major drivers of urbanization and initiatives to promote more sustainable growth. We investigate tradeoffs and choices related to land use, construction, disaster preparedness, energy and water resources, and the need to balance economic vitality, environmental quality, cultural heritage, and social equity.

01510213 Global Innovation Strategy 3 credits 48 hours

As information technology has evolved for decades, we have already embraced an era when the recombination of industries, information, talents has become common. In collaboration with universities and institutes from around

the globe via iPodia Alliance, this course will provide students with global vision on innovation opportunity identification, industry analysis, personal career planning, innovation strategy reporting etc.

Key features of this course include:

1. Global innovation theories and practices.
2. Student prepared seminar and workshops.
3. iPodia enabled cross-cultural study.

01510223 Computational Thinking and Foundations and Practice of System Design 3 credits 48 hours

This course lead students to create a full stack modern computing system from basic logic gates, and proceeds to build Memory, CPU, Assembly to Machine Language Translator, Virtual Machine, High level Language Compiler, an Operating System, and a small application program within one semester. The goal of this exercise is to help students to build an inter-connected complex system and see how they can organize their implementation efforts using a collection of methodical engineering approaches developed by computer scientists and software engineers. This course also lead students to discover the historical development and major insights of how complex systems are being organized.

0. This course is about seeing both trees and forests with a multi-level abstraction exercise system. It comes with a tried-and-tested developmental path that lead students to see the whole stack of computing machinery.
1. Gamified Exercises: Students are required to create solutions in incremental stages. Every stage is like a game level, so that students can be immersed in the search process of seeing connections across all layers of system abstraction.
2. Collective Learning: Students also must see that all these systems are designed to remind engineers that all sub-systems must be co-developed by engineers that are specialized in other disciplines. Therefore, creating a mindset that complex engineering systems are composed of not one-person's efforts but many teams.

14000022 English Practice 2 credits 80 hours

English is an important tool for people in industry and academia of Biomedical Engineering. This course will help the students in Department of Biomedical Engineering to enhance their ability to use English in professional writing, report, and communication. This course will based on real professional problems, emphasize the interaction among students and teacher. This course will be lectured in English.