

COURSE DESCRIPTIONS 科目簡介

COURSES FOR 4-YEAR UNDERGRADUATE PROGRAMMES

CLD9001 Technology and Cultural Change (3 credits)

This course introduces basic frameworks to enhance students' understanding of the complex relation between technology and cultural change. Emphasising both socio-cultural perspectives on technology and the cultural impacts of technological development, the course will focus on such questions as: how does technology shape our cultural life, and what meanings do technological artifacts acquire in the process? How are these meanings produced and circulated in particular historical and social contexts? Do cultural factors affect the development of technology and, if so, how?

CLD9002 Understanding Social and Economic Indicators (3 credits)

From 2025-26

This course introduces students to the scientific principles, methodologies, and quantitative techniques used to measure and analyze social and economic indicators. Emphasising data science and statistical methods, students will explore the impact of technological advancements on data collection, measurement accuracy, and policymaking. The course develops quantitative literacy, statistical and critical thinking skills through real-world applications. This enables students to assess socio-economic trends and apply their knowledge in creating their own indicators. Additionally, the course enhances civic responsibility by equipping students with the ability to interpret data and make informed decisions about social and economic policies.

In 2024-25 or before

The course introduces students to the nature, measurements, and limitations of major social and economic indicators that have been used internationally to measure and compare socio-economic conditions across societies. After learning commonly used indicators worldwide, students will apply them to assess the social and economic development of Hong Kong.

CLD9003 Statistics in Modern Society (3 credits)

Wells, H.G., the celebrated English author and historian, noted more than 100 years ago that “statistical thinking will one day be as necessary for efficient citizenship as the ability to read.” Modern society is becoming so complex that there is an ever-increasing need for citizens to possess an array of analytical skills. This course will help students develop skills in statistical thinking and reasoning through the use of real-world examples from the fields of economics, business, psychology, sociology, and political science. For example, does daycare breed bullies? Is your lifestyle healthy? Who benefits from a tax cut? Are the rich getting richer? Are we smarter than our parents? This course will address such issues as these in order to illustrate ‘user-friendly’ approaches to statistical studies. The course is specifically designed for non-statistical majors.

CLD9004 Mathematical Literacy in Today's World (3 credits)

Hermann Weyl (1885-1955) said: “Mathematics sets the standard of objective truth for all intellectual endeavours, science and technology bear witness to its practical usefulness. Besides language and music, it is one of the primary manifestations of the free creative power of the human mind, and it is the universal organ for world-understanding through theoretical construction. Mathematics must therefore remain an essential element of the knowledge and abilities which we have to teach, of the culture we have to transmit, to the next generation.”

This course stresses the prevalence, relevance, and practicality of mathematics in modern

society. Real world examples, such as traveling plans for a postman and a salesman, voting methods and strategies, social choice, elections and the time value of money, will expose the non-specialist to contemporary mathematical thinking. The mathematical techniques involved are taught via hands-on applications. This course is specifically designed for non-mathematics majors.

CLD9005 Colour Science and Digital Applications (3 credits) (deleted from 2022-23)

This course introduces a scientific approach to understanding colors as well as the current digital technology for mastering colours. Apart from the theoretical and instrumental bases for analyzing colours, emphasis is placed on practical applications of digital colour technology in areas such as photography and publishing. Students will also acquire skills in relevant software and equipment.

CLD9006 Personal Security in Cyberspace (3 credits) (deleted from 2022-23)

This course examines the misunderstanding of security from user behaviour perspectives. Many users believe their connections in cyberspace are safe and they do not realize the serious consequences of possible security breaches. This course shows the various threats in cyberspace. Consequences of security breaches will be discussed. It will also cover countermeasures which can protect cyberspace users. It provides a foundation for students to understand the technology which they use every day. Students will be able to protect themselves in cyberspace on completion of this course.

CLD9008 Life Sciences: The Way Life Works (3 credits)

This course gives a brief introduction to the Origin of Life and provides an understanding of the physical conditions that enable planet Earth to create and sustain life. A practical approach will be adopted to arouse the curiosity and interest of the students in the subject in order to stimulate critical scientific thinking. The course addresses the basic chemistry and biochemistry of vital components for the living cell. The course explains the role and functions of the various organs and organelles in plants and animals. It engages students in open discussion on the socio-cultural-religious impact of the theories of evolution, reproduction and bio-engineering. This course selects certain important topics that have a great impact locally and with possible global consequences. The course instills literacy in bio-science by broadening the scope of the students' knowledge in biology and will enable students to address issues on life competently and with confidence.

Depending on the availability of agency, Service-Learning will be implemented in the course. When implemented, all students will undertake the Service-learning component.

CLD9011 Using the Internet for Learning and Research (3 credits) (deleted from 2024-25)

As the Internet has become an indispensable tool for students, this course provides a systematic treatment of the online technologies for learning and research across academic disciplines. It provides a review of the state-of-the art technologies that can aid learning and research in various phases, from idea generation and literature review to data collection and disseminating research findings. It introduces students to online databases, search engines, intelligent systems, social network media, and the corresponding set of methods and analytical tools for learning and research of both qualitative and quantitative nature. This course is interdisciplinary and prepares students to be competent, productive and responsible in applying Internet technologies for academic achievement.

CLD9012 Natural Disasters: Science and Society (3 credits)

This course will explore the science of natural events that cause natural disasters (earthquakes, volcanos, tsunamis, tropical cyclones, mass wasting, floods, and wildfires) and the impacts that these events have on human societies and natural ecosystems.

CLD9014 Spreadsheet-Based Decision Making (3 credits)

Organizations and individuals often need to make decisions in their best interests in different situations, which may involve uncertainty and constraints. In this course, we introduce quantitative techniques that facilitate scientific and systematic decision making. Students will learn how to apply Microsoft Excel to effectively and efficiently implement appropriate decision-making techniques and obtain the best decision. We present concepts and decision-making techniques by solving a broad variety of practical problems in the social context, business and economics, daily life, and sports. Through practicing these techniques and Excel functions, students are expected to develop basic analytical skills and acquire competency in Excel, which can help them improve their performance at work or in daily life. This course is specially designed for non-math/non-computing majors.

CLD9015 Understanding Evolution (3 credits)

“Nothing in biology makes sense except in the light of evolution” (Dobzhansky, 1973)

Biology is the study of living things, and includes a diverse range of topics such as genetics, physiology, and ecology—evolution is the theory that connects all subjects in biology. The goal of this course is to provide students with a working knowledge of evolutionary theory and use it to understand current issues with social impact (i.e. disease, climate change, and human behavior). The course will begin with lessons on the nature of science, followed by the history of evolutionary thought, key concepts of evolution, implications of evolution, and application to current issues.

CLD9016 The Science and Technology of Music (from 2025-26)/ Music and the Science of Sound (in 2024-25 or before) (3 credits)

This course explores the intersection of music and sound production through the lens of science and technology, engaging students with critical questions such as: How is sound created? How do our ears hear? How do musical instruments produce sound? Can all sounds be music? How is music based on math and physics? How can we manipulate sounds and sound technologies to make new music? How can changing the mechanics of music affect our emotional reaction to it? How do cultural contexts shape music composition and production, and how do advancements in sound technologies influence global audiences?

By investigating these themes, students will learn and apply scientific principles to traditional and digital music production. Students will create and test new music and music technologies, develop critical thinking, communication, and collaboration skills, and investigate the properties of sound and music from scientific and societal perspectives.

CLD9017 Ecology: The Science of Environmental Issues (3 credits)

From 2024-25

We are living in what many refer to as the Anthropocene (Anthropo- derived from Greek word for “human”, -cene derived from Greek word for “recent”), because humans now have significant influence over Earth’s ecosystems and environmental processes. Human activities can contribute to worsening climate change, species extinctions, deforestation, pollution, and other environmental issues. A strong understanding of the science underlying these threats will be important in guiding the decisions we make as global citizens and future leaders.

Depending on the availability of partnering NGOs/organizations, Service-Learning (S-L) will be implemented in this course. When S-L mode is available, students will opt for either non-S-L mode or S-L mode in the first two classes. The S-L option will be announced before the course registration/add-drop period.

In 2023-24 or before

Climate change, extinction, air pollution, deforestation, pollution, invasive species, energy,

and water supply are all environmental issues facing us today and in the future. If citizens and leaders are going to make wise decisions about these and other issues related to the environment, sustainable development, and global citizenship, then it will be necessary for them to have a strong understanding of the science behind the issues.

CLD9018 Natural History of Hong Kong (3 credits)

This course introduces students to the natural history of Hong Kong. Natural history is the scientific study of living organisms and their environment, focusing on observation to gather data. Geographically sitting in the transition zone between tropical and temperate habitats, Hong Kong has a diversity of habitats, rich biodiversity compared to its size (*e.g.* Hong Kong is home to $\sim\frac{1}{3}$ of China's bird species) and is also home to globally endangered (*e.g.* Black-faced spoonbill, Golden coin turtle, Chinese pangolin) and endemic species (not found anywhere else in the world; 3 reptiles, 1 amphibian, 5 fish, 19 invertebrates, and 20 vascular plants). The goal of this course is to combine the theory learned in the classroom with hands-on experience in the field to learn about the ecosystems and living organisms of Hong Kong.

CLD9019 Calculus with Applications in Today's World (3 credits) (deleted from 2024-25)

Calculus plays an important role in the understanding of today's world. This is an introductory course which presents the ideas and techniques of calculus with an informal, intuitive and geometric approach. Students need to learn both the major tools and theories in calculus and applications of calculus to real-life situations in business, economics, the social sciences, natural sciences and visual arts. This course will equip students with calculus background needed for further study in many disciplines.

CLD9020 Ethical Dimensions of Artificial Intelligence (from 2024-25)/ **Artificial Intelligence and Society** (in 2023-24 or before) **(3 credits)**

From 2024-25

This course provides students with an accessible introduction to the ethical and social questions raised by artificial intelligence (AI) technology. The course first briefly introduces the history and philosophical background of AI as well as the basics of how neural networks and large language models work. The primary focus of the class is on the ethical and social issues raised by the increasing use of AI tools. In this main course component, we look at various applications of AI technology, focusing on distinctively ethical questions raised by their use in society. Topics covered may include the use of AI systems in medicine, law, business, warfare, and public policy; ethical frameworks for dealing with the social challenges raised by AI; 'robot rights' and the potential welfare of AI systems; and the future implications of AI for society, including the possibility of an AI 'singularity.'

In 2023-24 or before

This course provides an accessible introduction to the main methods of applied artificial intelligence as they are used in commonly available household products, care robots, self-driving cars, and automated weapons. After establishing some theoretical basis (theories of intelligence, methods of AI), it goes on to describe in detail the architecture of a number of easy, introductory AI systems (expert systems, computer game players, chat bots, and robotic pets), while also presenting these systems in the classroom and giving the students the opportunity to interact with them and (give sufficient interest and ability of the students) to make some easy modifications and adaptations. This hands-on approach is a unique feature of this course, and will give the students some actual experience in handling, analysing, and understanding the workings of basic AI systems. No previous programming knowledge is needed, but students should be open to learning basic concepts from computer science. All actual interaction with computers will be in form of guided exercises that do not require special skills. Finally, the course will address the social and

ethical implications of autonomous machines, using examples such as household assistants, care robots, self-driving cars, and autonomous weapons.

No prior programming experience is needed, but participants should have a basic familiarity with computers and an interest in information technology.

CLD9021 Technology and the Future of Mankind (3 credits) (deleted from 2024-25)

This course aims to enable students to develop an informed opinion about what the influence of technology on the near-future of mankind might look like. To this end, we first discuss what technology is, and how technological progress relates to social progress. Then, we examine four major technological and social challenges: climate change, synthetic biology, nanotechnology, and superintelligence, and examine expert opinions about how these might influence mankind's future. We then discuss the question whether technology can be successfully regulated by laws or other forms of social control, or whether, on the other hand, it develops independently and largely out of social control. Finally, we examine three different and very influential visions of the future impact of technology (Kurzweil, Bostrom, Joy), and try to evaluate them according to what we learned before.

CLD9023 The Science and Philosophy of Space and Time (from 2025-26)/ **Space and Time** (in 2024-25 before) **(3 credits)**

Is there such a thing as space? Are there absolute positions in space, so that one may return to the exact same location in space at different times? Can one be absolutely stationary, or is all motion relative? What does it mean to say that space is curved? Do we live, as Einstein supposed, in a four-dimensional static block universe that contains both the past and the future? Or does only the present exist? Could we build a time machine and travel back in time? This course will address these and other questions by looking at the theories of space and time proposed by arguably the three greatest scientists in history – Aristotle, Newton and Einstein – and by looking at the conceptual and philosophical implications of these theories. This course is accessible to all students and presupposes no background knowledge of physics or philosophy. The course aims to improve the skills of students regarding critical thinking, problem-solving, and argumentation. It also aims at increasing students' mathematical literacy, their knowledge of how science works and progresses, and their understanding of the contemporary overall scientific understanding of the world.

CLD9024 Mapping Our Changing World (3 credits)

This course is about geography and maps with an introduction to techniques for making maps. The contents cover principles of map making and design, thematic mapping techniques, map data processing and management. Modern technologies today such as web-based mapping, GPS and GIS (Global Positioning and Geographic Information Systems) tools will also be covered. This course combines classroom teaching and hands-on tutorial in two 1.5-hour sessions. Classroom teaching involves lectures about basic mapping concepts and spatial thinking. Hands-on tutorial enables students to explore industry leading web-based mapping applications and learn GIS analytical skills by practice.

CLD9025 Climate Change and Human Health (3 credits)

This course provides an overview of issues related to climate change and human health in the context of public health. It introduces fundamental concepts of climate change and climate change related human health impacts. The course comprises a series of 3-hour lecture and discussion sessions, as well as field trips. Lectures will cover topics such as causes and consequences of climate change and scientific methods relating to climate change assessments and the challenges of sustainable development. The policy implication about different adaptation and mitigation strategies related to climate change and human health impacts will also be examined. Guest speakers of related disciplines will be invited

to talk about future impacts of climate change and small-group field trips will be arranged. Other learning activities include movie appreciation, case studies, media reviews, data analyses, field trips and group discussions.

Depending on the availability of partnering NGOs/organizations, Service-Learning will be implemented in the course. When implemented, all students will undertake the Service-learning component. The addition of Service-Learning will be announced before the course registration/add-drop period.

CLD9026 Food: Health, Technology and Environment (3 credits)

Food is essential to life. The course aims to provide students with a comprehensive overview of scientific principles and issues related to food production and consumption by combining knowledge from multiple disciplines, including food science, environmental sciences, public health and social science. Upon completing the course, students should be able to critically discuss the concepts and apply the knowledge to make healthy and sustainable food choices.

CLD9027 Blue Planet (3 credits)

From 2025-26

This course is built upon two primary pillars: geology and sustainability. This course lays a foundation for students to develop geology literacy framed by the sustainable development goals. Students will learn the fundamental knowledge of the Earth's processes and the concurrent geology-related sustainability topics. Instructional methods include lectures, short videos, small-group discussions, in-class activities, field trips, and museum visits.

Service-Learning may be implemented in the course. When implemented, students will have the option to participate in the Service-Learning activity or to complete the course through traditional teaching and learning methods.

Note: during course enrolment, students should check the Course Offering List or Service-Learning Information on Registry's website whether service learning is offered in a term.

In 2024-25 or before

This course provides students a basic understanding of the Earth and its four main components: the atmosphere, hydrosphere, lithosphere and biosphere. The course comprises a series of 3-hour lecture and discussion sessions. Field trips and/or museum visits will be arranged during week 5 to week 8. The lecture will begin with the introduction of the Earth System and the Earth. Topics include: Weather, Climate, El Niño, Global Warming; Groundwater Contamination, Eutrophication, Coastal System; Earth's Origin, Plate Tectonics, Volcanism, Earthquakes; Ecosystems, Evolution and Extinction. In addition, Human Interactions with the Earth will also be examined. Other learning activities include movie appreciation, case studies, media reviews, field trips, museum visits and group discussions.

CLD9028 Who's #1? Rankings, Ratings, Critics, and Society (3 credits) (deleted from 2024-25)

Rankings and ratings affect many aspects of today's world: whether our favorite sports teams advance in championships, who attends our school, whether our preferred restaurants remain open or must close. Yet, who constructs these rankings? How do they do it? What are the social consequences of these rankings?

This course will lead students to answer these questions by teaching basic matrix mathematics in order to understand the language of rankings. Students will then

construct their own rankings and study the social consequences of rankings generally.

This course will be accessible to anyone with a basic understanding of arithmetic. The presentation of mathematics will focus on mechanical and computational aspects using software such as Microsoft Excel, not on proving mathematical theorems.

CLD9029 Consumers, Voters and Information Technology (3 credits) (deleted from 2024-25)

This course covers (1) the basic trends in the developments of information technology in recent years, (2) introduces the conceptual frameworks used in economics and political science (as well as other social sciences) to understand and analyse consumer/voter behavior in perceiving, interpreting and utilising information in forming their preferences and making selection in the marketplace and political arena; and (3) helps students understand better such new phenomena as free goods, consumer lock-in, algorithms, and political polarisation, etc.

CLD9030 The Brain, Mind, and Behaviour (3 credits)

What happens in the brain when you are asleep? Why wouldn't someone with memory loss forget how to talk? How does the brain solve problems and make decisions? The above questions and many similar ones concern how the mind works, especially in relating brain and neural activities to everyday behaviour. In this course, you will learn the basic principles and knowledge about how the brain works and relate them to various kinds of behaviours and psychological phenomena in your daily life. The beginning of the course will focus on the fundamentals of neuroscience, such as neural units and neural signals, functions and organization of the nervous system, and neural development. The remaining part of the course will connect the basic neuroscience knowledge with various topics in psychology connected to understanding oneself and role in society. Examples of such topics include sensation and perception, learning and memory, language, decision making, consciousness, sleep, motivation, and social interaction.

CLD9031 Application of Automatic Control in Daily Life (3 credits)

Automation can liberate human beings from heavy physical labour, part of mental labour, and harsh and dangerous working environments. It expands the functions of human organs, greatly increase labour productivity, and enhances human beings' ability to understand the world and transform the world.

This course gives a brief introduction to automatic control techniques (especially the electrical automation part) to our students. SENSOR, ACTUATOR, and CONTROLLER will be covered. Students will not only learn these techniques from the lecture notes but also use them through a set of exciting in-class experiments. Opportunities will also be given to evaluate and analyse the performance of different control methods in daily life and industry.

The experimental platforms and software templates will be provided to minimize the difficulties for taking this course. In addition to the basic knowledge and introduction given in the beginning of the course, recaps of the C programming language and hardware design will be provided throughout the course.

CLD9032 The Social Impact of Artificial Intelligence (3 credits)

Artificial intelligence (AI) has received not only considerable attention in the media over the past years, but we have started seeing it at work in a range of domains going from financial services to healthcare to social media and entertainment. Concomitantly, significant investments have flown over the past five years into AI. The increased awareness of its presence in a range of domains, as well as the continuing investment flows raise a series of questions with regard to the impact on AI on professions and

expertise, on work, organisations, trust, culture, social identities and personhood, to name but a few. Moreover, AI tools raise issues related to ethics, sustainability, and governance. This course develops a sociological perspective on AI and ML, drawing upon the latest research in the domain. It aims at shedding light upon the ways in which contemporary societies evolve under this impact, how AI can be used in a sustainable, responsible way.

CLD9033 Science and Technology: How They Drive Contemporary Societies and Why (3 credits)

This course will examine and reflect on science and technology's impact on the world economically, politically, socially and environmentally. The course will introduce students to the scientific process, discussing and analysing the structure of key scientific theories; the relationship between theory and empiric; crucial concepts such as theory falsification, experiment, and data; scientific measurement and instruments; scientific truth; the loci of scientific research (e.g., the scientific lab, the field, the hospital). The focus will then shift to (1) the various theoretical underpinnings of science and technology in society, (2) impacts of science and technology on social institutions, social groups and everyday life, and (3) the future of science and technology in human civilization. The material presented in class will be supplemented with readings and students' reflections on their daily life experiences.

CLD9034 Microbiomes: Our Invisible Partners in Daily Life (3 credits)

This course explores the vital roles of microbial communities—diverse groups of tiny, invisible microorganisms like bacteria, fungi, and viruses working together—in ecosystems, human health, and sustainable development. Designed for non-science undergraduates, it introduces foundational concepts of microbiomes (the communities of microbes and their environments, such as in soil, water, or the human gut) and their real-world applications. Students will learn how these invisible ecosystems contribute to Sustainable Development Goals (SDGs) and responsible innovation (Environmental, Social, Governance, ESG) through interactive lectures with relatable everyday examples, a hands-on field trip, and a group project. Discover how these microscopic powerhouses shape our world—and how we can harness their potential for a healthier, more sustainable future.

CLD9035 Introduction to Set Theory and Applications (3 credits)

A set is a collection of objects, considered as a single object. Following a series of breakthroughs in the 19th and 20th century, set theory has evolved into an indispensable tool for the modern mathematician, computer scientist, philosopher, or indeed anyone that needs to engage in rigorous reasoning about different classes of objects, whether it be in an ordinary or scientific setting. On one hand, set theory provides an axiomatic foundation for mathematics: proceeding only from a precisely formulated collection of set-theoretic axioms and logical rules, the fundamental objects of mathematical thought (relations, functions, numbers, arithmetical operations) can be defined. On the other hand, set theory provides a rigorous definition of the size of a set, opening the door to a celebrated study of different orders of infinity. In this course, we offer a first introduction to set theory, starting with the naïve laws of the basic set operations, proceeding to set-theoretic definitions of arithmetic and set size, and ending with the axioms of Zermelo-Fraenkel set theory (including the axiom of choice). Previous exposure to university-level logic or mathematics is not required, though a willingness to engage (and develop one's skill) in rigorous logical reasoning and abstract thought is highly recommended.

CLD9099 Special Topics in CLD Cluster (3 credits)

The subject matter of this course varies according to the expertise of the subject teachers

or visiting scholars available. Special topics will mostly complement regular courses offered in the CLD cluster, to provide a broad range of general knowledge and wide perspectives for students to investigate, analyse and reflect on issues and topics related to science, technology, mathematics and society.

CLD9099a Special Topics in CLD Cluster: Chinese Medicine—applications for sports and daily life (3 credits) (deleted from 2022-23)

What is Chinese Medicine? Does acupuncture really work? Is there any scientific basis of treating illness by drinking the herbal medicines? This course is designed to provide a thorough understanding of the cultural and practical aspects of Chinese Medicine. It will help to clarify the myths or misconceptions on Chinese Medicine. Besides the basic theories, working principles of Chinese Medicine, students will be given the chance of hand-on experiences of how to benefit from the knowledge of Chinese Medicine. The applications of this branch of Medicine in our daily life, such as treatment of minor sport injuries, will be introduced and demonstrated.

CLD9099b Special Topics in CLD Cluster: Generative Artificial Intelligence (3 credits) (in Term 2, 2023-24) (deleted from 2025-26)

(Restriction(s): Students who have taken CCC8015 Generative Artificial Intelligence cannot enrol in this course.)

This course introduces generative artificial intelligence (AI), including fundamental concepts, basic techniques for generating text, images and audio, methods for evaluating and enhancing models, and ethical considerations. Through lectures and hands-on labs, students with no prior AI knowledge will gain practical skills in implementing, critiquing, and refining generative models.

CLD9099c Special Topics in CLD Cluster: Earth Science Field Studies (3 credits) (in Summer Term, 2023-24) (deleted from 2025-26)

This course serves as an introductory field exploration on geology and the wild nature. No prerequisite is required. Basic geology and field work information will be distributed at the beginning of the course. The course features an immersive one-week field work experience in HK/Mainland/Overseas, offering an introduction to the basic/typical geology of the region. Potential topics, depending on the sites of the field work, may encompass minerals and rocks, soils, plate tectonics, natural hazards, geological structures, ore deposits, landscapes, environment, humanity and culture issues, etc. In-class lectures, workshops, and group discussions may be employed as appropriate. Guest lecturers from Mainland/Overseas may be invited. Students from Mainland/Overseas may join the field work. The course registration process entails an interview.

The site of the field work varies from time to time. Students are advised to consult Division of Science dos@ln.edu.hk to learn about the site of the field work before registering this course. For summer 2024, the field work will be conducted in Nanjing, Jiangsu Province, PRC. Together with the course instructor and students from Lingnan University, professors and students from Nanjing University (<https://www.nju.edu.cn/>) will join the field work as well.