

NTU Virtual Semester Exchange Course Offerings: Academic Year 21/22 Semester 1)

NO	SCHOOL	PROG	COURSE CODE	COURSE TITLE	AU	CLASS TYPE	MODE OF LESSONS	FINAL EXAM (Y/N)	Brief Description
1	EEE	EEE	EE8061	Innovation and Technology Management	3	LECTURE	SYNCHRONOUS ONLINE	Y	LEARNING OBJECTIVE: The course aims to provide a broad understanding of the dynamics of technological development through innovation and the related management issues and practices. CONTENT: Overview. Patterns of Technology Development. External Environment. Internal Environment and Processes. Financial Fundamentals, Funding and Risk Management.
2	EEE	EEE	EE4758	Information Security	3	LECTURE	SYNCHRONOUS ONLINE	Y	In today's cyber world, it is important for engineers to understand and appreciate information security, as it has become an essential aspect of our day life. This course intends to provide you with essential concepts of information security, cryptography, e-security protocols, digital money, Intrusion detection, biometric based e-security technologies, Cyber-Warfare and Cyber terrorism. You will learn to design e-security based policies and implementation procedures in order to describe, design and devise online security for individual and corporate networks. Contents: Introduction. Secret/public-key cryptosystems. Secure protocols. Electronic election and digital money. Intrusion detection, social networks and cyber security. Blockchain Technology development. IOT (Internet of things) and IIOT (Industrial Internet of things), Cyber physical systems. Safety of cloud computing for industry 4.0. Security of Big Data. Smart production life cycle and cyber risks.
3	CEE	CEE	CV3014	Transportation Engineering	3	LECTURE	ASYNCHRONOUS ONLINE	Y	Transportation systems. Transportation planning and management. Traffic flow studies. Geometric design of roads and intersections. Design of flexible and rigid pavements.
						TUTORIAL	ASYNCHRONOUS ONLINE	Y	
4	MAE	ME	MA9005	Start Up: Getting from Zero to Millions	3	LECTURE	HYBRID WITH SYNCHRONOUS ONLINE	N	This course will introduce you to practical real-world conditions of venture building. You will learn about the motivation and key drivers in the early stages for entrepreneurs. You will be exposed to ideation, operational, and growth tools. During the course, you will be working on your own venture and practically increasing its value over 13 weeks. You will learn to construct your own formula to venture success through personal insights developed through the guidance of others who have shared the entrepreneur journey.
						TUTORIAL	HYBRID WITH SYNCHRONOUS ONLINE		
5	SCSE	CS	CZ2004	Human-Computer Interaction	3	LECTURE	SYNCHRONOUS ONLINE	N	Introduction; Usability and application spaces; Guidelines and principles for text-based interactions; Hardware devices for interaction; Development processes and assessments; Software tools in user interface development; Interaction styles; Practical UI development concepts; Design Issues
						LECTURE	SYNCHRONOUS ONLINE		

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6	WKWSCI	CS	CS8300	Science Fiction Film	3	LECTURE	HYBRID WITH SYNCHRONOUS ONLINE	N	This course will provide an overview of the genre along the two paths - Diachronic approach and Synchronic approach. The first half of the semester will be devoted to the former while the second will be dedicated to the latter. During the second half we will touch on five issues (feminism, postmodernity, virtual reality, body, and artificial intelligence) that have repeatedly but variably appeared in many science fiction films from the genre's very beginnings to the present day. From Metropolis, 2001: A Space Odyssey, Alien to Back To The Future and Ex Machina, this course will screen a diverse set of films followed by in-depth analysis and intensive discussions which foster the critical thinking for assessing and advancing arguments about the subject. Upon successful completion of the course, students will be able to situate science fiction films in relation to their generic and historical lineage and to critically analyse them in terms of their cultural resonance and their aesthetic properties.
7	SOH	CHIN	HC3051	Sociolinguistics and Bilingualism	3	SEMINAR	SYNCHRONOUS ONLINE	N	This course covers central topics and major theories in the studies of sociolinguistics and bilingualism. The relation between language variation and societal, cultural, and contextual factors characterized by bilingualism will be examined from a multidimensional perspective. You will learn to follow the principles of sociolinguistics to identify functions of language and variations of language use where bilingualism is recognized as a main factor. In addition, the social importance of the use, spread, and changes of different languages and dialects will be evaluated within the multilingual and multicultural context of Singapore.
8	SOH		HV8001	Introduction to Environmental Humanities	3	Lecture	HYBRID WITH SYNCHRONOUS ONLINE	Y	This introductory course to the Minor programme in Environmental Humanities (EH) will offer a broad foundation to the emerging area of study. It will bring together a range of conceptual and theoretical approaches that define the field of EH since the 21st century, in order to reflect upon our changing relationships and dynamics with animals, plants, and the natural and urban environments, particularly in this epoch we call the Anthropocene. The range of disciplines we will focus on include literary and film studies; history; media and communication studies; sociology; linguistics; philosophy; art and aesthetics; as well as environmental science and geology. Major focuses of the course will include new theoretical concepts of nature and the environment; social and environmental justice; climate change and environmental degradations; pollutions ad toxicity in everyday life; debates in the naming of the Anthropocene; critical studies of human and animal relationships; as well as the relationship between environmental humanities and our daily lives as concerned, thoughtful citizens,
9	SOH	ELH	HL0201	Images of Singapore	3	LECTURE	HYBRID WITH SYNCHRONOUS ONLINE	Y	This course will consider majors works of literature by Singaporean authors, including Edwin Thumboo, Catherine Lim, Kuo Pao Kun, Haresh Sharma, Gwee Li Sui, Claire Tham, Philip Jeyaratnam, Tan Tarn How and films by Eric Khoo, as well as a wide range of critical essays and commentaries. Students will analyse works by the above authors from a variety of perspectives, in an efforts to evaluate how the artistic community frames images of Singapore.
10	SOH	PHIL	HY0001	Ethics and Moral Reasoning	1	LECTURE	ASYNCHRONOUS ONLINE	N	HY0001 will introduce students to three major ethical theories' utilitarianism, Kant's deontology, and virtue ethics. Then, four weeks will be devoted to teaching the ethical principles underlying academic integrity, research ethics, and intellectual property. Finally, students will discuss issues related to the ethics of environmental sustainability and conservation. All the while, students will be challenged apply the ethical theories learned to concrete moral problems, including world poverty, corporate accountability and whistleblowing, and workplace discrimination.
11	SOH	PHIL	HY8002	Logic and Critical Thinking	3	LECTURE	ASYNCHRONOUS ONLINE	Y	This course aims to teach you to think logically and critically. It covers a broad range of logical concepts and terminology, including argument, premise, conclusion, inductive and deductive reasoning, validity, soundness, and strength. You will learn how to evaluate good deductive arguments through the study of categorical and truth functional logic, and good inductive arguments using a probabilistic framework. Finally, you will learn about common fallacies (rhetorical, statistical, and psychological), how to avoid them, and how to clearly communicate where fallacious arguments go wrong.

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12	SOH		LZ9001	Tamil Language Level 1	3	TUTORIAL	SYNCHRONOUS ONLINE	N	This course aims to enable you to achieve a fundamental awareness of the Tamil language in both spoken and written forms. While you will be provided the opportunity to develop your receptive (reading, listening) and productive (speaking, writing) skills in Tamil through communicative classes and self-study, the emphasis of this course will weigh more heavily on Spoken Tamil and grasping the Tamil sounds and written script. You will also be introduced to basic Tamil grammar and basic vocabulary related to common daily communication. Also, students who are interested in exploration of some components of the Tamil culture through language should enroll in this course. Students who wish to travel to Tamil Nadu to maximize their cultural experience or start new ventures in Tamil Nadu for trade, industry, education and investments may find this course relevant. You may find the course an avenue to pique your interest in Tamil history, ancient and contemporary literary works and the illustrious Tamil film industry as well as to integrate with the Tamil community in Singapore and all over the world. You will also gain intrinsic language learning skills and various transferable skills as part of the course.
13	NBS	ACC	AB9101	Business Valuation: From Theory to Practice	3	SEMINAR	SYNCHRONOUS ONLINE	N	<p>With an in-depth discussion on the valuation process and the definitions of values used widely in the financial and corporate world, this course will cover fundamental concepts and principles of valuation, provide an insight into the valuation standards adopted internationally and highlight critical issues in different valuation contexts. We will also take a deep dive into various valuation approaches/methodologies commonly used to value business and equity for transactions and financial reporting purposes. In addition, the course will also elaborate issues on discounts/premiums and valuation of intangible assets under business combinations, as required by financial reporting standards.</p> <p>This course allows students to explore and understand the various technical and practical issues involved in the various valuation approaches and methodologies. After completing the course, students are expected to be aware of the pros and cons of adopting such approaches and methodologies when conducting business valuation.</p> <p>Cases and projects are used to illustrate and integrate the valuation concepts, principles and their applications.</p>
14	NBS	BUS	BU8101	Accounting: A User Perspective	3	SEMINAR	SYNCHRONOUS ONLINE	N	This course is designed for non-business and non-accounting students. The course aims to equip you with basic accounting skills and knowledge that are essential for making informed judgments and decisions to meet challenges of the real world. You will learn fundamental concepts and techniques in financial and managerial accounting, through solving business problems. In the process, you will be exposed to the environment of accounting and its role in providing useful information for decision making by various stakeholders of business organisations.
15	NBS	BUS	BU8601	Fundamentals of Management	3	LECTURE	SYNCHRONOUS ONLINE	N	<p>As the world becomes more and more complex, technical skills alone are insufficient for the needs of many jobs. To become an accomplished professional in today's workforce, you will need to understand how people behave at work, work well with others, and be able to manage people regardless of whether your job title has the word 'manager' in it!</p> <p>BU8601 is an introductory course for non-business undergraduates to help you understand, think and act like managers. Knowledge and skills gained from this course will help you in any situation where you need to manage yourself and other people. This includes other university courses, final year projects, internship experiences, and eventually your careers.</p>
						SEMINAR	SYNCHRONOUS ONLINE		

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16	NIE		AAA18J	Painting with Watercolour	3	LECTURE	SYNCHRONOUS ONLINE	N	<p>This course aims to highlight the beauty and ephemeral qualities of watercolour painting. Students will be progressively taught various techniques to achieve different results. There will be an emphasis on hands-on practice as well as keynotes on how to appreciate the visual qualities of watercolour paintings. Students will first be taught basic drawing and paintings skills, after which students are encouraged to take a more experimental and gestural approach to watercolour painting.</p> <p>Attendance is a requirement as there are continual and formative assessments.</p>
17	SBS	BS	BS3004	Cancer Biology & Therapy	3	LECTURE	ASYNCHRONOUS ONLINE	Y	<p>The course will survey the genes and gene products which control cellular proliferation, and the genetic changes that lead to the various stages of cancer. You will apply this information by studying real or imagined experiments and proposing hypotheses to explain the results. You will think broadly about the molecular mechanisms regulating cell function and how these are assessed experimentally. You will apply your understanding of the molecular mechanisms regulating cancer cells to understand how therapies can be developed to target cancer. Learning will be accomplished through a combination of traditional lectures, online learning and lab practicals.</p>
						TUTORIAL	ASYNCHRONOUS ONLINE		
18	SBS	BS	BS3003	Developmental Biology	3	LECTURE	ASYNCHRONOUS ONLINE	Y	<p>This course aims to introduce early embryonic development of different model organisms. You will gain an insight into animals (primarily those with well-characterized genetics) which are used in biological research and from which important contributions to understanding fundamental processes in cells have been made. Completion of this course should give you a good understanding of developmental biology and provide a basis for more advanced courses. You will become familiar with the experimental strategies and tools used by developmental biologists.</p>
						TUTORIAL	ASYNCHRONOUS ONLINE		
19	SBS	BS	BS3027	Spectroscopic Methods In Biomedical Structural Biology	3	LECTURE	ASYNCHRONOUS ONLINE	Y	<p>In this course, you will develop a fundamental understanding and will become conversant in the applications of several critical spectroscopy techniques to Structural Biology. Mainly through X-ray diffraction of crystals (XRD), but also Nuclear Magnetic Resonance (NMR) and Electron Microscopy (EM), the atomic view of the biological world is continuously expanding. Although this solves many mysteries of molecular function, our understanding of structure and function often requires the use of other complementary techniques, especially those that rely on the interaction between electromagnetic radiation and biological molecules, i.e., spectroscopy. These spectroscopic methods provide essential insights that are not accessible by the main structural techniques (XRD, NMR or EM), in the structural analysis of biomolecules, their dynamics, protein-protein or protein-ligand interactions, or the role of these biomolecules in a cellular environment. Overall, the aim is that you can use the acquired understanding of these techniques and apply it to a series of problems with examples from the literature, understanding at the same time their limitations, for their integration in your future projects. Current practice of Structural Biology is critically dependent on such integration. From a professional perspective, each of these techniques is a world in itself, and familiarity with its applications will also be useful in your future potential links with industry.</p>
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20	SBS	BS	BS4015	Plant Biotechnology	3	LECTURE	ASYNCHRONOUS ONLINE	Y	This 4th year elective course aims to help you gain an advanced level of understanding of the comprehensive components of plant biotechnology, the discipline that is making growing contributions to food security, human and animal health and sustainable environment but often surrounded by misunderstanding, criticism and safety concerns. On top of technical insights into plant breeding, tissue culture, plant genes and genetic modification (GM), you will have the overview of GM plants in the market and pipeline and their various applications like food and medicine. You will also gain a good knowledge on global regulation framework on GM plant and product as well as intellectual property rights related to plant biotechnology. The course will help your careers in plant related research, government regulatory bodies, education, food industry and other plant product and related businesses.
						TUTORIAL	ASYNCHRONOUS ONLINE		
21	SBS	BS	BS1001	Introductory Biology	3	LECTURE	ASYNCHRONOUS ONLINE	Y	This course aims to introduce you to biology at the basic molecular, cellular, tissue and body levels that will bring into perspective the unifying theme of all living things. You will learn about evolution, biodiversity, metabolism, physiology, and current advances in biology that have implications to our society and biology's interaction with other disciplines. This course will prepare you for advanced biology courses, and may prepare you for professional careers in teaching, research and those that require some basic understanding of biology.
						TUTORIAL	ASYNCHRONOUS ONLINE		
22	SBS	BS	BS2003	Biochemistry II	3	LECTURE	ASYNCHRONOUS ONLINE	Y	Metabolism represents the sum of the chemical changes that converts nutrients, necessary to nourish living organisms, into energy and the chemically complex finished products of cells. Metabolism consists of literally hundreds of enzymatic reactions organized into discrete pathways. These pathways proceed in a stepwise fashion, transforming substrates into end products through many specific chemical intermediates. The course will give an understanding about the anabolic and catabolic processes that satisfy the metabolic needs of the biological cell. This course deals with the basic principles, pathways and regulation of metabolism required to understand modern biological sciences. The lectures will cover introduction to metabolism and regulation and enzyme catalysis, carbohydrate metabolism, citric acid cycle, oxidative phosphorylation, photosynthesis, lipid metabolism, amino acid- and nucleotide metabolism.
						TUTORIAL	ASYNCHRONOUS ONLINE		
23	SBS	BS	BS3001	Neurobiology	3	LECTURE	ASYNCHRONOUS ONLINE	Y	This course aims to introduce components of the nervous system in humans and other animals. Students will learn basic mechanisms of neuronal transmission, neurochemistry, somatosensory processing, cognition and neurological disorders.
						TUTORIAL	ASYNCHRONOUS ONLINE		
24	SBS	BS	BS4010	Synthetic Biology	3	LECTURE	ASYNCHRONOUS ONLINE	Y	This course will highlight how the complexity of biological systems, combined with traditional engineering approaches, results in the emergence of new design principles for synthetic biology. It will also introduce many exciting examples of practical applications of synthetic biology. 1. Various state-of-the-art experimental and computational tools for synthetic biology. 2. A number of important applications of synthetic biology in both basic and applied biological research. 3. A few ambitious synthetic biology efforts in which tremendous challenges and opportunities coexist.
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25	SPMS	CHEM	CM8002	Forensic Science	3	LECTURE		Y	On completing this course, you will understand and appreciate how basic science can be applied to the solution of criminal cases. You will understand the basic chemistry, physics and biology behind forensic science and see how this knowledge can be applied. You will understand how forensic science fits into the legal system alongside other forms of police work. You will appreciate not only what forensic science can do, but also what is beyond its scope i.e. the limits of forensic science.
26	SPMS	MATH	MH2814	Probability & Statistics	3	LECTURE	SYNCHRONOUS ONLINE	Y	Uncertainties are unavoidable in the design and planning of engineering system. Therefore, engineering analysis should include probability and statistics to evaluate the significance of uncertainty on system performance and design. This course provides the basics of probability and statistical concepts in terms that are more easily understood by engineering students. We present probability and statistical concepts through problems that are meaningful to engineering science. This course should motivate the recognition of the significant roles of the relevance mathematical concepts in engineering.
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27	SPMS	MATH	MH3300	Graph Theory	4	LECTURE	SYNCHRONOUS ONLINE	Y	This course serves as an introduction to graph theory. As well as establishing some of the fundamentals of graph theory, this course aims to exhibit the wide range of applications enjoyed by graphs. The fundamentals of graph theory will be covered in a rigorous manner and you will be introduced to various graph invariants. You will see how these graphs invariants can be use to solve real-world problems. In particular, you will learn how to use graphs to solve scheduling problems, discrete optimization problems, and assignment problems.
						TUTORIAL	SYNCHRONOUS ONLINE		
28	SPMS	MATH	MH4320	Computational Economics	4	LECTURE	HYBRID WITH SYNCHRONOUS ONLINE	Y	<p>This course aims to introduce you to the fundamental concepts of game theory and mechanism design. Game theory, besides being of fundamental mathematical interest, is a main tool to model economic and strategic situations and then study the behavior of rational agents in such situations. Mechanism design is the study of how to design games (such as auctions) so that agents have incentive to act in a desirable way, e.g. by telling the truth. This course will improve your ability to model and analyze economics situations in a mathematical way. We will study the way rational agents will play games, based on their assumptions about the rationality of other agents. We will learn about the concept of Nash equilibria, which are solutions to games that no rational agent has an incentive to deviate from, and learn how to compute these.</p> <p>In the second part of the course we turn to the problem of social choice, namely choosing from a set of alternatives, given the preferences of a set of players. We will see that many desirable properties of social choice functions cannot be satisfied, and then turn to ways to deal with this issue. The first way is to introduce payments and money-valued preferences, which leads to auction theory and related topics. Here students will learn how to design auctions and other economic mechanisms so that players have no incentive to lie, and to learn how to compute expected revenues. Secondly, we will consider mechanisms that do not allow payments, and study the ways manipulations by the players can be limited in this case. In the second part of the course students will learn how to design economic mechanisms that have certain properties (if possible), and how to judge economic mechanisms, as well as to apply Bayesian reasoning to compute expected outcomes.</p> <p>The course is aimed at 3rd and 4th year students interested in economics, mathematical modelling, and applied math in general.</p>
						TUTORIAL	HYBRID WITH SYNCHRONOUS ONLINE		
29	SPMS	PHY	PH1012	Physics A	4	LECTURE	SYNCHRONOUS ONLINE	Y	<ol style="list-style-type: none"> 1. VECTORS 2. KINEMATICS 3. FORCES AND TORQUES 4. NEWTON'S LAWS OF MOTION 5. IMPULSE AND MOMENTUM 6. WORK AND ENERGY 7. THERMAL PHYSICS 8. ELECTRIC FIELD 9. MAGNETIC FIELD 10. MOTION OF CHARGED PARTICLES AND APPLICATIONS 11. CIRCUITS

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						TUTORIAL	SYNCHRONOUS ONLINE		
30	SPMS	PHY	PH3403	Cosmology	3	LECTURE	SYNCHRONOUS ONLINE	Y	This is a first course in cosmology which covers various fundamental aspects of standard cosmology and background tools to understand some active research topics in this area. The topics to be covered include inflation theory, structure formation, cosmic microwave background and gravitational waves. We will also discuss some aspects of geometry of the universe including the Robertson-Walker metrics and Friedmann equations. The course will conclude via touching on currently open problems in cosmology such as dark matter, dark energy and primordial gravitational waves.
						TUTORIAL	SYNCHRONOUS ONLINE		
31	ASE	EESS	GC0001	Sustainability: Seeing through the Haze	1	LECTURE	SYNCHRONOUS ONLINE	N	The course will discuss sustainability from perspectives of various disciplines, including humanities, business, policy, economics, and science. Students will learn about sustainability through a case study of oil palm plantation. The course will be composed of the following 6 modules. The course is supplemented by Module SI, which helps broadening students' perspectives on sustainability. Module 1 : General Introduction Module 2: The Global Seeding of Oil Palm Module 3: Recent Expansion of Oil Palm in South East Asia: How and Why did this happen? Module 4: How is Oil Palm Production Affecting Environment, Climate and Human Society? Module 5: Making Oil Palm More Sustainable Module 6: General Conclusions Module SI: National Geographic (Nat. Geo) talk
32	SSS	PSY	HP2200	Biological Psychology		LECTURE	ASYNCHRONOUS ONLINE	N	This course will provide an introductory overview to the field of biological psychology. Course content will begin by explaining what biological psychology is and why biology is the ultimate basis for the expression of behavior in any living organism. The course will cover the anatomy of the nervous system by exploring the structures of the brain, spine and neurons, and will introduce the basic techniques used by biopsychologists. In addition, the biological foundations of the perceptual and sensorimotor systems will be covered. The course will also cover the plasticity of the brain and how damage to the brain can influence behavior. We will cover material on the biological basis of motivation, cognition and emotion. We will study how hormones influence behavior, and we will cover the biology of sleep. Lastly, the course will introduce pharmacology, and the neurology of stress and psychological disorders.
33	SSS	PSY	HP2500	Personality & Individual Differences		LECTURE	ASYNCHRONOUS ONLINE	Y	The study of human personality is central to psychology. This subject surveys the major approaches, covering classical and contemporary themes, such as psychodynamic theories, behavioural models, humanistic theories, trait theories, social learning theories and personality perspectives indigenous to cultures in Asia.
						TUTORIAL	HYBRID WITH SYNCHRONOUS ONLINE		