



Majors and Minors

October 7th 2016

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ANTHROPOLOGY MAJOR

OVERVIEW

Anthropology questions what it means to be human by exploring as wide a range of human experience as possible. Anthropologists begin from an appreciation of the diversity of human social and cultural life across time and space. They investigate the lived experience people have of their society, exploring differences of language and culture, gender and sexuality, social class, caste, race, ethnicity, religion and locality. As anthropologists frequently focus on life among people who are geographically and socially marginalised, themes of power and powerlessness, identity and otherness, belonging and migration are central to the Anthropology major. Anthropologists produce knowledge about human social life through empirical description in fieldwork and archival research and ask larger philosophical questions of the human condition at large, based on their thick interaction with and study of the people with whom they work.

The major is designed to help students develop their skills in written, oral, and visual expression, in fieldwork, ethnography, and survey design, and in the interpretation of social science information. The field's unique focus on the diversity of human experience is also ideally suited to the development of global awareness at a culturally and historically deep level. Such awareness can lead to new kinds of civic engagement around the world and novel modes of moral and ethical reasoning. Anthropology students will learn to offer ethnographically and historically grounded descriptions of the human condition; to provide concrete examples of alternative ways of being human; and, upon that basis, to question what it means to be human in the world. Such a major is particularly relevant to the increasingly transnational world of the twenty-first century.

STRUCTURE

All Anthropology Majors will take the following: two required classes "Ethnography" (a methods class), and "Anthropological Imagination" (a theory/history class); six additional courses, two of which must be "advanced seminars" and two of which can be advanced or intermediate language classes relating to the capstone project; and two capstone seminars.

- Required courses (2 required):
 - 'Ethnography' (a methods class) 5MC
 - 'The Anthropological Imagination' (a theory/history class; exceptions can be made for students in class of 2017 & 2018 who took Gender Perspectives in Anthropology to fulfil this requirement) 5MC
- Electives (4 required)
 - Electives are selected from a list of anthropology and related approved courses. Two of them can be advanced or intermediate language classes that are relevant to the capstone project. 20 MC
- Advanced seminars (2 required) 10 MC
- Capstone seminars (2 required). During the fourth year, students will take two capstone seminars. During the first semester students will carry out a research project; during the second semester students will complete the project and write a capstone report. 10 MC

COURSES

Required Courses:

Ethnography (Methodology): Students are expected to take at least one course in research methodology. *Ethnography*, preferably taken in the first semester of the third year (or earlier), will introduce students to ethnographic, visual and linguistic methods of data collection and analysis, from participant observation, interview and survey design, and the collection, recording and transcription of oratory and other kinds of performative speech. As students will be expected to conduct short field research projects over the course of the semester, their training in methodology will feature substantial discussion on and work-shopping of the ethical dimensions of first-person research including: human subjects approval, confidentiality, and the ethics of observation among at-risk populations. Students are also encouraged to take *Methods in the Social Sciences*, a course dealing with a broader range of methods in the social sciences including survey design and implementation, and quantitative data analysis, as an anthropology elective.

Anthropological Imagination (Theory/History): Students are required to take *Anthropological Imagination* (preferably in the second semester of their third year or earlier). The theory course is designed to offer students grounding in the philosophical bases of the major questions anthropologists ask.

Advanced Seminars (two required): Students are required to take at least two advanced seminars in their third and fourth years. Advanced seminars will expose them to a variety of topics that are closer to the heart of the professional work of their professors. These include such classes as: Asian Medicine, the Body and Globalization; Global Intimacies; International Migration; Language and the Public Sphere; Gender Perspectives in Anthropology; Anthropology of Human Rights; and Religion, Ritual, and Magic. Advanced seminars presuppose a degree of scholarly maturity and experience and involve significantly more reading and (usually) a longer semester-long independent project. *Modern Social Thought* serves as a pre- or co-requisite course for advanced courses or permission by the instructor.

Electives (four required): Four courses have been specified above, which leaves four courses open to the student's discretion. These may be filled with survey courses, such as *Introduction to Anthropology* or area or topical courses that relate to student interests. They can be filled with additional advanced seminars. Up to two advanced or intermediate language courses that are *relevant to the student's capstone project* may be counted. Courses taken at NUS or at other approved institutions and programmes in Singapore or while studying abroad, may be counted in this category, in consultation with the faculty advisor and with the approval of the Head of Studies.

In addition to these requirements, the faculty strongly recommends that anthropology students should be or should try to become proficient in at least one second language and take advantage of at least one study-abroad experience, either in a semester-long programme, a summer programme, or a Week Seven LAB.

CAPSTONE

For the capstone project, which is the equivalent of two 5MC courses, a student majoring in Anthropology is expected to produce a substantial finished product (an essay and perhaps also a film, museum-quality exhibition or piece of academic work in any other medium) based on original field, museum, or library research. During the first semester seminar, during the fourth year, students will work closely with a faculty supervisor to develop a project, ideally building on papers or projects begun in the third year. The first semester will include, if needed, advanced research methodology, proposal writing and human subject approval, and the development of the research project. During the second semester, Anthropology majors will take part in a weekly senior capstone seminar. The seminar will include weekly meetings; short student presentations; discussions of methodology, ethics and the problems that inevitably crop up in anthropological research; and the completion of capstone projects. All students will complete a final report and will present the findings of their work to faculty and peers in a public symposium.

The ultimate products of the capstone experience of the major will be the cultivation of the experience, knowledge and attitude of a professional anthropologist along with a final product that meets the standards of junior professionals in the field.

MINOR

Students who wish to minor in anthropology must take at least two electives, two advanced seminars (or *Anthropological Imagination* and an advanced seminar), and either *Ethnography* or *Methods in the Social Sciences*.

ARTS AND HUMANITIES

OVERVIEW

The Arts and Humanities Major addresses the core elements of human expression from historical, critical, comparative, and practice-based perspectives. It will not only teach students about art in human life but also provide a context for students to develop their own arts practice. The intellectual and practical skills developed in the Arts and Humanities Major prepares students for a wide range of careers including work in art history, arts administration, art practice, art education, music, museums, performing arts, publishing, academia and journalism.

Courses in the Arts and Humanities Major include historical and analytical studies as well as active practice in the arts. The major is focused on critical and comparative work reaching across media, cultures, and periods, and it affords the opportunity to explore and develop one's own expression through the practice of creative writing, art, music and performance.

All students in the Arts and Humanities Major will complete courses of 40 Modular Credits and a Capstone Project worth 10 Modular Credits. This can include relevant courses in other institutions and study abroad programs.

COURSES

Introduction to the Arts

All Arts and Humanities majors are required to take *Introduction to the Arts*, preferably in their first or second year. The course will engage in the issues and practice of arts in visual, creative writing, or music and performance through the exploration of a theme, while digging into big questions about art and artistic expression such as:

- What is art for?
- What is its place in popular culture?
- What is its relationship to ritual and religion?
- What is its relationship to nature?
- What is modernity in art?
- How are examples of historical artistic expression relevant today?

Comparative/Analytical Category

Students will take at least one 5MC course from the *Comparative/Analytical* Category. The courses in this category will be focused on large ideas that are explored through case studies taken from different historical and geographical contexts with the aim of analysing key themes in human artistic production over time. Many of the courses in this category will develop student's capabilities in describing, assessing, analysing, and interpreting works of art.

Students will learn how to engage with artistic productions in the ways professional practitioners, critics, and historians do. They will practice analysis, interpretation, and critique themselves, and learn the creative process that each of these kinds of art forms require.

Questions addressed in the Comparative/Analytical Category may include:

- How does one begin to analyse a work of art, be it, visual, sonic, literary, or dramatic?
- What is art criticism?

- Who decides what is good or bad art?
- Where do we get our values and opinions?
- How does context affect our experience of art?
- Is there art without an audience?
- How do new media platforms change our experience of art?

Critical/Collaborative Category

Students will take at least one 5MC course from the *Critical/Collaborative* Category. Courses in this category may provide an in-depth study of the historical and theoretical frameworks across the arts. This is the opportunity for students to go deeper into specialized topics, and many of these courses will be a precursor to the Capstone Project. Other courses offered in this category will require student collaboration in order to create interdisciplinary artworks or events that would be beyond the scope of a single individual. Student groups will plan and develop their projects with suitable partners. The coordinator of the course must approve all groups, projects, and partnerships. Results of such collaborations could result in, for example:

- An artwork, event or publication in response to a particular location, site or context.
- A publication incorporating numerous contributors and media.
- A curated project in an arts institution.
- A music video or documentary treatment of a chosen theme.
- A musical, theatrical, dance event or festival.

Practice Category

Students will select at least four courses in the *Practice* Category. These courses may be half or full semester courses taken with faculty or with consultants, such as artists-in-residence, painters, sculptors, fiction and nonfiction writers, poets, critics, theatre and ensemble directors, instrumentalists, dancers, studio producers, etc. Appropriate external consultants may be arranged through the Head of Study.

Students need not take all of their practice-based studio courses in one medium, especially if they are interested in thinking across media or with hybrid modes of expression. On the other hand, if a student wishes to achieve a high level of competency in practice then the focus ought to be on a single art form. A course in the Practice Category culminates in some kind of presentational end product that reflects the work of the student over the duration of the course.

CAPSTONE

Students will complete a 10MC Capstone Project during their fourth year at the College. A Capstone Project could be:

1. A single, sustained essay investigating a topic or idea and involving original research of some kind.
2. A recital with extensively annotated program notes and appropriate analyses.
3. The creation and/or production of a performance art work.
4. A portfolio/exhibition of students' work with appropriate artists' statements.
5. Findings from a fresh approach to a specific topic or area of study in the arts.
6. A blend of the above.

Students will develop a Capstone Project through a sustained and rigorous period of research. Students must demonstrate a thorough contextual knowledge of their topic. Students will plan their Capstone Project in consultation with relevant faculty members in regular meetings before or during their seventh semester. In their eighth semester, students will meet with faculty and students working in the Major for discussion and presentation of their work. There will be key deadlines for first drafts, prototypes, rough edits,

drawings, compositions, or production plans. Students will contribute to the assessment of the work of others, and discuss the creative process of preparing a Capstone Project as well as any themes that are relevant to the students in the Major.

PATHWAYS

There are many potential pathways in the Major. Students may decide to focus on one art form or they may devise their own pathway across disciplines.

INTERNATIONAL OPPORTUNITIES

Students who wish to pursue art practices or topics not offered through the Yale-NUS College curriculum or through the NUS system can get advice from the Arts faculty and the Centre for International and Professional Experience (CIPE) to pursue study opportunities outside the College.

MINOR

Students who wish to obtain a minor in Arts and Humanities will need to complete 25 Module Credits, including Introduction to the Arts and at least:

- One course in the Comparative/Analytical Category
- One course in the Critical/Collaborative Category
- Two additional courses

ECONOMICS MAJOR

1. OVERVIEW

Economics is concerned with the study of how individuals make decisions and how these decisions affect, and in turn are affected by, the distribution of limited resources in society. It is a quintessential liberal arts subject with a breadth of questions and methodologies that intersect fields like Anthropology, Computer Science, History, Psychology, Political Science, Sociology, and Mathematics. Although Economics is often considered as a science which is limited to the study of demand and supply, inflation and unemployment, trade and exchange rates, economic growth, and financial markets, these are but a small sample of topics that concern modern-day economists. In fact, today economists research topics as varied as environment (how to control global warming?), marriage markets (who marries whom, and why?), design of institutions (which policies reduce political corruption?), neighborhood effects (whether individual decisions are affected by a desire to conform to social norms), and urbanization (what explains the formation of cities and specific spatial distribution of individuals within cities?).

Economics is a science that welcomes inquisitive students and encourages critical thinking through a study of such topics. Courses in the Economics major enhance students' analytical abilities, mathematical skills, and intuitive thinking that are essential for success in any career. In these courses, students will ask a broad range of questions relating to economic outcomes, social processes, and political developments, and learn a variety of methodologies—theoretical analysis, experimental approaches, and empirical analysis—that they will then use to analyze and answer these questions. A sustained engagement with such questions prepares Economics majors to become perceptive observers, critical commentators, and engaged members of the world.

2. STRUCTURE

The Economics major will involve one gateway course, four required courses including at least one of Advanced Microeconomics, Advanced Macroeconomics, and Advanced Econometrics, at least 3 more elective courses, and a capstone project that will count as two courses. The assumption is that all courses will get 5MC. If an elective of your choice has less than 5, then you should take enough electives to make sure the number of MCs is at least 50.

Gateway Courses:

Principles of Economics: This course is designed to serve as an introduction to Economics for prospective majors as well as for non-majors interested in Economics.

- a. **Prerequisites:** None
- b. **Preclusions:** If a student has completed A-level Mathematics AND A-level Economics (or equivalent courses in high school), then the student is not allowed to take Principles of Economics.

Note: Students who do not take Principles of Economics (either because they are precluded by the above condition or because they have done A-level or equivalent Mathematics and prefer to start directly with Intermediate Microeconomics) must take an additional 8th Economics course.

Required Courses:

1. Intermediate Microeconomics:

- a. **Prerequisites:** Principles of Economics or A-level or equivalent Mathematics. To emphasize, prior knowledge of economics is NOT necessary to take Intermediate Microeconomics. If a student has completed A-level or equivalent Mathematics, then he/she is allowed to take Intermediate

Microeconomics even if he/she has neither completed A-level or equivalent Economics nor Principles of Economics. Students without this background may enrol with instructor's permission.

b. **Preclusions:** None

2. **Intermediate Macroeconomics:**

a. **Prerequisites:** Any one of the following three options: (i) Principles of Economics (ii) A-level Economics and Mathematics or equivalent economics and mathematics courses (iii) Intermediate Microeconomics.

b. **Preclusions:** None

3. **Econometrics:**

a. **Prerequisites:** Any one of the following three options: (i) Principles of Economics (ii) A-level Economics and Mathematics or equivalent economics and mathematics courses (iii) Intermediate Microeconomics.

b. **Preclusions:** None

4. **At least one of the following:**

Note: The advanced economics requirement (to take at least one of Advanced Microeconomics, Advanced Macroeconomics, and Advanced Econometrics) is waived for students who completed the 2MC Introduction to Mathematics or Statistics courses which are no longer offered.

Advanced Microeconomics:

a. **Prerequisites:** Intermediate Microeconomics

b. **Preclusions:** None

Advanced Macroeconomics:

a. **Prerequisites:** Intermediate Macroeconomics

b. **Preclusions:** None

Advanced Econometrics:

a. **Prerequisites:** Econometrics

b. **Preclusions:** None

Elective Courses:

The Economics major will offer elective courses within two categories: Core courses and Applied Economics. These categories reflect the nature of the courses that fall within them. Thus courses in Core Courses will be theoretical and mathematical; courses in Applied Economics will apply economic theory and data analysis techniques to a range of topics. Core courses are especially advisable for those students who want to pursue an academic career (be it a Masters or a PhD in Economics).

In addition to gateway and required courses, students must choose at least 3 other elective courses. It is not necessary that all these courses belong to one category. What is more important while choosing the elective courses is that the particular combination of courses should prepare the student for his/her capstone, and ultimately, career ambitions. Students are encouraged to discuss their respective choices with the Head of Studies for Economics and their academic advisors.

All of these elective courses will have one or more of the following required courses as prerequisites: (i) Intermediate Microeconomics, (ii) Intermediate Macroeconomics, and (iii) Econometrics. Therefore it is highly advisable that students in the Economics major complete the above three required courses early on in their

undergraduate studies. Please check with the course instructor regarding the specific prerequisites before signing up for any elective course.

CATEGORY I: Core Courses

The following is a sample courses that fall in this category:

- Advanced Microeconomics
- Advanced Macroeconomics
- Advanced Econometrics
- Mathematics for Economists
- Introduction to Game Theory
- Mechanism Design

CATEGORY II: Applied Economics

The following is a sample courses that fall in this category:

- Behavioural Economics
- Collective Choice: Values and Environmental Policy
- Development Economics
- Firms' Strategies and Market Competition
- International Finance
- International Trade
- Labor Economics
- Law and Economics
- Political Economy
- Public Economics
- Urban Economics

The following tables provide sample pathways for students pursuing the Economics major:

Pathway 1: A student without A-Level or equivalent Economics	
Y1S2	Principles of Economics
Y2S1	-Intermediate Microeconomics -Elective Course 1 (Intermediate Microeconomics is a co-requisite)
Y2S2	-Intermediate Macroeconomics -Econometrics
Y3S1	-At least one of Advanced Intermediate Microeconomics, Advanced Macroeconomics or Advanced Econometrics. The advanced economics requirement (to take at least one of Advanced Microeconomics, Advanced Macroeconomics, and Advanced Econometrics) is waived for students who completed the 2MC Introduction to Mathematics or Statistics courses which are no longer offered. -Elective Course 2
Y3S2	Elective Course 3

Y4S1	Capstone I
Y4S2	Capstone II

Pathway 2: A student with A-Level or equivalent Economics	
Y1S2	
Y2S1	-Intermediate Microeconomics -Elective Course 1 (Intermediate Microeconomics is a co-requisite)
Y2S2	-Intermediate Macroeconomics -Econometrics
Y3S1	-At least one of Advanced Intermediate Microeconomics, Advanced Macroeconomics or Advanced Econometrics. The advanced economics requirement (to take at least one of Advanced Microeconomics, Advanced Macroeconomics, and Advanced Econometrics) is waived for students who completed the 2MC Introduction to Mathematics or Statistics courses which are no longer offered. -Elective Course 2
Y3S2	-Elective Course 3 -Course 8 (<i>In lieu of Principles of Economics. Must be approved by Head of Studies for Economics</i>)
Y4S1	Capstone I
Y4S2	Capstone II

3. COURSES

I. Gateway Courses:

Principles of Economics (YSS1203): Economists are mainly concerned with the study of choice: choices made by consumers (buy the latest gizmo or save the money?), firms (how much to produce and what price to charge?) and policy-makers (bailout the banks or reduce income tax rates?) are all within the purview of economic analysis. This module serves as an introduction to economics and the basic mathematical tools for economic analysis. It covers topics in microeconomics, macroeconomics, univariate calculus, and systems of equations. **Prerequisites/Co-requisite**: NIL **Preclusions** (conditions under which a student is not allowed to take this course): A level Mathematics AND A level Economics (or equivalent mathematics and economics courses). **Note**: Students who do not take Principles of Economics (either because they are precluded or because they have done A level or equivalent Mathematics and prefer to start directly with Intermediate Microeconomics) must take an additional 8th economics course.

II. Required Courses:

Intermediate Microeconomics (YSS2203): Microeconomics analyses individual decision making and its implications for economic outcomes. Here the term “individual” is used broadly to include individuals, households and firms. We deconstruct the demand-supply model by analyzing consumers' choices as outcomes of rational preference maximization and producers' decisions as results of profit maximization in various market structures. We study how equilibrium of demand and supply in competitive markets generates efficient outcomes. We then analyze a variety of instances when markets fail to be efficient. This course will place special emphasis upon mathematical foundations of theoretical models. In particular, we will study and apply techniques in multivariate calculus, and unconstrained and constrained optimization.

Prerequisites: Principles of Economics or A level or equivalent Mathematics. To emphasize, prior knowledge of economics is NOT necessary to take Intermediate Microeconomics. If a student has completed A level or equivalent Mathematics, then he/she is allowed to take Intermediate Microeconomics even if he/she has not done A level or equivalent Economics AND Principles of Economics. Students without this background may enrol with instructor's permission. **Preclusions:** NIL

Intermediate Macroeconomics (YSS2214): Economics is concerned with the study of how individuals make decisions and how these decisions affect, and in turn are affected by, the distribution of limited resources in society. This course introduces students to the formal analysis of the economy as a whole. The goal is to understand how decisions by the firms, consumers and institutions affect the markets, and the welfare implications of such choices for society. Special attention is placed on the effect of government and monetary policies on the economy. Emphasis is placed upon the mathematical foundations of theoretical models.

Prerequisites: Any one of the following three options: (i) Principles of Economics (ii) A-level Economics and Mathematics or equivalent economics and mathematics courses (iii) Intermediate Microeconomics.

Preclusions: NIL

Econometrics (YSS2211): Does going to college increase your earnings? Does height have an effect on your wage? Do episodes like the haze 2013 in Singapore have a major impact to the economy? This course introduces students to the statistical methods that economists use to answer this and similar questions. More generally, this is an introduction to the methods used to test economic models and examine empirical relationships, primarily regression analysis. Although much of the course will focus on the mathematical development of the methodology, emphasis is placed on learning by studying and replicating specific case studies that address current economic questions.

Prerequisites: Any one of the following three options: (i) Principles of Economics (ii) A-level or Economics and Mathematics or equivalent economics and mathematics courses (iii) Intermediate Microeconomics.

Preclusions: NIL

Advanced Microeconomics (YSS3208): This broadly covers the same range of topics as 'Intermediate Microeconomics'. However it has a more intensive treatment of consumer and producer theory, and covers additional topics like choice under uncertainty, game theory, contracting under hidden actions or hidden information, externalities and public goods, asset pricing, auctions, and general equilibrium theory.

Prerequisites: Intermediate Microeconomics. **Preclusions:** NIL

Advanced Macroeconomics: This course serves as an advanced introduction to the modern macroeconomic analysis to understand the causes and consequences of macroeconomic activity fluctuations. We will explore at a deeper level some of the topics covered in Intermediate Macroeconomics, as well as some other research

topics. Topics covered may include: economic growth, overlapping generations model and applications, macroeconomics and finance, labor market, etc.

Prerequisites: Intermediate Macroeconomics. **Preclusions:** NIL

Advanced Econometrics (YSS3207): This course broadly covers advanced topics in econometrics. The focus is on time series econometrics and financial econometrics. However, panel data and asymptotic theory are also tackled in this course in more depth than in 'Econometrics'. This course mixes theory and applied work: theoretical foundations are covered, and the applications of the theory in real life are analyzed.

Prerequisites: Econometrics. **Preclusions:** NIL

Capstone I: This research seminar has several components. Faculty will present a series of workshops on research methods. Students find a topic of interest and specify an appropriate research question for their capstone research, explore the existing related literature, identify an appropriate research design to address the question, and learn how to apply empirical and theoretical skills acquired from their courses to the specific question. Each student will also be expected to prepare: (1) an in-depth exploration of the literature related to their area of research interest, and (2) a more specific research proposal.

Prerequisites: All Major Required Courses. **Preclusions:** NIL

Capstone II: This seminar-based course will be a continuation of the process started in Capstone I. Students will continue to develop their proposals and carry out their projects, culminating in both a written paper and a presentation of their research results.

Prerequisites: Capstone I. **Preclusions:** NIL

III. *Electives:*

CATEGORY I: Core Courses

Mathematics for Economists: Modern economics uses mathematical expressions to describe precisely economic concepts and applies mathematical techniques to analyse economic models. This course will cover topics in mathematics that are essential for the study of economics. Topics include univariate and multivariate calculus, constrained and unconstrained optimization, linear algebra, and differential equations. Special emphasis will be placed on economic applications.

Prerequisites: Intermediate Microeconomics **Preclusions:** NIL

Mechanism Design: Mechanism Design is concerned with the design of decentralized institutions within which agents interact with the aim of attaining specific goals. The focus of analysis is the relationship between the rules that define an institution and their impact on individual incentives and behaviour. In this course, we will apply game theory and mathematical techniques to study the abstract mechanism design problem as well as the design of auctions and matching markets.

Prerequisites: Advanced Microeconomics. **Preclusions:** NIL

Introduction to Game Theory (YSS1205): Game theory studies strategic situations where the involved parties impact each other's welfare through their individual decisions. In such situations, it becomes necessary to think about how others will act while trying to further one's own goals. Game theory has wide ranging applications and is used to model strategic interactions in both human and biological worlds. This course introduces students to concepts in game theory and their applications.

Prerequisites: NIL. **Preclusions:** NIL

CATEGORY II: Applied Economics

Behavioural Economics (YSS3203): The field of behavioral economics draws on insights from other disciplines, especially psychology, to enrich our understanding of economic behaviour and decision making generally. Individuals frequently make decisions that systematically depart from the predictions of standard economic models. In this course we will attempt to understand these departures by integrating the psychology of human behavior into economic analysis. Hence, this course analyzes all types of decisions made by agents on a daily basis (from which breakfast to have to where to send the kids for education, etc.). Also special focus will be put on decision making in a context of bounded rationality (scarce information, scarcity of time to make decisions, decision making under drugs intoxication etc).

Prerequisite/Co-requisites: Intermediate Microeconomics. **Preclusions:** NIL

Collective Choice: Values and Environmental Economics: This is a course about evaluating social decisions, in particular when applied to environmental policy. Economics is sometimes taught as if values are not important, or as if they are self-evident. Nowhere is this more visibly wrong than in environmental policy.

Prerequisites: Intermediate Microeconomics. **Preclusions:** NIL

Development Economics (YSS3204): This course focuses on the understanding of the process of economic development. The course will be structured around the four main questions: (1) Why are some countries much poorer than others? (2) What are the main barriers to the process of economic development? (3) What are the main barriers that prevent the poor to escape from poverty?, and (4) Why do these barriers exist and persist?

Prerequisites: Intermediate Microeconomics; Econometrics. **Preclusions:** NIL

Firms' Strategies and Market Competition (YSS2212): In this course, we will study various strategies that firms deploy when facing market competition and the impact of such strategic behaviour on market outcomes like prices, efficiency, market structure, innovation etc. Examples of firms' strategies include price discrimination, product differentiation, advertising, collusion, mergers and entry deterrence. We will analyse theoretical models of imperfectly competitive markets to gain insights into firms' behaviour and functioning of real-world markets.

Prerequisite: Intermediate Microeconomics. **Preclusions:** NIL

International Finance: This course is an overview of international macroeconomic theory and policy. It presents economic theories to foster understanding of international financial markets and the interrelationships of economic aggregates such as GDP, exchange rates, trade balances, etc. Models will be applied to understand the effects and implications of macroeconomic policies in the international arena. The course will also look at relevant current issues: the global financial crisis, international coordination in macroeconomic policy, the economics of the Euro, etc. Students should have a working knowledge of algebra, graphical techniques and the basics of micro- and macro- economics.

Prerequisites: Intermediate Microeconomics; Intermediate Macroeconomics. **Preclusions:** NIL

International Trade (YSS3205): In this course, we will study the theoretical and empirical foundations and policies of international trade at a fairly abstract and rigorous level. The course materials and lectures will employ mathematics. The issues that will be addressed include the causes of international trade, the gains from trade, the role of international capital movements, the effects of trade and investment barriers, etc. We will also read about real-world areas of trade, such as trade institutions, the interactions between trade and

development issues, etc. We will study models in trade and apply them to questions of interest in the real world.

Prerequisites: Intermediate Microeconomics. **Preclusions:** NIL

Labor Economics: In this course we will investigate the mechanisms by which labor resources are allocated in an economy. Labor market outcomes are intrinsically linked to several decisions: Which school to go? What neighborhood to live in? What personal image to project? This course analyses how all these decisions impact allocation of labor.

Prerequisites: Intermediate Microeconomics. **Preclusions:** NIL

Law and Economics (YSS3206): An introduction to the relationship between law and economics, including the practical application of microeconomics to several common legal issues: torts, contracts, property, and crime.

Prerequisites/Corequisites: Intermediate Microeconomics. **Preclusions:** NIL

Political Economy (YSS3220): This course focuses on understanding how interactions between political actors influence decisions and outcomes.

Prerequisites: Intermediate Microeconomics; Econometrics. **Preclusions:** NIL

Public Economics: Public economics studies economic policy. We will study the setting of taxes and tariffs, the handling of externalities and the provision of public goods. The course will do so using microeconomic approaches.

Prerequisites/Corequisites: Intermediate Microeconomics. **Preclusions:** NIL

Urban Economics: In this course, students will use economic methodology to understand and design solutions to the various issues (traffic, housing, potable water etc.) that most modern cities face.

Prerequisites: Intermediate Microeconomics. **Preclusions:** NIL

4. CAPSTONE:

In their senior year, students will complete their capstone project. A capstone project is a two semester long in-depth study which culminates in a written essay and presentation. The capstone project will be supported and structured through student participation in a research seminar series. This will allow students to proceed with their research in a structured supportive and collaborative environment.

The primary objective of the capstone is to develop and apply the skills required to write original research. It will provide experience that is particularly valuable for students interested in careers that require producing rather than just consuming economic analysis and/or those seeking to pursue graduate programs (including economics, business, public policy, and international relations).

Students use the skills they developed through coursework to design, research, and write a paper on an economics topic of their own choosing. The thesis provides students with the opportunity to tackle larger and more ambitious topics than would typically be assigned in an undergraduate economics course. Applied topics are the most common, and many make use of econometric techniques. Students are expected to develop a carefully reasoned exposition that critically analyzes a problem using basic principles of economics. Given the variety of topics and techniques available it is difficult to give an exact guideline on an appropriate length for these research papers, but a maximum of 10,000 words could serve as a rough guideline. Students with

questions about the scale and scope of the question they wish to address are advised to seek input for the teaching faculty supervising their seminar group.

Students may choose from almost any topic in economics that is of interest to them, subject to the approval of the faculty members supervising the research seminar. To give a sense of the scope of possible topics, here are some sample topics:

(a) The role of information in financial markets (b) The effect of electoral rules on voting behavior (c) College choice and bounded rationality (d) The effect of malaria on economic development (e) Eurozone crisis and its impact on the world economy (f) Critical analysis of media reports on economic events (g) The evolution of marriage markets in South-East Asia and its effect on children's education and (h) Asian monetary union.

Students will undertake a new project for their capstone. The project should be original in its content and scope. However, if a student has a deep interest and makes a proposal for a significant expansion of the scale and scope of project already written, then (s)he may approach the Head of Studies for special permission.

Completion of a research project will have two distinct phases:

Semester 1: The first semester of the capstone project will involve participating in the *Research Seminar* organized by the Economics faculty. Early in that term, faculty will present a series of workshops on research methods – perhaps including how to proceed with research projects, tips on finding and using data, tips on using research resources, and a discussion of academic writing (plagiarism, citation, etc). Students find a topic of interest and specify an appropriate research question, explore the existing related literature, identify an appropriate research method to address the question, and learn how to apply empirical and theoretical skills acquired from their courses to the specific question. Each student will also be expected to give two presentations in the fall term: (1) an in-depth presentation on their area of research interest, and (2) a more specific presentation of their research proposal. Corresponding to these presentations, they will also submit written summaries of their literature review and research proposal.

Semester 2: The second semester of the capstone will continue this process. Students will continue to develop their proposals and carry out their projects, culminating in both a written paper and a presentation of their research results.

ECONOMICS MINOR

Economics minor requires completion of five full semester Economics courses including *Principles of Economics*, *Intermediate Microeconomics*, *Intermediate Macroeconomics* and *Econometrics*. The fifth course may include any other course in the Economics major. Those students who do not take *Principles of Economics* because either they are precluded from that course or they have done A-level or equivalent Mathematics and prefer to start directly with *Intermediate Microeconomics* must take another Economics course to fulfill the five-course requirement of the Economics minor.

ENVIRONMENTAL STUDIES MAJOR

OVERVIEW

Environmental Studies is an interdisciplinary program that explores the fundamental drivers of environmental problems, and develops within students the skills and aptitude for creative problem solving. Our focus is both local and global, and we draw upon the natural sciences, social sciences, and humanities in our work. Coursework and applied experience expose students to a range of environmental issues from the familiar, such as energy choices and climate change, to the less well-studied, like the rise of consumerism and the impacts of changing settlement patterns. Our overriding aim is to cultivate within students four critical attributes: the ability to discern the root causes of environmental problems, openness to a range of solutions, the habits of working effectively across disciplinary boundaries, and a capacity to engage distressingly complex problems infused with risk and uncertainty.

The program is organized to help students strike an appropriate balance between breadth of knowledge of environmental issues and depth in knowledge of a specific area or topic of interest. To this end, students select an environmental studies area of interest in their third year, in consultation with their major advisor. Internships and experiential learning opportunities will be an important component to all Environmental Studies pathways.

STRUCTURE

Majoring in Environmental Studies requires the completion of ten courses in the following five categories:

ONE

Students begin with the program's gateway course, Introduction to Environmental Studies. This course is required of all students majoring or minoring in the program, and is best taken prior to enrolling in other Environmental Studies courses.

TWO

Students continue by taking at least two courses in environmental analysis, which explore conceptual frameworks and analytic tools critical to the assessment of environmental problems. Students ideally take these courses early in their time with the program, but exceptions can be made in consultation with their program advisor. These courses develop the analytical skills relevant to the student's area of interest and facilitate their completion of the capstone project.

THREE

By the beginning of their third year, students develop and declare, in consultation with their faculty advisor, a four-course area of interest. Environmental Studies areas of interest may be in a specific disciplinary sub-field or in a specific environmental problem. Necessary prerequisites for upper-level courses do not count toward the four-course requirement for an area of interest. For example, a student wishing to explore a natural-science area of interest will need to complete the necessary natural science prerequisites, or a student exploring an environmental/ecological economics area of interest will need to complete the required pre-requisites for upper-level economics courses. Those students aspiring to the five-year Yale-NUS/Yale School of Forestry and Environment will spend one semester at Yale in their third year; courses taken at Yale under this program may also count toward a student's area of interest.

Examples of Environmental Studies areas of interest include but are not limited to the following:

- Tropical Forest Degradation and Revitalization
- Global Environmental Politics
- Ecological Economics
- Global Consumption and Consumerism
- Natural Hazards and the Human Condition
- Biofuels in Southeast Asia
- Biodiversity and change in Southeast Asia
- Waste and Water in Singapore
- Global Food Transitions
- The Interplay of Science and Politics in Climate Change
- Environmentalism and the Poor

FOUR

All students will take a required Applied Environmental Studies course, which will be offered for the first time in Semester one of AY 2016/2017.

FIVE

In the fourth year, students will work with faculty on a two-course capstone research project rooted in their selected pathway.

COURSES

Gateway Course

Introduction to Environmental Studies: An introduction to the central concerns and dominant analytic and policy approaches of scholars and activists working in the field of environmental studies. Insights from the natural sciences, social sciences, and humanities are used to interrogate an array of environmental problems, from climate change and energy technologies to consumerism, the formation of environmental values, and theories of social change. Special emphasis will be placed on issues of regional concern, including waste management, biofuels, escalating energy use, and competing environmental value sets, which will be used to understand and illustrate a distinctive ‘environmental studies’ approach to these challenges. (Offered every semester)

Environmental Analysis Courses

The Theory and Practice of Environmental Policymaking: Environmental problems frequently arise from asymmetries in political power that result in policies that benefit some groups at the cost of environmental integrity. Likewise, addressing environmental problems often involves the redistribution of power and influence, with new policies that reflect or cement these political-economic changes. How might we best understand those dimensions of political power and policy change that relate to environmental quality and human health? What models of political and social change best inform our thinking as we try to understand systems of power, policy, and politics consistent with prevailing notions of environmental sustainability? What can we learn from successful and failed attempts to implement effective and efficient environmental policies at the local, state, national, and/or transnational level? (Offered AY 2014/2015 S2; scheduled for AY 2015/2016 S2)

Systems Thinking and Analysis in Environmental Studies: An exploration of the tools for analysing systems dynamics, with special focus on how complex natural and social systems function and change. The fundamentals of energy flow and nutrient cycling through systems will be reviewed, and ways to extend

these concepts to social systems will be introduced. The implications of the key concepts of feedback, thresholds, dynamic equilibrium, and punctuated equilibrium will be explored, with special focus on understanding the drivers of systems resilience and resistance in the natural and social world. Students will work with others on a series of system modelling projects. (Scheduled for AY 2015/2016 S2)

Ecology and Ecosystems: A complement to the natural-science common curriculum, with special emphasis on the theory and practice of ecological analysis and ecosystem management. (Scheduled for AY 2015/2016 S1)

Ecological Economics: An interrogation of the limits of neo-classical economics for explaining the sources of and solutions to environmental ills, and the ways in which conventional economic tools can be informed by the natural sciences to better guide policy making. Topics within the course will include the proliferation of environmental externalities, debates over ecosystem valuation, and the politics of economic growth. (Scheduled for AY 2015/2016 S2)

Energy Humanities: Culture, Energy, and the Environment: The application of the humanities to an understanding of contemporary challenges in the production and use of energy, and potential responses to the environmental risks of contemporary energy choices. This course is meant to model how scholars and practitioners of the humanities play a pivotal role in the analysis of and response to environmental problems. (Scheduled for (Scheduled for AY 2015/2016 S1)

Applied Environmental Studies

All students are required to take Applied Environmental Studies. Students who joined Yale-NUS College in its inaugural year will take this class during their fourth year of study. The seminar is an interdisciplinary exploration of a contemporary, controversial environmental problem. Students conduct research, perform necessary analysis, and present their findings in project teams to relevant stakeholders. The seminar serves three functions: It heightens students' ability to conceptualize and analyse knotty problems, it fosters an ability to communicate effectively across disciplines, and it acclimates students to controversial and conflictual settings that are becoming increasingly common in the field. (Scheduled for AY 2016/2017 S2)

Courses in the Area of Interest

Students will draw on the array of courses taught at Yale-NUS and NUS to develop and complete their Environmental Studies area of interest.

CAPSTONE

In consultation with a research advisor, environmental studies students will complete a two-semester capstone project. This project may focus on original academic research, or it may involve collaborative analysis of an environmental problem or policy. The capstone project must further develop and extend the student's area of interest. As such, it serves as the culminating experience of the student's work in the major.

MINOR

The Environmental Studies minor requires the completion of five Environmental Studies courses, including the introductory course, and at least one course in environmental analysis.

GLOBAL AFFAIRS

OVERVIEW

Global Affairs is an interdisciplinary field of study that investigates the relationships among states, economies, and societies. Global Affairs is a major based on praxis, the process by which a theory is enacted or realised. The focus is on dynamics and processes that span borders and geographical boundaries. Our work in the major is thus both international and transnational, and draws on the insights and methodologies of political science, anthropology, economics, sociology, history, environmental studies and urban studies. Students in the Major will learn to critically analyse transnational social patterns and processes of interconnectedness, deterritorialization, unevenness and resistance on all levels of analysis – individual, state, society and system-wide. They will be equipped to analyse global events and underlying processes of stability and change, developing skills in problem solving, critical thinking, oral and written communication as well as keen research capabilities.

Students who major in Global Affairs may go on to pursue careers in public policy, law, diplomacy, international business, international finance, international development, journalism, or humanitarian work. Global Affairs majors and minors will gain critical thinking skills that will enable them to address tomorrow's global challenges with an interdisciplinary understanding of the world.

STRUCTURE

The Global Affairs major is comprised of eight courses and a Capstone that will count as two additional courses. Students may count up to two cross-registered courses to count toward their GA Major. Students can count one language course toward their major *if* it applies to their capstone research project. Students must take at least two 4000-level course.

Students Must Complete Four Required Courses for the Global Affairs Major (Class of 2018 onwards):

1. **Introduction to Global Affairs**
2. **Methods in the Social Sciences**
3. Student chooses at least TWO out of the SIX core courses:
 - Globalisation on the Ground
 - International Political Economy
 - International Relations
 - International Security
 - Global Governance
 - International Development

COURSES

Required Course Descriptions: Students must take Introduction to Global Affairs as a pre-requisite to the Major but can take it simultaneously with any of the Global Affairs core courses. Non-GA majors would not be excluded from this course but preference would be given to declared majors.

Introduction to Global Affairs: This course focuses on the economic, political, cultural, and social aspects of globalisation as well as defining the field of Global Affairs. Students will be introduced to the various waves of globalization the world has undergone, and the impact of the growing mobility of capital, labour, and ideas around the world. In addition to economic globalization, students will study the impact of globalization on popular culture, security, gender and the environment. They will read what both the critics and advocates of globalization and its sub-processes have to say about its impacts, looking at particular case studies sourced from various countries. Students will develop skills in oral and written communication and acquire information and visual literacy competencies.

Methods in the Social Sciences: This course equips students with basic skills in both quantitative and qualitative research approaches. Students will be introduced to mixed-methods research in the social sciences, focusing on five primary techniques: Survey methodology, quantitative data analysis, participant observation, in-depth interviewing, and textual analysis. This will be essential preparation before students embark on their capstone projects and will provide a strong foundation for more advanced methodology courses they may take in subsequent semesters. This course is to be taken in year 2 or 3. Students must have completed Quantitative Reasoning as a prerequisite.

Majors choose at least TWO of the following SIX core courses:

International Relations: This course provides an overview of the evolution and history of international politics. Students taking this course will survey some of the major issues that are the terrain of international politics, from war to the proliferation of weapons of mass destruction, to international trade and finance, to the management of international and intergovernmental organizations. Students will also be introduced to various theories that seek to explain international politics, including realism/neo-realism, different systems theories (anarchy vs. balance of power), and rational choice theory.

International Security: This course focuses on the use of armed forces to resolve international security/conflict situations, and the threats and risks involved for the countries involved in such conflicts, the military personnel on the ground, and civilians caught in the crossfire. Students in this course will learn to analyse any given international security situation to determine whether or not involving armed forces is appropriate, especially in crisis management situations.

International Political Economy: This course introduces students to how states and non-state actors (such as multinational corporations and international institutions) influence the production, distribution, and consumption of scarce resources over national borders. Students will analyse the knotty problem of how domestic and international politics influence inter-state economic relations, and how economic relations between states influence international and domestic politics in return. Topics covered in this course include exchange rate regimes, trade policy, international monetary systems, foreign direct investment, sovereign debt, and foreign aid.

Global Governance: This course introduces students to the history and evolution of international institutions – from formal organizations such as the United Nations to international norms, treaties, and agreements – and the changing nature of diplomacy in the contemporary world. A particular emphasis will be given to understanding different diplomatic strategies, and the role of both states and non-state actors in diplomacy. Prerequisite: International Relations

Globalization on the Ground: This core course takes an ethnographic approach to the study of globalization, focusing on the impact it has had on the daily lives of individuals, families, and communities around the world, and how they have responded in turn. Over the course of the semester, students will focus on different manifestations of globalization in consumption and production patterns, transnational labour markets, international migration, inequality, crime, religion, and social movements. At the same time, students will be expected to conduct their own semester-long ethnographic investigations into globalization in Singapore. This course is distinct from the Introduction to Global Affairs course because of the methods used and level of analysis emphasized.

International Development: This core course addresses causes of (under)development in the developing world, looking at the determinants and mechanisms through which poor countries develop. Students will examine factors at the state and sub-national level the influence poverty alleviation. Students would examine long-term and short-term causes of poverty, issues that are common in developing countries such as authoritarian regimes, civil wars, and corruption. Students will critically analyze the ways in which various attempts at ameliorating poverty by various actors have been attempted and explore when and how they worked or failed. Case studies in the course will explore the development of political structures that enhance human dignity. Prerequisite: CSI, MST and International Political Economy

Sample Advanced Level Courses: Through their advanced electives, students can start to focus on a particular area of interest e.g. security studies, development policy, international migration, trade, and other transnational issue areas.

Politics of Identity in Developing Countries: This course offers an introduction to the study of identity and politics in political science. Students will become familiar with the various theories and approaches to understanding the construction and mobilization of identities: ethnic, national, linguistic, religious, and sexual. Drawing on the empirical literature on the politics of identity in Southeast and South Asia, and Sub-Saharan Africa, students will learn to evaluate how identities are shaped, and how they in turn determine outcomes such as violence, voting behaviour, allocation of public services, inequality, and inter-group trust and cooperation.

Chinese Foreign Policy: Students will gain a deeper understanding of the major contours of the debate and discussion on China's contemporary international relations. The course examines the political, diplomatic, military, and economic challenges facing China under conditions of uncertainty in the regional and international system and the processes through which China responds to and manages these external challenges. The course will analyse how existing theories of international relations and foreign policy analysis apply to China to gain a deeper appreciation of the factors that undergird conflict and cooperation in Chinese foreign policy.

Human Rights: What are human rights? Where did the idea of human rights originate? How does the notion of universal human rights interact with ideas of state sovereignty? Who should police human rights and how? These are some of the questions covered in this course, with a heavy emphasis on case studies sourced from around the world.

International Migration: In this course, students grapple with the questions of why and how people leave their home countries and move elsewhere, and the impacts these people-flows have on both origin and sending countries. The course allows students to investigate and unpack different migrant typologies, such as labour migrants vs. refugees, high- vs. low-skilled migrants, and legal vs. undocumented migrants. It also

exposes students to emergent patterns of international migration (such as circular, stepwise, and return migration) that are becoming increasingly prevalent in our globalized world.

Tobacco: A Policy Perspective: This course helps students to develop skills to explore, analyse and formulate policy responses to complex social challenges. Focussing on arguably the most important single public health concern of our age, it introduces students to its manifold aspects – historical, social, psychological, medical, economic, legal and philosophical. Students will develop skills to navigate controversial social, and especially public health, issues by locating and critiquing relevant evidence, and effectively communicating their analysis. The translation from evidence to policy is rarely straightforward: the course will provide students with insight into the forces that shape public opinion and public health policy formation. Students who will have a role in future policy-making will benefit from this course.

CAPSTONE

Description of Capstone (AY2016/2017) - Global Affairs

1. **Identification of project and supervisor:** *Students should consult with their advisor throughout their Junior year on possible Global Affairs' Capstone subjects. Students should notify the HoS no later than July 1 whether they intend to pursue an experiential policy outcome document or the large-scale theory-based outcome document Capstone option. Students pursuing the experiential option will need to have secured a pre-approved internship in advance of the start of semester1, year four. See also "Capstones in Global Affairs" available from the Global Affairs Website.*
2. **Range of topics and formats:** *There are two kinds of Global Affairs Capstone projects. Large-scale writing and research projects of 10,000 words, which involves an exploration of some aspect of a transboundary challenge as addressed from an interdisciplinary perspective. Such projects should represent an original synthesis, and not merely summarize the works of other scholars. Alternatively, students may produce an experientially based policy outcome document relevant to field research they have completed as part of an internship conducted in Sem1 of year four. The outcome document is a written research paper of 7,000 words. Examples of topics for both options include the following: Election Violence; Natural Resource Endowments and conflict; US Foreign Policy in SE Asia; International Education Standards in Southeast Asia; Regionalism in Global Governance: ASEAN Explored; Greening the Global Shipping Industry; Human Trafficking in Southeast Asia; The Arab Spring, Umbrella Revolution and Conceptions of Democracy.*
3. **Activities as part of project:** *In the first semester, all students attend a weekly seminar colloquium on proposal development and research. This culminates in the submission of a full research proposal inclusive of a literature review and methodology submitted at the end of Semester 1 by each student regardless of which outcome document the student is pursuing. Students pursuing the experiential learning option will also complete a bi-weekly journal entry detailing their practical work and industry-specific reflection in Semester1. The second semester of the capstone will continue the research and writing process under the supervision of the relevant GA faculty. Students will complete their writing in Semester2, culminating in both a written paper and a presentation of their research results. Presentations of the final products will take place after submission of the capstone in Week 12. See standards of formatting and citation criteria in "Capstones in Global Affairs" available from the Global Affairs website.*
4. **Expectations for students/supervisor interactions and work on the project:** *All students are expected to attend the weekly seminar session in Semester 1. Students should meet with their GA capstone supervisor at least once a month in Semester 1 and twice per month in Semester 2, with the student providing a summary of recent activities and progress to the supervisor at least 48 hours prior to the meeting.*

5. **Format(s) of final product:** *The experiential policy outcome document should be no more than 7,000 words or the large-scale theory-based outcome document should not exceed 10,000 words. Final products should include a Cover Page; Table of Contents; Abstract; Introduction; Methodology; Literature Review; Main Body – case study assessment or theory exploration; implications; Conclusion; Annex; Bibliography.*
6. **Assessment(s):** *Participation in research seminar during Semester 1 (10%); Proposal inclusive of literature review and methodology submitted end of Semester 1 (20%); Presentation and defence of final project (20%); and Final Outcome Paper (50%).*

MINOR

To earn a minor in a Yale-NUS Major, a student must complete:

- 25 MC or 5 courses

Students choosing to minor in Global Affairs must take the following courses:

- Introduction to Global Affairs
- 2 out of the 6 core courses in the major
- 2 additional courses – these can be cross-registered courses
- Excepting exceptional circumstances, all Minor courses must have a letter grade. The Head of Study must approve exceptions in writing.
- GA Minors cannot gain credit for language study

CROSS REGISTER CAP

A Cross-registered course is a course taken outside of Yale-NUS, such as at NUS or during study abroad. Up to 2 cross-registered courses can count toward the Major.

LANGUAGE CREDIT

A *relevant* foreign language course can count for 1 course (5MC) credit toward the Major. A foreign language is relevant when it is necessary to undertake research toward the Capstone.

HISTORY

OVERVIEW

The History major offers students the opportunity to explore the complex relationship between our understanding of the past and our experience of the present. Through the study of history, students will learn to interpret past events, to understand societies and peoples, and to recognize patterns and structures in history. They will also attend to the ways in which historians' narrations of the past often reflect contemporary concerns and assumptions.

Course offerings in the History major span a wide range of geographical regions, such as East Asia, Southeast Asia, Europe, the Americas, and the Indian Ocean. They also address important thematic issues that transcend geographical divisions, such as colonialism, urbanism, science and technology, migration, material culture, and gender. In consultation with their academic advisors, students will have the freedom to shape their own pathways in the major according to their geographical and thematic interests.

STRUCTURE

The History major comprises three components – required courses (two), History major courses (six), and a capstone project (the equivalent of two courses).

Required Courses (two)

The History major has two required courses, The Historian's Craft and The History of History.

History Major Courses (six)

1. At least two History courses at the intermediate level, (history courses with codes 2xxx or 3xxx) or courses outside of the History major at the intermediate level that have been approved by the student's faculty supervisor.
2. At least two History courses at the advanced level (history courses with codes 4xxx), or courses outside the History major at the advanced level that have been approved by the student's faculty supervisor.

Note: Neither the two required courses (The Historian's Craft & The History of History), nor a course that has been counted by a student as Historical Immersion, count towards satisfying this component of the History major program. Students should plan their pathways within the major in close consultation with the Head of Studies of History or his/her faculty supervisor.

COURSES

Required Courses

The Historian's Craft: The Historian's Craft is a course that instructs students in a wide range of historical practices and introduces them to important modes of practicing history, including history as craft, history as science, and history as literature. Students will learn about the wealth of available sources through which to access the past, such as newspapers, memoirs, letters, government documents, photographs, and material artefacts. Through a close study of these sources, students will gain an understanding of the multiple ways in which such historical documents or artefacts can be interpreted and analysed. This direct engagement with primary sources will be a principal area of focus in this course. This course should be taken by the end of Year 3.

The History of History: Practitioners of every discipline benefit from having an understanding of their discipline's history. This is especially true for historians, whose work demands an acquaintance with the history of the writing practices and modes of conceptualizing the past to which they are heirs. The History of History introduces students to a wide range of historical approaches and seeks to develop an understanding of major historiographical traditions in Europe and Asia. Through an engagement with foundational historical texts, students will learn about the diversity of ways in which the past has been represented, narrated, and interpreted; they will also explore how historians' interpretations of the past are themselves imbedded in specific historical contexts. This course should be taken in Year 4.

Introductory History Courses (courses with codes 1xxx)

Introductory courses introduce students to large themes and narratives. These courses tend to be chronologically and geographically broad in nature.

Sample Introductory courses:

- World History to AD 1500
- Rise and Fall of the British Empire
- History and Culture of Southeast Asia
- History and Culture of the United States
- History and Culture of East Asia

Intermediate History Courses (courses with codes 2xxx or 3xxx)

Intermediate History courses focus on research methods and the writing of history. Students will explore various methodologies and approaches to history, such as cultural history, social history, economic history, intellectual history, gender history, and micro-history. They will also examine the different ways in which historians have written about and conceived of the past.

Sample Intermediate courses:

- Art and Politics from Napoleon to Hitler
- Environmental History before AD 1800
- Social and Economic History of Britain
- The Age of Enlightenment
- The Industrial Revolution
- Drug Empires in History
- Pre-Modern History of China to the Tang Dynasty Through Tomb Archaeology
- China and the West
- Classical and Contemporary Vietnamese Historical Literature in Translation

Advanced History Courses (courses with codes 4xxx)

Advanced courses are thematically based and emphasize a close engagement with key scholarly works. They focus on the main theoretical approaches and discourses that characterize a particular field of historical study. Students can expect these courses to be the equivalent of honours year or entry-level graduate seminars. Advanced History courses can only be taken in the fourth year, unless prior approval has been given by the instructor teaching that course.

Sample Advanced courses:

- Comparative Empires and Colonialisms
- World Systems Theory
- Cities as Drivers of History
- History of Business and Capitalism
- Orientalism in Visual Culture
- Topics Courses (e.g. Topics in European Intellectual History)

CAPSTONE

The purpose of the capstone project, a year-long undertaking, is to provide History majors with the opportunity to conduct original research. The final product may take the form of a traditional academic thesis or a non-traditional project. The precise nature of the project is to be determined in consultation with the faculty advisor.

In the first semester, students will participate in a research circle, where they will have the opportunity to share their work in progress with their peers and faculty members, as well as to discuss and critique each other's work. By completing a capstone project, students will develop expertise in a particular time, place, culture, or event of the past. The capstone experience will culminate in a colloquium, during which History seniors will showcase their final products, present their projects to the larger college community, and field questions and answers.

MINOR

The History minor is designed to provide a solid grounding in history for students who are pursuing other majors. It allows students to design a curriculum that will not only support their respective majors, but also encourage non-majors to pursue a historical perspective in their own areas of interest. The History minor consists of five courses. All students are required to have taken "History of History" by year 4. Three of the remaining four courses are to be chosen from any of the intermediate (history courses with code 2xxx or 3xxx) or advanced (courses with code 4xxx) level History courses offered. Note that a course already counted for a student's Historical Immersion does not count towards this component of the minor program.

Note: It is recommended that students undertaking the History minor choose a strong methodological, chronological, or geographic theme from their History courses. This theme can be constructed in consultation with the Head of Studies or assigned faculty supervisor.

LIFE SCIENCES

OVERVIEW

The Life Sciences endeavour to unravel the mysteries of living things at all scales from the mechanics of protein ‘machines’, to the development of organisms from a single cell, to the splendour and complexity of entire ecosystems. The questions in the life sciences are as varied and intriguing as life itself. How does a single cell “know” how to develop into a complex organism? How is genetic information interpreted? Can we predict the effects of gene mutations on the properties of an organism? Or the effect of climate change on ecosystems? How do organisms protect themselves from viruses, and how do viruses circumvent those protections, continuing on and on in an evolutionary arms race? How might life have arisen on Earth? What drives the formation and stability of ecological communities? What can human genetic variation tell us about the history of human evolution and migration?

Part of the appeal of biology is that the methodologies and technologies we use to are as varied as the questions themselves. The methods draw on chemistry, physics and computational sciences, as well as some that are uniquely biological, like genetics.

The Life Sciences major is ideal for the student with a fascination for where we come from, why we are the way we are, and how life works — as well as those motivated by the relevance of biology to issues of human health, the environment, and sustainability. The major provides excellent preparation for careers in biological research, biotechnology, law, conservation, public policy, and science writing, as well as the health professions, including medicine, veterinary medicine and public health.

STRUCTURE

- Students may enter the major via Integrated Science OR Foundations of Science.
- Students must take a minimum of 8 courses (40 module credits) within the major and complete a Capstone project (10 module credits).
- All majors must take the Biology Lab course and Research Seminar.
- Students will select several of their optional courses from a category called Foundations for Advanced Biology (FAB). The FAB courses ensure that students get the broad education in biology that will be expected of them, while allowing more flexibility than traditional required courses.
- Remaining courses will typically be specialized courses that emphasize the reading and interpretation of primary scientific literature. Courses in other scientific disciplines can also be counted toward the major.
- Students will conduct a capstone project, involving original research.

REQUIREMENTS FOR THE MAJOR

There are two required courses for the major: Biology Lab and Research Seminar

Other Courses

In addition to the Biology Lab, Research Seminar, and Capstone students are required to take at least four courses from the Foundations for Advanced Biology category (FAB). FAB courses are designed to allow students considerable flexibility to study aspects of biology that are of greatest interest, while also ensuring breadth of knowledge in biology. Provisionally, the FAB courses consist of the following:

- Biochemistry and Cellular Metabolism

- Comparative Anatomy and Physiology (Human Biology)
- Computational and Systems Biology
- Developmental Biology
- Ecology and Ecosystems
- Genetics and Evolution
- Mathematics and Statistics for Life Scientists
- Molecular Biology and Genomics
- Neurobiology and Behaviour

The remaining two courses for the major can be chosen from among the FAB courses or from additional optional courses offered in the Life Sciences at Yale-NUS or at NUS. More generally, courses in any of the natural sciences, mathematics, or computing will be accepted for this requirement. Courses related to the history or philosophy of science, or to the economics and policy implications of scientific discoveries will also typically be acceptable, but are subject to approval on a case-by-case basis by the Head of Studies and cannot be used to satisfy the requirements for a minor in another discipline. Courses taken during a study abroad program can be used towards the major with the approval by the Head of Studies.

INTEGRATED SCIENCE VS. FOUNDATIONS OF SCIENCE

Integrated Science is the preferred pathway for students interested in the molecular aspects of biology. Students who take Foundations of Science, rather than Integrated Science, are encouraged to begin advanced work for the major with a biology course in Semester 4, in addition to the Biology Lab. Regardless whether Integrated Science is taken or not, students are encouraged to consider carefully the importance of courses in mathematics, chemistry, physics and computing to many areas of biology.

COURSES

Biology Lab: This required course will introduce students to modern methods in life science research. Students will learn how to conduct original research, and why and how to apply techniques in a research lab setting. The course will feature semester long projects culminating in a research report modelled on the scientific literature. The Biology Lab course must be taken no later than in the 3rd year.

Research Seminar: This required course is to be taken in the second semester of the 3rd year. The purpose of the course is to prepare students to begin independent research projects for the Capstone. The course will consist of tutorial style meetings to discuss assigned primary literature, as well as presentations by students on their research to date, whether conducted in the lab or based on literature readings. The Research Seminar will be capped by a research proposal for the Capstone, written in the style of a grant application and defended in an oral presentation.

Biochemistry and Cellular Metabolism: Harnessing energy and elemental compounds living things build the most complex structures in the universe: themselves. Rather than memorizing pathways and reactions, the usual way biochemistry is learned, this course emphasizes the evolutionary and chemical logic that explains why biochemical pathways are the way they are.

Comparative Anatomy and Physiology (“Human Biology”): This course examines the anatomy and physiology of humans and other animals in an evolutionary and comparative framework. Major themes include integration among physiological systems; homology; adaptive solutions as the product of phylogenetic constraints or physiological trade-offs; and human adaptive plasticity in diverse environments.

Computational and Systems Biology: Computers have become as important a tool in modern biology as microscopes and gel electrophoresis. This course will use and develop computational tools for sequence analysis, gene expression analysis, modelling of pathways, and more.

Developmental Biology: How does a single cell 'know' how to turn into a complex organism? As amazing as it is, multicellularity and differentiation have evolved independently on many occasions. This course will discuss the themes, mechanisms and pathways of development using a variety of model organisms.

Ecology and Ecosystems: Just as cells and organisms are complex networks of biochemical and genetic interactions, organisms interact in complex networks at the level of ecosystems. This course will examine the nature of ecological data and the structure and behaviour of ecosystems.

Genetics and Evolution: The most important criterion for life to exist is that it has a mechanism for passing on the information that is required to make another entity similar, if not identical, to it. To the extent that this replication process is imperfect (and that is inevitable) the ingredients are all there for natural selection and evolution. This course explores the fundamentals of genetics and of evolutionary mechanisms.

Mathematics and Statistics for Life Scientists: This course will build on students' mathematical foundations, using explicit biological applications of calculus, linear algebra (matrices), computational search algorithms, experimental design and statistics.

Molecular Biology and Genomics: The central, unifying theme of biology is the flow of information from the genetic material (DNA) to the molecules that implement the genetic program (proteins and RNA). Molecular biology is fundamentally the study of how this works. Genomics – a new field of biology founded on the revolution in DNA sequencing technology – is providing enormous insight into the distribution of various mechanisms across the tree of life.

Neurobiology and Behaviour: This course will cover the fundamentals of molecular neuroscience, as well as animal behaviour, a high level, emergent property. Genetics, electrophysiology, biochemistry, and psychology will all be brought to bear in this course.

CAPSTONE

The capstone project will typically be a guided, independent project in laboratory or field research. Students will begin preparing for the project no later than the 3rd year with the Life Sciences Research Seminar, culminating in a proposal for their 4th year project. Students are encouraged to engage in research earlier in their college years, but the capstone project is required as an intensive research experience that will typically involve the development of hypotheses, design of experiments, collection and interpretation of data, and oral and written presentations of research findings. Proposals for alternative types of capstone projects that do not involve original research, such as policy papers, or the production of educational videos, will be considered with the approval of the Head of Studies.

MINOR

Students must take five courses in the Life Sciences. These courses must be selected from the set of Foundations of Advanced Biology courses. There are no other requirements.

LITERATURE

The study of literature provides an opportunity to examine the cultural values, questions, and conflicts embodied in the literary achievements of human civilisations. The Literature major teaches students how to read and interpret texts from a broad range of cultural traditions and historical periods. The major builds on the unique linguistic diversity among students and faculty at Yale-NUS College. Students will cultivate the aesthetic, rhetorical, and cultural literacy required to become cosmopolitan readers of the human experience. Expertise in attentive reading, effective writing, clear speaking, analytical skills, and cross-cultural criticism are fundamental to a wide range of careers, including journalism, law, creative writing, web-development, finance, international relations, and politics.

Through the study of literature, students will acquire several skills:

- Aesthetic analysis: the ability to identify details in a text and relate them to the work as a whole.
- Formulating arguments: the ability to craft debatable theses by using textual evidence appropriately, develop a confident authorial voice, and identify the appropriate audience for their writing.
- Historical and cultural knowledge: the ability to identify, describe, and contrast the major authors, conventions, trends, themes, and texts in world literature.
- Critical thinking: the ability to recognise, question, and present alternatives to cultural assumptions, received ideas, and normative values.

STRUCTURE

In consultation with the Head of Studies, the prospective Literature major will develop an individualised and intellectually rigorous programme. Each student will complete 40 module credits in approved electives and a capstone project. The electives must include:

1. Pro-seminar in Literary Studies:

The proseminar in literary studies will have a different topic every time it is offered, and will focus on a methodological problem that is of interest to a broad range of students. The proseminar is required for both the major and the minor in Literature, but is not a prerequisite to any course in literature. Students outside the major may also take it as an elective. It is recommended that Literature majors take the proseminar in their junior years. A student may take the proseminar twice and have the second course count as an elective that fulfills the “theory and cultural criticism” requirement.

2. Distributional Requirements:

Each course offered in the Literature major will fulfill one or more distributional requirements. Before graduation, the Literature major is required to complete the following:

- Historical Distribution: Students are required to take at least one course in the modern period, and at least one course in the pre-modern period.
- Cultural Traditions: Students are required to complete at least one course in Western literature, and one course in non-Western literature. Alternatively, a student can fulfill this requirement by completing two courses that are designated as “cross-cultural” studies.
- Theory and Cultural Criticism: Students are required to take one course specifically devoted to the study of theoretical paradigms, schools, or methodologies in literary and cultural studies.

Courses may be identified in the Registry list as fulfilling more than one distributional requirement. In all such cases, a student taking the course can decide, in consultation with the HOS, the specific distributional requirement that the course will fulfil in her or his transcript: that is, a course may be cross-listed for more than one distributional category, but it can account in an academic transcript for only one of such distributional categories.

All courses must be taken for a letter grade, and at least 20 MC must be taken at Yale-NUS. Courses offered abroad must first be approved by CIPE and Registry for credit transfer, and then receive approval from the HOS to count toward the major.

CAPSTONE

Students majoring in Literature will attend a weekly Capstone Writing Seminar in the first semester of their senior year and complete a year-long project of directed reading and research under the supervision of a faculty advisor, leading to an undergraduate thesis of approximately fifty pages.

SPECIALIZATIONS

Currently, the Chinese Studies specialisation has been approved. To complete the Chinese Studies specialisation, the student must complete:

1. Third-year Chinese language study or equivalent level of competency.
2. Introduction to Classical Chinese.
3. At least two electives in Chinese literature, such as “Modern Chinese Literature” (Fall 14), “Story of the Stone” (Spring 15), or “Tales of the Strange” (Fall 15).

COURSES

The proseminar introduces students to major problems, themes, and approaches in the study of literature. Faculty instructors and specific topics may vary from year to year, and they will cover topics such as critical translation, literary theories, literary history, formal analysis, or other methodologies useful for students of literature.

The Literature major offers a wide range of electives. Some examples:

Dystopian Fiction This course will address the issue of why dystopian writing exercises a fascination for the modern imagination. A study of representative texts will trace the broad genealogy of utopian thought through the ages; then address the issue of its inversion in the last two centuries. The course will provide opportunity for inferring attitudes from texts in relation to social and technological modernity, the impact of technological change and social transformations on life-systems, and the modes of extrapolation through which speculative fiction become dystopian in orientation.

Queer Theory An introduction to the body of critical writings on dissident forms of gender, desire, and sexuality that has come to be known as “queer theory,” with a focus on its influence on literary studies. Paying equal attention to the classic theories in the 1990s (Butler, Sedgwick, Halperin, Rubin) and contemporary debates (Love, Freeman, Edelman, Rofel), this course traces the development of queer theory from its early concerns with performativity, heteronormativity, butch/femme, and drag, to new theories of queer temporalities, affect, transgender, intersex, and homonationalism.

Dante and the European Middle Ages This course is a slow and complete reading Dante's *Divine Comedy*, an undisputed masterwork of world literature. As the Italian poet narrates his vision of the world beyond, we will journey with him through Hell to Purgatory and ascend to Paradise and finally return to earth. We will pay special attention to the historical, intellectual and social world of the European Middle Ages and the fraught legacy of the classical tradition. We will experience the sublime and terrifying grandeur of his cosmic vision, discuss theology and revelation, the state of souls in the afterlife, the primacy of poetry as an intellectual and spiritual activity, the nature of art and beauty, the relationship between pagan myths and Christian mysteries, and the medieval encyclopaedia of classical learning and religious doctrine.

Postcolonial Theory, Literature, and Culture: Southeast Asia As a historical category and a critical practice, postcolonialism is not a unified field of inquiry. This course, instead of simply surveying the field in its entirety, focuses on significant debates that helped shaped a vast field of inquiry, and the literatures, films, and artistic works of Southeast Asia, which continue to grapple with the legacies of colonialism. From our particular vantage point, this course concerns itself with the difficult question of whether postcolonialism is an oppositional trend in which the ex-colonized "writes back to the center, or is it a complicitous movement that mystifies neocolonial tendencies of global culture?

Literary Genres: Ancient Epic and Gangster Film This course explores the limits of epic in different historical contexts and media: Classical epic poetry (Greek and Roman) and gangster film traditions from the US, Europe, and Asia. How do these works define or align themselves with epic as a genre? What are their characteristics, and how do audiences participate in creating them? Primary material will include classical epics (the Iliad, Ovid's *Metamorphoses*), drama and literary criticism (Sophocles, Aristotle), and contemporary film and television, with critical and theoretical bibliography.

Dangerous Ideas: The Graphic Novel and Social Critique Graphic novels are now an established and popular literary genre. How do they tell a story that is socially relevant, and even question the status quo? This course will examine the graphic novel as a hybrid visual and literary form reflecting its particular sociopolitical context and as a vehicle for social critique. Focusing on graphic novels and their film adaptations from the Middle East/North Africa, the US, and Southeast Asia, we will consider how this unique genre explores colonialism, occupation, the trauma of 20th-century war, normalizing and repressive societal and/or familial expectations, urban anomie, and suburban desolation.

MINOR

To complete the minor, a student complete 25MC in electives approved for the Literature major, one of which must be the proseminar in literary studies. Courses taken for a different major cannot be counted toward the minor, and all courses must have a letter grade.

MATHEMATICAL, COMPUTATIONAL, AND STATISTICAL SCIENCES

OVERVIEW

Mathematics and computation have occupied a central place in the liberal arts curriculum from its earliest history. Across societies, we find mathematics not only in the service of science, government, and ritual, but also for its own sake – an aesthetic of mathematical beauty. In recent centuries, the mathematical sciences have been viewed as fundamental to describing the laws of nature. In the twentieth century, statistics enabled the growth of social science. In the present day, computers are not merely aiding in the observation of societies, but evidently reshaping them. Mathematics continues to flourish, for its own sake and with powerful applications.

Majoring in MCS offers the opportunity to pursue traditional curricula as well as curricula that cut across disciplinary boundaries.

Traditional curricula can prepare students for graduate study in mathematics, computer science or statistics, as well as specialized careers in industry. The MCS major develops skills in analysis and problem-solving, and in the communication of complicated information. Such skills are highly sought-after in the workforce.

The MCS major can include courses that cross disciplinary boundaries, creating a major with complementary interests in subjects such as economics, philosophy and the natural sciences. A small number of courses that contribute to the major may be taken from other disciplines, with the approval of the MCS Head of Studies. Close guidance with faculty is required so that students achieve a reasonable balance of breadth and depth. Our faculty can advise a rigorous curriculum of classes at Yale-NUS College, supplemented by the excellent variety of courses at NUS.

STRUCTURE

To major in Mathematical, Computational, and Statistical Sciences (MCS), a student must complete a pathway that includes eight courses beyond the Common Curriculum and a year-long capstone project. Many pathways are possible, and the MCS faculty will work personally with each student to design a rigorous and coherent programme of study. The MCS Head of Studies must approve any pathway that is meant to satisfy the requirements for an MCS major. Many of the courses on a pathway will be required for the student to earn a degree in MCS. Any changes in pathway require careful discussions with the MCS faculty and the approval of the Head of Studies.

Below are some sample pathways – model courses of study – that students might follow for an MCS major. They should be understood as starting points for students to devise their personal curriculum with MCS faculty. Although some of the models below contain more than eight courses, in all cases an MCS major is possible with a total of eight courses plus the capstone, and the MCS faculty advisor will indicate which courses along the personal pathway are required for the degree.

SAMPLE PATHWAYS

Traditional examples

<i>Mathematics</i>	
Y2S1	Integrated Science or Foundations of Science Number theory
Y2S2	Proof Advanced calculus
Y3S1	Linear algebra One real variable Groups
Y3S2	Rings and fields
Y4S1	Complex analysis Synthetic geometry Capstone
Y4S2	Metric and topological spaces Capstone

<i>Computer Science</i>	
Y2S1	Integrated Science or Foundations of Science
Y2S2	Proof Fundamentals of programming
Y3S1	Advanced programming Theoretical computer science
Y3S2	Algorithms Foundations of computer systems
Y4S1	Programming languages design and implementation Capstone
Y4S2	Operating systems Capstone

<i>Statistics</i>	
Y2S1	Integrated Science
Y2S2	Statistical inference Statistical programming
Y3S1	Statistical computing One real variable
Y3S2	Regression methods
Y4S1	Stochastic processes and models Statistical principles Capstone
Y4S2	Fundamentals of programming Capstone

Interdisciplinary examples

<i>Mathematics, with emphasis on physics</i>	
Y2S1	Integrated Science: Maths and physics foci.
Y2S2	Proof Classical mechanics and special relativity
Y3S1	Statistical thermodynamics One real variable
Y3S2	Fundamentals of programming Groups
Y4S1	Advanced calculus Electrodynamics Capstone
Y4S2	Quantum mechanics Metric and topological spaces Capstone.

<i>Mathematics, with humanities</i>	
Y2S1	Foundations of Science
Y2S2	Foundations of Science Proof
Y3S1	History of mathematics One real variable
Y3S2	Synthetic geometry Groups
Y4S1	Philosophy of Science (Philosophy) Number theory Capstone.
Y4S2	Logic (Philosophy) Capstone

<i>Information Security</i>	
Y2S1	Integrated Science or Foundations of Science
Y2S2	Proof Fundamentals of programming Introduction to information and system security
Y3S1	Number theory Advanced programming Theoretical computer science.
Y3S2	Foundations of computer systems Rings and fields.
Y4S1	Programming languages design and implementation Capstone
Y4S2	Operating systems Cryptography theory and practice Capstone.

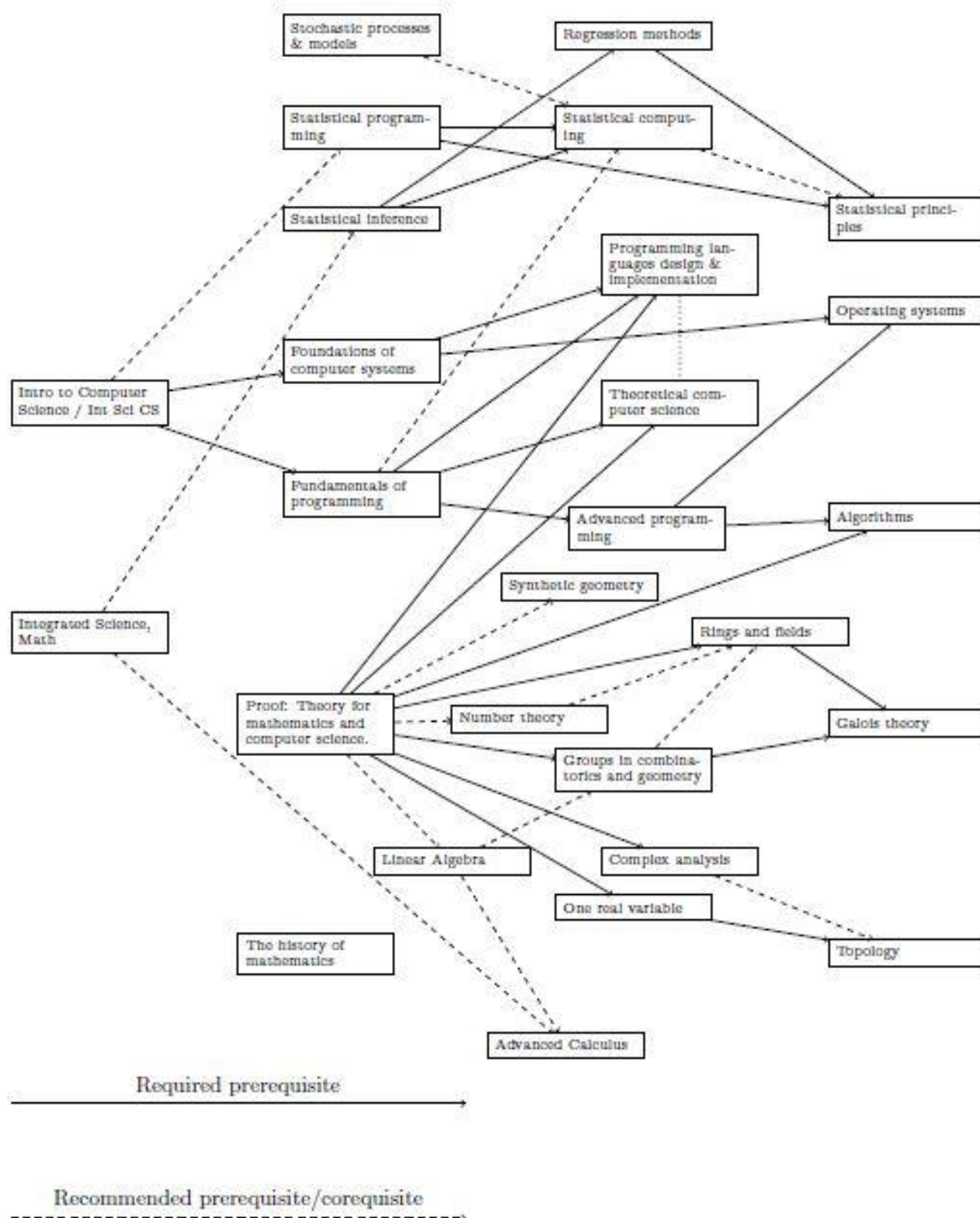
<i>Computer Graphics</i>	
Y2S1	Integrated Science or Foundations of Science
Y2S2	Proof Fundamentals of programming
Y3S1	Advanced programming Linear algebra Computer graphics
Y3S2	Algorithms Foundations of computer systems
Y4S1	3D Modelling and animation Synthetic geometry Capstone
Y4S2	Operating Systems Capstone

<i>Computer Science and Statistics for a career with big data</i>	
Y2S1	Integrated Science
Y2S2	Proof Fundamentals of programming Statistical Inference
Y3S1	Advanced programming Theoretical Computer Science Statistical Computing
Y3S2	Algorithms Foundations of computer systems Regression Methods
Y4S1	Programming languages design and implementation Statistical principles Capstone
Y4S2	Operating Systems Capstone

<i>Computer Science and Statistics for a career with big data</i>	
Y2S1	Integrated Science
Y2S2	Statistical Inference Statistical Programming
Y3S1	Statistical Computing Genetics
Y3S2	Regression Methods
Y4S1	Stochastic processes and models Statistical principles Capstone
Y4S2	Population genetics and evolution Capstone

COURSES

- All courses listed below are 5 MCs.
- Prerequisites (mandated or recommended) may be found in the flow chart below.



Proof: Theoretical foundations for mathematics and computer science

Semester 2

Mathematicians write proofs: convincing arguments, combining clear and concise language, computations and symbolic manipulation, illustrations and tables. By reading, writing, and revising proofs, students will be prepared for modern topics in analysis, algebra, and geometry.

Computer scientists also write proofs, and computers sometimes participate in the process of verifying and discovering proofs. By studying logic and proofs, especially those in discrete mathematics, students will be prepared for advanced topics in theoretical computer science. Students will write proofs that utilize direct deduction and proof by contradiction, complicated logical structures with cases, and mathematical induction. Students will carefully declare variables and utilize quantifiers. They will acquire the common language of deductive mathematical argument. Close readings will lead students towards an appreciation of beautiful proofs.

To give a rigorous foundation for later classes, students will acquire a thorough knowledge of naïve set theory, including sets and functions, equivalence relations and classes, cardinal and ordinal arithmetic. Topics in discrete mathematics will include the combinatorics of finite structures such as graphs and trees.

One real variable

Semester 1

This course embarks on a deep study of the real numbers and functions of a single real variable. Fundamental properties of real numbers – arithmetic, distance, limit, convergence, order – are developed from scratch. From there, the course delves into the inner workings of calculus, the general notions of continuity, differentiability, measure, and integration, for functions of one real variable.

Linear algebra

Semester 1

A rigorous first course in linear algebra of finite-dimensional real and complex vector spaces. The course covers vectors and linear transformations, building geometric intuition and algebraic aptitude. Topics include spaces and subspaces, linear maps, linear independence and spanning, basis, and representations by coordinates and matrices. The theory of linear operators is developed, including some development of canonical forms, eigenvalues and eigenvectors, characteristic and minimal polynomials. The course also covers the structure of bilinear and Hermitian forms. Other topics may include computational aspects of linear algebra and connections to statistics. Problems may include applications to scientific fields and economics.

Advanced Calculus

Semester 2

While One real variable examines the deep workings of one-variable calculus, this course focuses on the extension of calculus to smooth functions of many variables. A geometric approach leads to a treatment of regions in n -dimensional space, smooth functions and their derivatives, differential forms, cycles, and integration. This course may be suitable for students seeking advanced study in mathematics for physics or economics.

Complex analysis

Semester 1

Complex analysis develops the calculus of functions of one complex variable. This includes a thorough

treatment of the algebra and geometry of complex numbers, holomorphic functions, power series, line integrals and residues.

Metric and topological spaces

Semester 2

Metric spaces are the abstract setting for the study of distances, while topology is the study of shapes. These subjects form a basic framework for geometric reasoning in mathematics and its applications (such as equilibrium theory in economics, cosmology, robotics, stereochemistry and molecular biology). Topics covered include metric spaces and continuity, completeness, topological spaces, separation axioms, connectedness, compactness.

Synthetic geometry

Semester 1

Modern synthetic geometry follows the Euclidean axiomatic tradition to prove intricate geometric theorems from a small number of basic assumptions. While Euclidean geometry focuses on figures in the flat plane, modifications of Euclid's postulates allow one to study projective, spherical and hyperbolic geometry.

Groups in combinatorics and geometry

Semester 1

Groups are fundamental objects of abstract algebra, and they arise in a variety of contexts. This course introduces group theory through a deep study of permutation groups, symmetry groups, and matrix groups. Examples of group actions play a central role. The course includes a study of subgroups, quotients, and homomorphisms, direct and semi-direct products, and other methods of constructing and classifying groups.

Rings and fields

Semester 2

Rings and fields are mathematical realms which share some similarities with our number systems. Within a ring or field, one may add, subtract, and multiply, and some familiar axioms hold. This course introduces rings and fields, through examples such as polynomial rings, rings of algebraic integers, and finite fields.

Galois theory

Semester 1

Galois theory has been described as "one of the jewels of mathematics. Its intrinsic beauty, dramatic history, and deep connections to other areas of mathematics give Galois theory an unequalled richness." It uses theory of groups, rings and fields to solve ancient problems such as: which numbers can be constructed by straight-edge and compasses alone, is it possible to square the circle, and do there exist explicit formulae for the solution of polynomial equations of degree higher than 2?

Number theory

Semester 1

Number theory involves a deep study of the integers, including prime decomposition, linear and quadratic Diophantine equations, Diophantine approximation, congruence's of the first and second degree, and quadratic reciprocity. Applications to cryptography, and computational algorithms are included as well.

Fundamentals of Programming

Semester 2

This course teaches rigorous and systematic methods for developing and analysing software. Its primary focus is on the specification, design, and analysis of algorithms and data structures, mostly in a functional

style. It focuses on the OCaml language. Students will learn to write code that is reliable, efficient, readable, maintainable, testable, verifiable, and beautiful.

Advanced Programming

Semester 1

This course will introduce students to number of advanced programming techniques. It covers imperative algorithms and data structures, memory management, parallel and concurrent programming, and object-oriented programming. Software engineering topics such as abstraction are discussed throughout the course. Different programming languages (Java, C, Haskell, and OCaml) are used to motivate the various techniques.

Theoretical Computer Science

Semester 1

The course covers the foundations of theoretical computer science. Topics include models of computation, computational complexity, type theory, semantics, verification, machine-checked proof, and certified programming. Students will use the Coq proof assistant.

Algorithms and Data Structures

Semester 2

The course covers the design and analysis of efficient algorithms and data structures, and emphasizes ideas rather than implementation. Topics include sequential algorithms and data structures in both imperative and functional styles; parallel algorithms; and concurrent data structures.

Foundations of Computer Systems

Semester 2

This course examines modern computer organization. Topics include CPU design, instruction sets, assembly code, and computer architecture. The course includes a project involving the ARM processor.

Programming Language Design and Implementation

Semester 1

This is a course in the design and implementation of computer languages. Topics include lexing, parsing, tree-based program representations, type checking, interpreters, runtime systems, and compilers. This course will focus on a significant project, written in OCaml, in the area of programming language implementation.

Operating Systems

Semester 2

Basic concepts and techniques used to implement operating systems are introduced here. Topics include processes, inter-process communication, memory management, and scheduling. The course will feature a significant project, written in C: the implementation of an operating system.

Statistical inference

Semester 2

This course is a key bridging course for the statistics major which will give the requisite knowledge to be able to take any of the subsequent courses, as well as elective courses taught by the Department of Statistics and Applied Probability in NUS proper. Topics will include the likelihood function, Bayesian inference, the central limit theorem, likelihood ratio tests, model comparison and frequentist desiderata.

Statistical programming

Semester 2

This is a problem-based learning course that will teach students the foundations of modern computational statistics. They will have, by the end of the course, intermediate proficiency in R, being able to write functions, scripts, manage and manipulate data, identify suitable packages, be able to create aesthetically pleasing graphics using grid, and undertake simulation studies. Classes will take place in the computer lab with minimal lecturing, with faculty and students discussing problems and different approaches.

Stochastic processes and models

Semester 1

This course covers some traditional material from classes on stochastic processes (discrete and continuous time models, discrete and continuous state-space models) but from the perspective of understanding the models and being able to apply them to real problems rather than focusing on proofs. Students will learn how to simulate stochastic models, how to undertake inference (using data augmentation and Markov chain Monte Carlo, approximate Bayesian computation, and/or importance sampling) and developing suitable models for real problems, such as emerging infectious diseases. Classes will take the form of lectures plus computer labs.

Statistical computing

Semester 1

This is a problem-based learning course that brings students up to advanced proficiency in computational statistics using R. Students will learn how to implement and understand the theory behind techniques including Markov chain Monte Carlo, Hamiltonian Monte Carlo, sequential importance sampling, lasso, and data mining techniques. As new methodologies enter the statistical mainstream these will be incorporated into the course. Classes will take place primarily in a computer lab with small group discussions.

Regression methods

Semester 2

This course covers the main techniques used in regression analyses. Students will learn generalized linear models, including logistic regression and Poisson regression, about separation, Cox regression, extended Cox regression, model checking, hierarchical models, lasso, model selection using Akaike's Information Criterion, stepwise model selection and the Hosmer-Lemeshow method. The course will be taught in a lecture and computer lab.

Principles of statistics

Semester 1

This course brings together the various methods and ideas developed in other courses. Students learn how to convert substantive problems into statistical solutions, how to design studies, communicate results to the laity (in discussion, presentations, and writing), and write statistical analyses in formal scientific prose. Learning will take place via several projects — ideally consulting for a non-statistician in Yale-NUS or elsewhere where such consultations can be arranged — and seminars.

CAPSTONE

The capstone experience offers each student an opportunity to learn a subject in great depth, to apply and reflect back on previous coursework, and to reach out to other disciplines. It also serves to develop further skills in technical exposition, both written and spoken. Graduating students will enjoy the self-confidence and initiative that comes from having successfully conducted an independent research inquiry. Sample

topics include: topological field theory and physics; robotics; number theory and cryptography; survival statistics; social network analysis; computer graphics; smartphones as a distributed computing platform; neuroimaging.

MINOR

An MCS minor offers students the opportunity to engage with advanced topics in mathematics, computation, and statistics. This can be an excellent supplement for students pursuing a major in quantitative social sciences, natural science, philosophy, etc. We encourage students to pursue an MCS minor to enhance their major, to explore their curiosity, and to develop skills for future employment.

To minor in MCS, a student must complete at least five MCS courses. MCS faculty are pleased to assist students to design a suitable programme of study for the minor. The MCS Head of Studies must approve any pathway that is meant to satisfy the requirements for an MCS minor.

PHILOSOPHY

OVERVIEW

Philosophy investigates the nature of the good life and of reality, knowledge, truth and beauty. It does not just teach us about ideas; most importantly, it teaches us to *do* philosophy, and hence to lead rewarding and productive lives informed by philosophical reflection. The skills and habits of mind developed in the Philosophy major prepare graduates for a wide range of careers in fields including law, government, business, medicine, academia and journalism.

STRUCTURE

The Philosophy major guides students in their development as philosophers on three dimensions:

- I. An understanding of philosophy pursued in the past and in the present (Something Old/New)
- II. An appreciation for philosophy in multiple traditions
- III. Fundamental philosophical skills: (a) Textual Analysis (c) Formal Analysis
(b) Problem Solving (d) Applications

I. Something old, something new: Each student is expected to complete at least one course focused on significant works in the history of philosophy, and at least one course focused on contemporary texts.

II. The traditions dimension: A major's philosophy courses must address texts and ideas drawn from at least two of the world's philosophical traditions. This may be done *either* by taking two courses, each focusing predominantly on a distinct philosophical tradition; *or* by taking several courses treating multiple traditions together.

III. The skills dimension: Each student must take at least one distinct course in each of three areas; you are strongly advised to take courses addressing all four – particularly if aspiring to graduate work in philosophy:

- (a) Textual analysis: focuses on reading challenging philosophical texts and understanding these texts in the context of their composition and in the context of their commentarial traditions.
- (b) Formal analysis: uses the tools of formal logic, decision theory and related techniques to develop and analyse philosophical arguments, or focuses on topics in the philosophy of logic and mathematics.
- (c) Philosophical problem solving: tackles important philosophical problems, in abstraction from the traditions or texts in which they arise, and develops arguments to defend solutions to these problems.
- (d) Application: applies philosophical ideas outside the discipline of Philosophy, for instance to medicine, science, religion, environmental issues, social or political problems, or to shaping one's life.

** While one must take 3 distinct courses for each of 3 skills, a single course may serve to satisfy requirements in two or three dimensions.*

MAJOR

Any set of eight courses in Philosophy collectively satisfying the three dimensions detailed above, together with a capstone project, suffices to fulfil the requirements of the major.

No particular course is required of all majors, except the Capstone seminar.

CAPSTONE

The Philosophy Capstone may be a single sustained essay investigating a philosophical topic, or it can be a linked set of shorter essays on more specific topics; even more daring formats may be explored, designed in consultation with the student's advisor. The philosophy Capstone Seminar meets in Sem. 1 of the final year.

There will be a Capstone Symposium at the end of Sem. 1, and public oral examinations in the form of a conference after submission of the final written work in Sem. 2.

MINOR

The Philosophy minor comprises five courses and does not require a capstone project.

Courses must be selected so as to include at least one distinct course representing two of the four skill areas; and so as to satisfy the traditions dimension, as described above.

WHAT COURSES COUNT TOWARDS THE MAJOR?

Any course cross-listed with philosophy automatically counts towards the philosophy major – whether that is a course offered at Yale-NUS, NUS or at a university abroad.

Up to two non-philosophy courses may count towards the major, where a case is made on the basis of the proposed course's content, or of its fit with the particular philosophy interests and courses constituting a student's way through the major. Such decisions are made in consultation with the student's advisor, and may not be determinable in advance.

NOTE: Only courses listed as philosophy courses can satisfy the 'traditions' or 'old/new' dimensions of the major's requirements.

DESCRIPTION OF COURSES

SEM.1 AY2016/2017

The Metaphysics of Human Nature: Metaphysics concerns what things there are, what they are like, and how they are related. In this course, we will investigate such questions with respect to a special class of objects: *us*. In particular, we will consider question of *what we are*. This course will focus exclusively on recent philosophical research within the 'analytic' tradition.

Skills: Applications, Problems; Historical: New

Classical Indian Philosophy of Language: Among the major topics in linguistic analysis within the traditions of India, this course focuses on two questions: *What is linguistic meaning? How do we understand what is meant?* As the former question is embedded within the latter for Indian thinkers, we turn first to the epistemology of testimony in Nyāya and Mīmāṃsā; then to the question of what meaning(s) are primary, both in terms of words and sentences; finally, we address meanings beyond primary: metaphor, bi-textuality (punning), and suggested meaning.

Skills, Textual analysis; Traditions: Indian; Historical, Old

Ancient Greek Philosophy: An overview of how philosophy—as both a mode of inquiry and a way of life—developed in Western antiquity. We will begin with the pre-Socratics, focus on Plato and Aristotle, and conclude with a brief look at later schools (such as the Epicureans, Stoics, and Sceptics). Topics include the nature of being, knowledge, the soul, virtue and happiness, and the city.

Skills, textual analysis skill; Traditions: European; Historical: Old

The Political Philosophy of Spinoza: Benedict de Spinoza has been hailed variously as the originator of an enlightenment more radical than that of the *philosophes* or as a conservative thinker; as an early champion of liberalism, or as a proto-Marxist materialist; as an atheist hostile to religion or as a defender of religious forms;

as an arch-rationalist, or a champion of the imagination. In this course, our primary task will be to read the original texts on their own terms; on this foundation, we will be able to navigate the contemporary debates over those texts' significance.

Skills: Textual Analysis, Applications; Traditions: European; Historical: Old

Chinese Political Philosophy See Description under PPE.

Skills: Problems; Traditions: Chinese

SEM. 2 AY2016/2017 (provisional)

Money: If you have money, you probably think about it a fair bit. And if you don't have money, you might think about it even more. In this course, we will think about money a lot. In particular, we will examine some central philosophical issues surrounding money and its place in a well-lived life, including its relation to happiness, freedom, and virtue.

Skills: Applications, Problems; Historical: New

Analogical Reasoning and Metaphor: Einstein imagines a beam of light as a train which he rides. Mengzi thinks of human virtues as growing sprouts. Why is this kind of reasoning so pervasive, and what does it mean to think with metaphor and analogy? Looking at Indian philosophy, Chinese philosophy, and contemporary Anglophone analytic philosophy, we will consider what metaphor and analogy are, their role in our thought, their relationship to culture and language and their importance in two philosophical questions: what is the nature of reality? and how should we live?

Skills: Textual analysis, Problems; Traditions: Indian (partial), Chinese (partial)

Late 20th Century French Philosophy: This course introduces students to the work of Jacques Derrida and Gilles Deleuze. It will involve close and systematic readings of a selection of their main texts, which are widely regarded as some of the most influential works to emerge from France. It will also seek to locate the distinctive approach of both Derrida and Deleuze respectively with respect to the way that their work has been taken up and used more broadly, and to address disputes about the meaning and adequacy of their views.

Skills: Textual Analysis; Traditions: European; Historical: New

Knowledge and Mind: You might think that we can easily gain knowledge using sources such as perception, eye-witness testimony, introspection, or moral reflection. Traditional sceptical challenges to these sources use thought experiments involving evil demons or brains-in-vats. This course will survey non-traditional challenges to these sources from psychology and neuroscience.

Skills: Problem Solving; Historical: New

Philosophy as a Way of Life: In the contemporary world, philosophy is one academic discipline among many. But throughout its history, philosophy has also been conceived as a way of life. We will explore this alternative conception of philosophy by exploring pre-modern Greco-Roman and Chinese models, and contemporary reflections on the philosophical life. Topics include the relation between theoretical discourse and one's lived life; philosophy and living well; philosophy as a way of life and "religion"; protreptic arguments for pursuing philosophy; therapeutic arguments; spiritual exercises; and the extent to which this conception of philosophy remains viable today.

Skills: Applications; Traditions: European (partial), Chinese (partial); Historical: Old

Aristotle: This course surveys key topics in the thought of Aristotle (384-322 BCE), a major figure in the European philosophical tradition. Main themes include Aristotle logic and theory of knowledge; Aristotle's philosophy of nature (including his physics, cosmology, and biology); Aristotle's psychology, metaphysics, and theology; and Aristotle's practical philosophy—including his ethics, politics, and literary theory.

Skills: Textual Analysis; Traditions: European; Historical: Old

The following courses give a sense of the sort of courses that are also likely to arise in future years:

Art and the Mind: This course is a survey of topics in the philosophy of art, with emphasis on issues that tell us something about the mind. Topics include horror, emotional expression, pictorial representation, and evaluation. This course may also take in the treatment of these in the European, Indian and Japanese traditions.

This course satisfies the Skills Dimension: Problem Solving, Application; Historical: New

Convention, Knowledge and Existence: Scepticism East and West: This is a cross-cultural introduction to the sceptical tradition, running from Sextus through Hume and Wittgenstein in the West and the Madhyamaka Buddhist tradition. The course addresses the relationship between convention and our knowledge of the world, including our knowledge of our own minds.

Skills: Textual Analysis, Problem Solving; Traditions: European (partial), Indo-Tibetan (partial);
Historical: Old

Death and the Meaning of Life: In this course, we will examine the central philosophical issues surrounding life and death, including the questions of what death is, whether it is to be feared, whether immortality is possible or desirable, and whether life is meaningful.

This course satisfies the Skills Dimension: Problem Solving, Application; Historical: New

Early Modern European Philosophy: This course provides an introduction to the relationship between philosophy and science in the 16th–18th centuries in Europe. The course will address debates about the nature of the self, knowledge, our access to the external world, and the role of science in understanding the world and human nature.

Skills Dimension: Textual Analysis, Problem Solving; Traditions: European; Historical: Old

Hermeneutics, Translation and Cross-Cultural Interpretation: This is a cross-cultural hermeneutics course that juxtaposes European, Indian, Tibetan and Chinese texts on hermeneutics, and uses translation as the focus of hermeneutical activity, exploring the role of interpretation in translation and the way the act of interpretation is conceived in different philosophical traditions.

Skills Dimension: Textual Analysis, Application; Traditions: European OR Indo-Tibetan OR Chinese;
Historical: Old

Philosophy of Law: An examination of some key themes and issues in the philosophy of law, including the nature of law; rule of/by law; the functions and reach of law; the enforcement of morality; punishment; justice; and (the universality of) rights.

Skills: Textual Analysis, Problem Solving; Traditions: European (partial), Chinese (partial); Historical: Old

POLITICS, PHILOSOPHY AND ECONOMICS (PPE)

OVERVIEW

The PPE major is designed to give students a more integrated understanding of the world by teaching them how to investigate the connections between economic, political, social, philosophical, and ethical phenomena. It aims to foster a multi-disciplinary, empirically informed, and philosophically reflective approach to these phenomena. The PPE major will provide students with a wider set of qualitative and empirical tools of analysis, and conceptual forms of knowledge, than would be gained by specializing in just one of the three disciplines of philosophy, politics, and economics. It is designed for those students who want to explore the interconnections between such things as ethical and normative issues, institutional arrangements, international relations, production, trade or market mechanisms, religious institutions and customs, and legal orders.

Students in PPE will thus be required to integrate at least two of the different disciplinary theories, perspectives, and methodologies to explore a variety of interdisciplinary projects in their capstone project: e.g., How do our economic, political, and legal orders interact to affect the distribution or redistribution of material resources, political rights and duties, or forms of recognition and honour? Are mechanisms of decision-making in our political and economic institutions complementary or conflictual, and how are these differences grounded in various philosophical, religious, or ethical traditions? What different forms do justice, equality, responsibility, or liberty take in various economic, political, and legal institutions?

The PPE major teaches students how to think creatively across boundaries and to address a range of different subject areas in a critical fashion. It is also designed to combine social scientific forms of knowledge and modes of analysis with more philosophical and normative methods of inquiry. For these reasons, the PPE major prepares students for a wide range of different careers: law, public policy, government, non-governmental organizations, business, social work, journalism, market analysis, accounting, finance, and academia.

STRUCTURE

To complete this major, students are required to take eight courses (as specified below), and to complete a two-course equivalent capstone project (ten courses in total). In addition, students are strongly encouraged (though not required) to devote an additional three electives to courses supporting the major and leading up to the capstone.

Gateways to the major:

All students are required to take one course in Economics and one course in Politics before choosing their 6 remaining courses from 2 of the 3 categories: Philosophy, Politics and Economics.

Economics Course:

Students are required to take either Intermediate Micro-Economics or Intermediate Macro-Economics.

Politics Course:

Students should choose from one of the following Politics courses:

1. Students who plan to take advanced courses in comparative politics should take Introduction to Comparative Politics in their second year.

2. Students who plan to take courses in international relations should take Introduction to International Relations in their second year.
3. Students who plan to specialize in economics and philosophy, and take no further courses in politics, may take any politics course of their choosing, in consultation with HoS.

Categories of the major

In consultation with the Head of Study, students should then choose their remaining courses from two of the three categories: philosophy, politics, and economics:

Philosophy: See the philosophy major for a description of courses.

Politics: See Global Affairs Major, in addition to PPE specific courses which may include Human Rights, Chinese Political Thought, Republicanism, Ancient Greek Political Thought, Ideas of India, etc. Students should refer to the current year's course offerings or consult with Head of Study.

Economics: See the Economics major for a description of courses.

CAPSTONE

The final-year capstone project offers the PPE major the ability to apply the interdisciplinary set of skills they have acquired to a more focused set of issues or problems in order to produce a substantial piece of research. Students will complete this program of directed reading and research under the supervision of an advisor. Proposals for alternative types of capstone projects that involve such things as policy papers in conjunction with an internship project will be considered with the approval of the Head of Studies.

MINOR

There is no minor in PPE.

PHYSICAL SCIENCES

OVERVIEW

Students majoring in Physical Sciences will explore some of the fundamental processes in matter, space and time. How did the universe emerge? What is the structure of matter? What physical laws determine the motions, temperatures, and chemistry of the matter that comprises our planet and its life-forms? Students will extend their interdisciplinary preparation in science provided by the common curriculum with a rigorous, in-depth sequence of courses that explore advanced topics in physics, chemistry, earth and space sciences. The major adopts an approach to science that integrates multiple disciplines in ways that enable students to continuously question and refine their understanding of scientific issues. The major emphasizes the ability to understand physical concepts deeply and to solve real world scientific problems, which necessitates clear critical thinking on different levels. Thus, students who major in physical sciences will be well-equipped for both scientific and non-scientific careers in a wide-range of fields. The major also offers excellent preparation for graduate study in the sciences as well as for graduate study in engineering, law, and medicine.

STRUCTURE

Students will design a pathway in close consultation with a faculty advisor for approval by the Head of Studies. Pathways leading to graduate study in particular disciplines will be available, as will pathways leading to jobs outside the university that require scientific expertise.

The major begins with one gateway module in either physics or chemistry, and one mathematics course appropriate to the student's chosen pathway.

All students in the Physical Sciences major are required to take:

1. Either Principles of Organic Chemistry or Classical Mechanics
2. Either Mathematical Methods for Physical Scientists or an appropriate upper division Mathematics course
3. Statistical Thermodynamics
4. At least five other courses (a minimum of 25 modular credits) in the Physical Science major, with at least one full course or two half-courses that are laboratory-based
5. A year-long capstone project (10 modular credits)

Example pathways include the following:

Chemistry: Principles of Organic Chemistry, Techniques in Analytical Chemistry (half-course), Techniques in Organic Chemistry (half-course), Mathematical Methods for Physical Scientists, Synthetic Organic Chemistry, Quantum Chemistry and Spectroscopy, Statistical Thermodynamics, Advanced Chemistry Lab, and Inorganic Chemistry. Students planning on graduate study in Chemistry are encouraged to take an additional course in Chemistry.

Physics: Classical Mechanics, Mathematical Methods for Physical Scientists, Electromagnetism, Quantum Mechanics 1, Statistical Thermodynamics, Experimental Methods in Physics, Electrodynamics, one more optional course in Physics. For students planning upon graduate study in Physics, the optional course should be Quantum Mechanics 2.

Materials/Nanoscience: Principles of Organic Chemistry, Techniques in Analytical Chemistry (half-course), Techniques in Organic Chemistry (half-course), Mathematical Methods for Physical Scientists, Materials Chemistry, Organic Synthesis, Statistical Thermodynamics, Nanoscale Physics, Polymers and Condensed Materials.

Note: Students can create an individual pathway in consultation with their Academic Advisor and/or Head of Studies.

COURSES

Mathematical Methods for Physical Scientists: This module introduces important mathematical methods that are essential for treating a variety of problems in the physical sciences. Topics could include vector calculus, linear algebra, differential equations, complex analysis, integral transforms, curvilinear coordinates, group theory, and calculus of variations. The module will focus on aspects of each topic pertinent to the physical sciences.

- Prerequisite: Integrated Science 2.

Classical Mechanics: This module aims to consider the principles of mechanics in a rigorous mathematical framework. Topics may include the Lagrangian formalism, damped and driven oscillations, coupled oscillations, rigid bodies and normal modes, central-force motion, motion in a non-inertial frame, Hamiltonian dynamics, and special relativity. This module is a prerequisite for many of the Major modules in physics.

- Prerequisite: Integrated Science 2.
- Co-requisite: Mathematical Methods for Physical Scientists OR Classical Analysis.

Principles of Organic Chemistry: This lecture-tutorial module focuses on the fundamentals of organic chemistry. It focuses on exploring functional groups common in biochemistry to illustrate the principles and reactions in organic chemistry.

- Prerequisite: Integrated Science 2.

Statistical Thermodynamics: This module explores the laws and statistical nature of thermodynamics, kinetic theory, the equilibrium state, phase transitions, molecular driving forces, and properties that give rise to phenomena such as black-body radiation, paramagnetism and Bose-Einstein condensates. Molecular driving forces are the main focus of this module with applications to physics, chemistry, biology, and material science.

- Prerequisite: Either Integrated Science 2 and Mathematical Methods for Physical Scientists, or Classical Mechanics.

Techniques in Organic Chemistry: This module is an introduction to laboratory techniques in organic chemistry. It focuses on basic methods of organic synthesis, and the purification and characterization of organic compounds.

- Prerequisite: Integrated Science 2 or consent of instructor
- Co-requisite: Principles of Organic Chemistry

Techniques in Analytical Chemistry: This course is an introduction to laboratory techniques in analytical chemistry. It focuses on basic analytical and instrumental methods widely used in the chemistry laboratory.

- Prerequisite: Integrated Science 2 or consent of instructor

Synthetic Organic Chemistry: This combined lecture-tutorial and lab module focuses on the synthetic aspects of organic chemistry and explores some of the advanced principles of organic chemistry reactions. The accompanying laboratory focuses on techniques in organic synthesis.

- Prerequisite: Principles of Organic Chemistry and Techniques in Organic Chemistry Lab.

Quantum Mechanics: This module gives a rigorous introduction to quantum theory. The Schrödinger equation is introduced and applied to one-dimensional systems with an emphasis on the connection between abstract calculations and actual measurements done on quantum systems. The algebraic formalism of quantum mechanics is then presented, followed by a discussion of spin, angular momentum, the hydrogen atom, as well as systems of indistinguishable particles.

- Prerequisite: Classical Mechanics.

Environmental Chemistry: This module surveys the natural environment from a chemical perspective. The module explores environmental issues related to the chemistry in the atmosphere, hydrosphere, and the biosphere. The accompanying laboratory will encompass both field-work and lab-based experiments.

- Prerequisite: Integrated Science 2.

Astrophysics: This module introduces the key concepts of astronomy, cosmology and astrophysics through topics such as star formation, stellar information, the expanding universe, galaxies, and black holes.

- Prerequisite: Integrated Science 2.

Quantum Chemistry and Spectroscopy: This module treats in detail the quantum mechanics of atoms, molecules, and chemical bonding. The principles underlying quantum chemistry, molecular orbital theory, and the physical basis of various spectroscopic techniques are introduced.

- Prerequisite: Integrated Science 2 and Mathematical Methods for Physical Scientists.

Introduction to Electrodynamics: The electromagnetic force is the most relevant to our daily lives. This module gives a fully rigorous introduction to electrodynamics. Topics include electrostatics, magnetostatics, dielectric media, Maxwell's equations, electromagnetic waves, and multipole treatment of radiating systems.

- Prerequisite: Classical Mechanics.

Inorganic Chemistry: This module explores the principles of inorganic chemistry and includes molecular structure, acid-base theories, coordination complexes, the solid state, and organometallic chemistry.

- Prerequisite: Integrated Science 2 and Principles of Organic Chemistry.

Experimental Methods in Physics: This lab-only module focuses on the design and implementation of a single experiment over the course of the semester. Students taking this course concurrently with the first

semester of the capstone project could work with the instructor to tailor the course to provide an additional laboratory component to the capstone. Other choices of experiments include: the quantum Hall effect, High-Tc superconductivity, helium-neon lasers, superfluid flow in liquid helium.

- Prerequisite: Quantum Mechanics or Statistical Thermodynamics or Introduction to Electrodynamics.

Methods in Molecular Simulation: This combined lecture-tutorial and lab module introduces the basic methods of computational chemistry and molecular simulation. Electronic structure calculations, molecular dynamics, Monte Carlo methods are among the techniques covered.

- Prerequisite: Either Quantum Chemistry and Spectroscopy or Quantum Mechanics.

Solid State Physics: This module emphasizes fundamental concepts of condensed matter physics. Starting with introductory topics like crystal structure and reciprocal lattices, we make our way to some of the more contemporary and interesting behaviours of electrons in solids, including Fermi liquids and non-Fermi liquids, superconductivity, topological insulators, and properties of low-dimensional materials such as graphene and carbon nanotubes.

- Prerequisite: Quantum Mechanics and Statistical Mechanics and Introduction to Electrodynamics.

CAPSTONE

In their fourth year, students will complete a guided independent research project in physical science in consultation with a faculty advisor. The capstone can comprise a new experiment in physics and chemistry of the student's design, an investigation of astrophysics using international telescope facilities, or a theoretical simulation of chemistry, physics, or earth science. This academic experience will be an opportunity for the students to engage in cutting-edge research in physical science while synthesizing what they have learned in their courses. The results of the capstone will also be communicated to their peers and faculty, using the presentations and writing styles consistent with practice in the professional scientific disciplines.

MINOR

A minor requires five courses (a total of 25 modular credits) in the Physical Sciences.

PSYCHOLOGY

OVERVIEW

Psychology is the scientific study of emotion, thought and behaviour, often with a specific emphasis on the study of human beings but with significant references to animal behaviour as well. As such, psychology addresses issues such as how our brains function, why we do the things we do, how we become the persons that we are, and why it is that sometimes people may behave in seemingly unusual or even bizarre ways. Psychology is relevant to everything that humans do and has strong links to other disciplines in the liberal arts, including social sciences, natural sciences and humanities.

The Psychology major at Yale-NUS is designed both to provide an overview of the discipline as well as to encourage students to delve more deeply into specific aspects of psychology such as human development, social behaviour, how our brains work and the application of psychology to questions of mental and physical health. Students can enter psychology from either Foundations of Science or Integrated Science. At the end of their course, Psychology majors will have gained an understanding of various aspects of human behaviour as well as skills in the methodologies by which human behaviour can be scientifically studied. As such they will be prepared for doing advanced study in psychology and related disciplines as well as professions in both the public and private sector that are concerned with understanding and managing human behaviour, including social work, health issues, or personnel management in business organizations.

The study of psychology will be pursued through lectures, seminars, laboratory courses, and independent study that may include empirical research. In this way, students will explore the classic findings of psychological research and associated theories, while also being involved in the development of a better understanding of various psychological phenomena. Laboratory courses will engage students in the quest for new findings to expand psychology's base of knowledge. As such, students will be actively involved in research as well as in the usual classroom activities.

STRUCTURE

All Psychology majors are required to take at least 40 module credits within the major and complete a Capstone project worth 10 module credits. Required courses include:

- Understanding Behaviour and Cognition
- Statistics and Research Methods for Psychology
- At least one laboratory course

As part of their studies, students will take "Understanding Behaviour and Cognition" as an introductory course providing an overview of the field of psychology. Understanding Behaviour and Cognition also serves as a gateway course for more advanced courses. In addition they will be required to take "Statistics and Research Methods for Psychology," at least one laboratory course and more specialized courses providing in-depth coverage of various subareas of the discipline. Courses on offer will include those concerned with how human beings develop as individuals and social beings, the nature of our social relationships, how we interact with the world around us, and how our brains process information. Other courses will explore the ways in which behaviour can become disordered and the techniques that can be used to help people with psychological and behavioural abnormalities. Although there are no formal specializations in the Psychology major, students can choose to take courses in specific areas of interest to form their own specializations.

COURSES

Understanding Behaviour and Cognition

This course will introduce students to themselves and others as viewed through the lens of psychology. We will present and explore the scientific study of human (and animal) behaviour, seeking to understand why we think, feel, and act as we do. The goal is to build a firm foundation for those wishing to major in psychology while simultaneously providing an interesting and revealing elective to those visiting psychology on their way to other disciplines.

Statistics and Research Methods for Psychology

This course is concerned with research methods and the use of statistics in psychology. As such this is a skills oriented course aimed at preparing students for taking the required laboratory course in psychology as well as doing their senior capstone project. We will be covering research methods and statistics simultaneously since they are closely intertwined. Prerequisite: Quantitative Reasoning

Introduction to Neuroscience (cross-listed with Life Sciences)

The course provides an introduction to the nervous system, with a particular emphasis on the structure and function of the human brain. Topics include the anatomy and function of nerve cells, sensory systems, and the brain as a whole, as well as exploration of the neural basis of learning, memory, perception, reward, emotion, social thinking, and the control of movement. Diseases of the nervous system and neuropharmacology will also be discussed. The course serves as a gateway to related upper-level courses within the Psychology major, including Computational Explorations of Cognition, Images of the Mind, and the Behavioural Neuroscience Lab.

Cognitive Psychology

This course introduces students to the study of how the mind works, seeking to understand how sensory information is transformed, stored, retrieved, or used. Although primarily focused on psychological approaches to understanding cognition (as mental information processing), it will also connect to relevant approaches within neuroscience, linguistics, philosophy, and computer science. Topics and processes to be explored include attention, language, learning, memory, perception, reasoning, emotion, and action. Prerequisite: Understanding Behaviour and Cognition

Images of the Mind

There have been many recent advances in our ability to explore the relationship between the brain, cognition, and behaviour. Perhaps none has so captivated the public as much as functional Magnetic Resonance Imaging (fMRI), which allows researchers to infer the patterns of brain activity associated with a given task. In this course, we will consider how fMRI has been used to explore various cognitive processes--e.g. attention, memory, perception, emotion, and social reasoning--and where its use raises profound ethical questions, such as "mind reading" or psychiatric diagnosis. In addition, we will discuss the complementary contributions of lesion work, electroencephalography (EEG), neuropsychopharmacology, computational models, and positron emission tomography (PET), with a particular focus on the influence of technological progress on the types of questions researchers address. Prerequisite: Introduction to Neuroscience

Personality and Individual Differences

In this course we will be exploring the various ways in which people differ from each other and some of the theories that have been proposed to account for these differences and for the overall nature of human

beings. As such this course will explore both the theories and empirical evidence related to what makes us the people that we are. Prerequisite: Understanding Behaviour and Cognition

Social Psychology

Humans are known as social animals for a reason. There is no part of our lives that is not influenced in one way or another by our social interactions. In this course we will be exploring the ways in which we are influenced by our social environment, how we influence others, how we think about social situations, how we related to other people and the implications for understanding human behaviour. Prerequisite: Understanding Behaviour and Cognition

Human Sexuality

In this course we will be investigating human sexuality in all of its diversity. We will begin with some theoretical aspects of the study of human sexuality and then go on to considering sexual anatomy, conception, contraception, sexual arousal, sexuality across the lifespan, issues related to love and attraction, sexual orientation, sexual disorders and sexuality transmitted diseases as well as the relationship of ethics, religion and law to sexuality.

Laboratory in Health Psychology

This is a skills-based course concerned with research methods in health psychology, which is concerned with the application of psychological methods and theory to issues related to physical health. As a part of this topics covered will include the various methods used in health psychology research, the practical mechanics of doing research studies as well as the collection, analysis and write-up of data. Following discussion of different methods in health psychology students will be doing group projects which may be done either through collection of questionnaire data or an experiment in the Psychology Lab. Prerequisite: Understanding Behaviour and Cognition and Statistics and Research Methods for Psychology

Laboratory in Neurobiology of Behaviour (cross-listed with Life Sciences)

This course explores the scientific investigation of animal and human behaviour. It will do so using human behavioural experiments, animal models, and computer simulations of learning, memory, attention, and cognition. Practical considerations of gathering, analysing, and reporting data will also be discussed. Prerequisite: Introduction to Neuroscience

CAPSTONE

The Psychology major will culminate in a year-long capstone experience when students will be able to work closely with one or more faculty members within psychology and related disciplines, in which they will conduct original research using appropriate methodologies, with the goal of producing findings that add to our understanding of a specific psychological topic. Sample capstone project topics would include topics in learning and memory, intergroup relations, aspects of abnormal behaviour, child development and the impact of psychological stress. Although empirical work is strongly encouraged, other approaches to the capstone will be considered on a case by case basis.

MINOR

Students may take a minor in Psychology by taking Understanding Behaviour and Cognition, Statistics and Research Methods for Psychology and at least three additional courses of their choice.

URBAN STUDIES

OVERVIEW

Urban Studies is an interdisciplinary field of study that offers an in-depth understanding of cities and processes of urban and regional development. Cities are powerhouses of economic growth and human creativity, yet they also contribute to many of the most pressing contemporary challenges. Today the processes of urbanisation that give rise to cities are of a scale never before seen in human history. As such, understanding the human condition is now inevitably an urban question. So, if you are a student who is curious about the city, enthralled by its physical forms, energised by its culture, troubled by its social injustices, worried about its environmental harms, or enthusiastic about its economic and creative potentials, you will find a unique liberal arts opportunity in the Urban Studies Major.

The Urban Studies Major draws on the insights and approaches of a range of disciplines, including sociology, geography and environmental science, political science, anthropology, economics and history. The program takes full advantage of our location and offers field opportunities in Singapore and other parts of Asia. Students may choose courses that offer breadth, or construct a pathway with a social science, humanities or environmental emphasis.

Students completing the Urban Studies Major will:

- Understand processes of urbanisation from a range of perspectives (political, economic, environmental, social and cultural);
- Be familiar with key theoretical frameworks for explaining and analysing urbanisation;
- Become familiar with a number of cities and urban forms – past and present, developed and less developed, planned and unplanned;
- Learn about urban policy and planning frameworks;
- Develop skills in spatial reasoning, including GIS and related modes of data gathering, analysis and visualisation;
- Gain practical experience, through field-based learning and/or internships, of a number of urban contexts, conditions and institutions;
- Acquire skills of research and critical thinking that are transferable to a range of social scientific, policy and community contexts.

Students who major in Urban Studies may go on to pursue careers in public policy, planning, architecture and urban design, development, journalism, or social and community work. They are also well placed to enter PhD training programs in a range of social science disciplines.

STRUCTURE

All students completing the Urban Studies Major will take eight courses (40 MC equivalent) and a final-year Capstone Project, which is the equivalent of 10 MC.

Students selecting this Major must complete:

One Introductory course:

Introduction to Urban Studies (ordinarily taken in Year 2)

One Theory course:

Urban Theory (ordinarily taken in Year 2 or Year 3)

At least one Methods Course (ordinarily taken in Year 2 or Year 3, prior to the capstone year)

Students select at least one of the following offerings. In special circumstances, students may seek permission from the Head of Study to substitute an alternate methods course.

- Urban Spatial Reasoning and Visualisation
- Methods in the Social Sciences

Up to five Topical or Methods Courses

At least two of these should be advanced (4000) courses.

Capstone: Urban Studio (taken in Year 4)

MINOR

The Minor in Urban Studies requires the completion of five courses, excluding the capstone. Students taking a Minor must complete Introduction to Urban Studies and Urban Theory.

COURSES

Introduction to Urban Studies

This course offers an introduction to the central concerns of urban studies illustrated by way of real world examples.

Methods in the Social Sciences

This course provides an introduction to mixed-methods research in the social sciences, including research design, surveys, quantitative and qualitative data collection and analysis.

Urban Spatial Reasoning and Visualisation

This course provides an introduction to spatial reasoning and methods, including GIS and other spatial analysis and visualisation techniques relevant to the analysis of urban environments and processes.

Urban Theory (previously Understanding Urbanisation)

This course offers students in-depth exposure key theoretical thinkers in the field of Urban Studies.

Topical Courses

A range of topical courses is offered in the Urban Studies major. Examples might include:

- Divided Cities
- Urbanisation in China
- Living on the Edge: The Experience of Peri-urbanisation
- Urbanisation in South and South East Asia
- Urbanisation and the Environment
- Urban Anthropology
- Living in the Metropolis. The Rise and Fall of Ancient Megacities

CAPSTONE

The Capstone Project gives students the opportunity to explore a specialised topic by way of supervised, independent research. The Capstone Project should make an original contribution to a particular empirical, theoretical or methodological question within the field of Urban Studies. Projects must be based on field or archival research, or the analysis of existing data sets (quantitative, visual or textual).

The Capstone Project in Urban Studies is supported through the Urban Studio, which is a regular seminar, meeting, advising and reporting space. This complements the student-supervisor relationship. In Semester 1 of Year 4, the Urban Studio is used to support the development of the Capstone Project (research design, data collection and/or analysis, literature review). In Semester 2 of Year 4 the Urban Studio offers a forum for the presentation of, and constructive feedback on, draft versions of the final work.

Students majoring in Urban Studies can elect to submit their final assessed work in one of three formats:

- A 10,000 word written report in academic format, and an Urban Studio final presentation;
- A multi-media work (e.g. film, photographic essay) with a 5,000 word written report, and an Urban Studio final presentation;
- A visualisation/analysis (e.g. GIS, CAD, etc.), with a 5,000 word written report, and an Urban Studio final presentation.

The format a student selects must be consistent with the skills they have acquired prior to the capstone year, or will acquire as needed during the course of the capstone year.