**ART-SHU 200: Topics in Acting: Theory and Practice (STG)**

This course is focused on the theoretical and practical techniques necessary for the actor to live truthfully within the imaginary circumstances of a character. Students participate in group and individual activities centered on self-observation, applying discoveries to improvisations, monologues, and scene work. At the onset of the class, one filmic version of the chosen play is viewed, (and if possible, attendance at a live performance of the same text), which will serve as the touchstone for class members to explore the various tenets and themes of the play, especially as to how they inform acting choices. In the first part of the semester students will concentrate on a series of lessons designed to facilitate exploration of a character's physical, intellectual and social truth. In the second half of the semester students will present monologues of their own choice (subject to approval by instructor) and scenes by applying the lessons and techniques learned. Reading and writing assignments are due as outlined in the course schedule. Class participants should wear suitable clothing for movement and rehearsal.

Prerequisite: None.

**BIOL-SHU 22: Foundations of Biology II (LEC)**

This course satisfies the following: Core Curriculum ED; FoS for Science & Math & Honor Math Majors.   
Prerequisite: None.

**BIOL-SHU 261: Genomics and Bioinformatics (LEC)**

Fueled by recent advances in technical approaches to data collection and analysis, the biological sciences have entered a new era in which vast amounts of genome-scale sequence and functional data are becoming available for a large number of species, including human. Many medical and biological studies are being carried out on an unprecedented scale. The surge of biological data changes genomics and biology into one of the major research topics in data science. Familiarity with the fields of genomics and bioinformatics, which impact society on all levels, is vital for the next generation of scientists. The course of Genomics and Bioinformatics introduces to students a broad range of subjects in this field through lectures and hands-on exercises that use fundamental principles of biochemistry, computer science, and mathematics. Students are also expected to understand G&B applications such as how genomic analysis is used to facilitate precision medicine research, and how to study biology questions from a systemic perspective.

Prerequisite: Basic programming experience is required, preferably with R. FOS biology is preferred, but not required.

This course satisfies Science, Technology and Society Core Curriculum. It fulfills Biology Elective and Neural Sciecne Elective.

**BPEP-SHU 9042: Political Economy of East Asia (LEC)**

This course focuses on China’s political and economic development over the last century and a half with particular attention to the last 33 years, the so-called Reform Period. Our three primary objectives are to (1) understand the historical trajectory of China’s development path; (2) consider in what ways and to what degree the growth experiences of East Asia’s high-performing economies helped inform China’s economic policymakers decisions and shed light on the prospects for the long-term success of reforms in China; (3) assess the state of China’s contemporary political economy. Prerequisite: Upperclass standing, with priority to Stern BPE Students.

This course satisfies the following: Econ Elective; SS: Focus; GCS elective; or Business - non-finance/marketing elective or China Business Studies.

**BUSF-SHU 101: Statistics for Business & Econ (LEC)**

This course introduces students to the use of statistical methods. Topics include: descriptive statistics; introduction to probability; sampling; statistical inference concerning means, standard deviations, and proportions; correlation; analysis of variance; linear regression, including multiple regression analysis. Applications to empirical situations are an integral part of the course.

Prerequisite: None.

This course satisfies the following: major pre-req: Business and Finance, Business and Marketing, Economics, Data Science; Social Science: methods course.

**BUSF-SHU 142: Info Tech in Business & Society (LEC)**

In Information Technology in Business and Society, students learn the fundamental concepts underlying current and future developments in computer-based information technology - including hardware, software, network and database-related technologies. They will also acquire proficiency in the essential tools used by today's knowledge workers and learn how these can be used to help solve problems of economic, social or personal nature. Throughout the course, they will be exposed to a range of more advanced topics which may include big data, information privacy, information security, digital piracy and digital music.

Prerequisite: None.

This course satisfies Business and Finance/ Marketing Major: Business Elective.

**BUSF-SHU 202: Foundations of Finance (LEC)**

This course is a rigorous, quantitative introduction to financial market structures and financial asset valuation. It has three goals:

1. To develop the concepts of arbitrage, the term structure of interest rates, diversification, the Capital Asset Pricing Model (CAPM), valuation of an individual firm, efficient and inefficient markets, performance evaluation of investment management , and valuation of derivative securities, particularly options.

2. To provide sufficient background knowledge about financial institutions and market conventions for students seeking an overview of capital markets as an introduction to advanced finance courses.

3. To introduce the principles of asset valuation from an applied perspective. The majority of the class is concerned with the valuation of financial securities. These valuation issues are heavily used in portfolio management and risk management applications.

Throughout the course every effort will be made to relate the course material to current financial news.

To take this course, students must be comfortable with statistics, linear algebra, calculus, and microeconomics.

Prerequisites: BUSF-101 (Statistics for Business and Economics) and ECON-150 (Microeconomics) or ECON-3 (Microeconomics).

This course satisfies the following major core: Business and Finance, Business and Marketing. It can count for the Stern Minor.

**BUSF-SHU 250: Princ. of Financial Accounting (LEC)**

Develops students’ abilities to understand business transactions and financial statements and to determine the most appropriate financial measures for these events. Investigates the underlying rationale for accounting practices and assesses their effectiveness in providing useful information for decision making. Emphasis is placed on accounting practices that purport to portray corporate financial position, operating results, cash flows, manager performance, and financial strength.

Prerequisite: None.

This course satisfies major core for Business and Finance, Business and Marketing. It can count for the CAS Business Studies Minor.

**BUSF-SHU 303: Corporate Finance (LEC)**

This course analyzes the major financial decisions made by corporate managers. The major topics include the objective of the firm, investment valuation and capital budgeting, risk management, capital structure and dividend policy. Insights from behavioral corporate finance that help better understand corporate decisions in practice will also be discussed. There will be emphasis on both developing the tools and mindset of the financial practitioner as well as examining specific applications in the form of examples, case discussions, and classroom simulations.

Prerequisite: BUSF-SHU 202 (Foundation of Finance).

This course satisfies a major core for Business and Finance, and major core elective for Business and Marketing.

**BUSF-SHU 304: Futures and Options (SEM)**

This course covers the theoretical and practical aspects of futures, options, and other derivative instruments, which have become some of the most important tools of modern finance. While the primary focus is on financial derivatives, contracts based on commodities, credit risk, and other nonfinancial variables are also covered. Topics include market institutions and trading practices, valuation models, hedging, and other risk management techniques. The course requires relatively extensive use of quantitative methods and theoretical reasoning.

Prerequisite: BUSF-202 (Foundation of Finance).

This course satisfies the following: Business Finance Elective; Business and Marketing Major: Non-Marketing Elective.

**BUSF-SHU 305: Debt Instruments and Markets (SEM)**

This course describes important fixed income securities and markets and develops tools for valuing debt instruments and managing interest rate risk. The course covers traditional bond pricing, term structure, and interest rate risk concepts. It also covers the analytical and institutional aspects of fixed income derivatives, such as interest rate swaps, forwards, futures, and options, as well as bonds with embedded options and mortgage-backed securities. Topics also include credit risk, bond portfolio, management, financial engineering, and international fixed income. The study of fixed income is quantitative and technical by nature.

Prerequisite: BUSF-202 (Foundation of Finance).

This course satisfies the following: Business Finance Elective; Business and Marketing Major: Non-Marketing Elective

**BUSF-SHU 307: Private Equity & Venture Capital (SEM)**

This course is designed to prepare students to have a good general understanding of private equity and venture capital especially with an Asian focus. This will provide an overview of investments, financing, strategies and other elements in private equity and venture capital in China, Asia, and globally. The class format will include lectures, case studies, discussions, and guest speakers (time dependent). The course will require the student's active participation. Leading industry guest speakers may be arranged for further learning enhancement, schedules permitting. The course materials will draw heavily on the lecturer's experiences.

This course is an upper level finance elective.

Prerequisites: BUSF-SHU 202 (Foundations of Finance), BUSF-SHU 303 (Corporate Finance) and BUSF-SHU 250 (Economics of Global Business) (or ECON-SHU 1 Macroeconomics).

This course satisfies 2 credits of Finance Elective.

**BUSF-SHU 321: Equity Valuation (LEC)**

This course covers the valuation of stocks and businesses. Real life valuations of companies are an inherent part of the content. By the end of the course, students should be able to: (1) apply discounted cash flow analysis to find the intrinsic value of an asset; (2) define, describe, analyze, and apply any multiple (PE, Value/EBITDA, Price/Book Value, etc.) to find the relative value of an asset; (3) value any publicly traded firm, small or large, domestic or foreign, healthy or troubled; (4) value any private business for owners or investors (private equity, venture capital, IPO); and (5) separate fact from fiction, sense from nonsense, and real analysis from sales pitch in equity research reports, valuations, and general discourse.

Prerequisites: BUSF-SHU 202 (Foundations of Finance) AND BUSF-SHU 303 (Corporate Finance).

This course satisfies Business & Finance Elective.

**BUSF-SHU 351: Competitive Advantage from Operations (LEC)**

Operations Management (OM) plans and coordinates all activities in the process of producing and delivering products (goods and services). Effective operations management is a key ingredient of success in most industries. Achieving operations excellence is one of the most essential strategies to improve efficiency and to gain a competitive advantage. The goal of this course is to introduce students to the fundamental concepts, problems, and strategies in the operations function of a firm. This course will cover a mix of qualitative and quantitative methods that provide the necessary tools to make intelligent decisions in operations.

Prerequisites: Sophomore Standing.

This course satisfies Business Elective for Business and Finance / Marketing Major.

**BUSF-SHU 353: International Financial Management (SEM)**

This course examines the operation of international currency exchange and capital markets and applies financial management principles to the financial decisions of multinational corporations. It addresses such topics as economic determinants of exchange rates, currency market efficiency, exchange rate forecasting, techniques for measuring and managing exposure to exchange and political risk and financing alternatives and capital budgeting decisions of multinational corporations. Readings and case studies are employed.

Prerequisites: BUSF-303 (Corporate Finance) and ECON-250 (Economics of Global Business).

This course satisfies Business Finance Elective.

**CCSC-SHU 130: Intro Computer Programming with Mathematica (LEC)**

Mathematica is a powerful tool for technical computing. It provides a robust computing environment that is used in biology, chemistry, economics, engineering, finance, mathematics, physics, the arts, and a wide range of other fields. It is designed for symbolic as well as numerical calculations, and for visualization of technical information. Mathematica can change forever both what we teach and learn in the classroom, and how we teach and learn it. To provide students with the very best education possible, we need to bring it into our classrooms. The goal of this course is to empower students in the sciences, engineering, economics, finance, and even in the arts and humanities, to use symbolic and numeric computation, and thereby give them a tool (and a leg up) that they can use throughout their whole professional carrier. The course will include the following topics: A brief introduction to computer science and numerical methods, Mathematica as a sophisticated symbolic and numeric calculator, Wolfram Alpha – a computational database, programming in Mathematica and the concepts behind the language. Procedural programming, functional programming and rule based programming, parallel computing using multiple cores, dynamic interfaces (animation), precision and accuracy, working with units, vectors, matrices, calculus, differential equations, difference (recurrence) equations, optimization methods, image and video processing, audio processing, finance and economics applications, and software development. Students will complete a project that they will choose from within their own areas of interest.

Textbooks:

John W. Gray, Mastering Mathematica: Programming Methods and Applications, (Academic Press, 1997).

Paul R. Wellin, Programming with Mathematica, An Introduction, (Cambridge U. Press, 2013).

Handout notes.

Prerequisite: None.

This course satisfies: Core Curriculum: 2 cred of 4 needed for PCT

**CCSF-SHU 101L: Global Perspectives on Society (LEC)**

In this course, we will explore a set of timeless questions about how society is, or should be, organized, based on close examinations of diverse thinkers and writers from different times and different cultures. The questions raised in this course will engage the moral, social, and political foundations of human relationships, the principles according to which people assemble into societies of different scales, and the bases for interaction among societies in a world of accelerating interdependence. By engaging texts that explore these questions from multiple perspectives, students reflect on several overarching issues, including how different societies have organized their economic and political institutions, how those societies fashion both shared identities and hierarchies of difference, how people experience themselves as “individuals” or as members of a collectivity, how they experience both time and space, and how they engage with others both locally and globally. Over the semester, students develop skills that are central to a liberal arts education, including reading carefully and thoughtfully, considering questions from more than one perspective, participating in respectful and serious intellectual explorations of difficult topics, developing oral presentation skills, and writing essays that make effective and appropriate use of the ideas of others as they present the students’ own ideas to different audiences of readers. Each week, students will meet twice as an entire class for lectures and once in smaller recitation sections led by one of New York University Shanghai’s Global Postdoctoral Fellows. Students receive 4 credits for the lecture and recitation.

Prerequisite: None; offered Fall term Freshman year.

**CENG-SHU 201: Digital Logic (LEC)**

This module provides a rigorous introduction to topics in digital logic design. Introductory topics include: classification of digital systems, number systems and binary arithmetic, error detection and correction, and switching algebra. Combinational design analysis and synthesis topics include: logic function optimization, arithmetic units such as adders and subtractors, and control units such as decoders and multiplexers. In-depth discussions on memory elements such as various types of latches and flip-flops, finite state machine analysis and design, random access memories, FPGAs, and high-level hardware description language programming such as VHDL or Verilog. Timing hazards, both static and dynamic, programmable logic devices, PLA, PAL and FPGA will also be covered. Prerequisite: Intro to Programming or Intro to Computer Science or placement test or interaction lab.

This course satisfies: Core Curriculum: Programming and Computational Thinking; Major: CS Electives, CE Required, EE Required.

**CHEM-SHU 125: Foundations of Chemistry I (LEC)**

This course constitutes an introduction to general aspects of chemistry for science, engineering and math majors. Topics include the theories of atomic structure, stoichiometry, properties of gases, kinetic molecular theory, thermodynamics, quantum mechanics, electronic structure of atoms, periodicity of the elements, chemical bonding, and molecular structure. A particular emphasis is placed on developing physical and chemical intuition through problem solving.

Prerequisite: None.

This course fulfills Chemistry, Biology, Neural Science, Physics Major: Foundations of Science I, and satisfies core curriculum ED.

**CHEM-SHU 225: Organic Chemistry I (LEC)**

This course uses an interactive, problems-based approach to study the structure and bonding of organic materials, conformational analysis, stereochemistry, and spectroscopy- topics that partly trace their roots to the development of quantum theory. The course also incorporates an introduction to modern analytical methods that are the cornerstone of contemporary organic chemistry. The topics covered include basic reaction mechanisms such as substitution and elimination, and the reactions of aliphatic and aromatic hydrocarbons, alcohols, ethers, amines, carbonyl compounds, and carboxylic acids. This course satisfies Chemistry Major: Required Courses.

Prerequisite: CHEM-SHU 126 (Foundations of Chemistry II). Corequisite: CHEM-SHU 225L (Organic Chemistry I Lab)

This course satisfies: Required Chemistry course, core curriculum ED.

**CRWR-SHU 159: Intro to Creative Writing (SEM)**

This course will introduce students to the craft of writing fiction and poetry. You will learn to express your inner creativity on the page, draw characters, structure plots, entice your reader into a setting, and explore new modes of language and lyrical imagery. This course is encouraged for any student with ambitions toward becoming A Writer (!), or who is curious about how far they can stretch their creativity and their command of the English language. In this course, students will read classic and contemporary literary examples, conduct in-class workshops, and write and revise several short stories and poems.

This course fulfills the Introduction to Creative Writing requirement for Creative Writing minors or a Humanities Survey requirement.

Equivalency: This course counts for CRWRI-UA 815 Creative Writing: Introduction to Fiction and Poetry

Prerequisite: None.

**CRWR-SHU 220: Intermediate Creative Writing Craft (SEM)**

In this intermediate craft course, we will investigate how the teller shapes and powers the story. Along with critical texts, we will read fiction told in a variety of perspectives, including stories that aren’t easily categorized. How does a narrator reveal herself? How is narrative perspective developed, maintained, and broken? When is intimacy created with the reader, or distance from him, and why? Students will write their own stories in an experimental array of perspectives--from the third-person omniscient we associate with Dickens, to the unreliable first-person beloved by fans of J.D. Salinger, to the less traditional second person found in Lorrie Moore’s work. Alongside discussions of narration, we will continue to practice additional craft elements: plot, characterization, imagery, among others. Students will be required to complete a substantial fiction project, but may also experiment with other or hybrid genres as part of their work for the course.

This is a course for students who love to read, who are committed to the practice of writing creatively, and who aim to become better creators and analyzers of stories. This is also workshop, and we will share our creative work and respond to the work of others in a writing workshop setting.

This course is open to juniors and seniors and to those who have completed the introductory creative writing course.

Prerequisite: WRIT-SHU 159 (Intro to Creative Writing)-- exceptions by permission of the instructor.

**CSCI-SHU 11: Intro to Computer Programming (LEC)**

An introduction to the fundamentals of computer programming. Students design, write, and debug computer programs. No prior knowledge of programming is assumed. Students will learn programming using Python, a general purpose, cross-platform programming language with a clear, readable syntax. Most class periods will be part lecture, part lab as you explore ideas and put them into practice. This course is suitable for students not intending in majoring in computer science as well as for students intending to major in computer science but having no programming experience. Students with previous programming experience should instead take Introduction to Computer Science.

Prerequisite: None.

This course satisfies: Core Curriculum: Programming and Computational Thinking.

**CSCI-SHU 101: Intro to Computer Science (LEC)**

This course has three goals. First, the mastering of a modern object-oriented programming language, enough to allow students to tackle real-world problems of important significance. Second, gaining an appreciation of computational thinking, a process that provides the foundations for solving real-world problems. Finally, providing an overview of the very diverse and exciting field of computer science - a field which, arguably more than any other, impacts how we work, live, and play today.

Prerequisite: Introduction to Computer Programming or placement exam. Equivalency:

This course counts for CSCI-UA 101. This course satisfies: Core Curriculum: Programming and Computational Thinking; NS Electives, CS Required, Data Science Required, CE Required, EE Required.

**CSCI-SHU 210: Data Structures (LEC)**

Data structures are fundamental programming constructs which organize information in computer memory to solve challenging real-world problems. Data structures such as stacks, queues, linked lists, and binary trees, therefore constitute building blocks that can be reused, extended, and combined in order to make powerful programs. This course teaches how to implement them in a high-level language, how to analyze their effect on algorithm efficiency, and how to modify them to write computer programs that solve complex problems in a most efficient way. Programming assignments. Prerequisite: Intro to Computer Science or Instructor's consent.

Equivalency: This course counts for CSCI-UA 102 Data Structures (NY).

It satisfies: Core Curriculum: Programming and Computational Thinking; CS Required, Data Science Required, CE Required.

**CSCI-SHU 215: Operating Systems (LEC)**

This course covers the principles and design of operating systems. Topics include process scheduling and synchronization, deadlocks, memory management (including virtual memory), input-output, and file systems. Programming assignments.

Prerequisite: Data Structures; Computer Architecture or Computer Systems Organization.

This course satisfies: CS Required, Data Science Concentration in Computer Science, CE Required.

**CSCI-SHU 235: Information Visualization (LEC)**

Information visualization is the graphical representation of data to aid understanding, and is the key to analyzing massive amounts of data for fields such as science, engineering, medicine, and the humanities. This is an introductory undergraduate course on Information Visualization based on a modern and cohesive view of the area. Topics include techniques such as visual design principles, layout algorithms, and interactions as well as their applications of representing various types of data such as networks and documents. Overviews and examples from state-of-the-art research will be provided. The course is designed as a first course in information visualization for students both intending to specialize in visualization as well as students who are interested in understanding and applying visualization principles and existing techniques.

This course satisfies: CS Electives, Data Science Data Analysis Required.

**CSCI-SHU 410: Software Engineering (LEC)**

An intense hands-on study of practical techniques and methods of software engineering. Topics include: advanced object-oriented design, design patterns, refactoring, code optimization, universal modeling language, threading, user interface design, enterprise application development and development tools. All topics are integrated and applied during the semester-long group project. The aim of the project is to prepare students for dynamics in a real workplace. Members of the group will meet on a regular basis to discuss the project and to assign individual tasks. Students will be judged primarily on the final project presentations.

Prerequisites: CSCI-215 and 220.

This course satisfies: CS Electives.

**CSCI-SHU 2314: Discrete Mathematics (LEC)**

This course is an introduction to discrete mathematics, emphasizing proof and abstraction, as well as applications to the computational sciences. Topics include sets, relations, and functions, graphs and trees, algorithms, proof techniques, and order of magnitude analysis, Boolean algebra and combinatorial circuits, formal logic and languages, automata, and combinatorics, probability, and statistics.

Co-requisite MATH-SHU 121 or MATH-SHU 201.

Equivalent to MATH-UA 120.

This course satisfies: Honors MATH Mathematics Electives, MATH Mathematics Electives, CS Required, Data Science Concentration in CS, CE Required.

**ECON-SHU 1: Principles of Macroeconomics (LEC)**

Focuses on the economy as a whole (the ""macroeconomy""). Begins with the meaning and measurement of important macroeconomic data (on unemployment, inflation, and production), then turns to the behavior of the overall economy. Topics include long-run economic growth and the standard of living; the causes and consequences of economic booms and recessions; the banking system and the Federal Reserve; the role of government policy; and international trade.

Prerequisite: None.

This course satisfies the following: Prerequisite: Economics; Social Science Foundational course.

**ECON-SHU 3: Microeconomics (LEC)**

Economics studies how agents make decisions under conditions of scarcity and uncertainty. This course provides a rigorous introduction to economics, with special emphasis on microeconomics. It will introduce you to economics as a discipline and as a way of thinking. It will also provide you with a set of tools, which will be very useful in other economics courses. We will first study the behavior of individual consumers and firms. Then we will give you some insight into how markets work and whether market outcomes are desirable. We will also look at situations in which the firm is a monopolist, or competes with a limited number of rivals. Some key concepts we will introduce include economic incentives, marginal analysis, opportunity cost (which costs matter), market efficiency (what does it mean for a market to work) and strategic behavior (how to predict and respond to your rivals’ decisions). The tools that you will be acquainted with in this class are fundamental for most upper division courses of the Economics major as well as classes in Finance, Accounting and Marketing.

Prerequisite:MATH-SHU 121 (Calculus) or 201 (Honors Calculus).

This course satisfies major pre-req for Economics and Business. It is a foundation course for Social Science major.

**ECON-SHU 10: Intermediate Microeconomics (LEC)**

Rigorous examination of consumer choice, profit-maximizing behavior on the part of firms, and equilibrium in product markets. Topics include choice under uncertainty, strategic interactions between firms in noncompetitive environments, intertemporal decision making, and investment in public goods.

Prerequisite: ECON-SHU 3 (Microeconomics).

This course fulfills Required Economics course

**ECON-SHU 225: Advanced Economic Theory (LEC)**

Designed to introduce students to some of the main model-building techniques that have been developed by microeconomists. Intended for advanced undergraduates who have taken the necessary preparatory courses in economics and mathematics. Any of the following three basic topics may be covered. The first topic is the static theory of consumer behavior both in a certain world and in an uncertain world, including game theory. The second topic is the theory of general equilibrium. The third topic is the theory of dynamic optimization. In addition to the coverage of the economics, the advanced mathematical techniques that are needed to understand the material are reviewed.

Prerequisites: ECON-SHU 10 (Intermediate Micro) AND ECON-SHU 5 (Math for Econ 1) OR MATH-SHU 123(Multivariate Calculus).

This course satisfies Advanced Economics course.

**ECON-SHU 238: Modern Economic Growth: Explore China (LEC)**

The course introduces the history of modern economic growth, with a special focus on China. It will be organized around two main themes: the Industrial Revolution and the Great Divergence. To understand why some nations became developed but the others failed, this course tries to analysis the important evidences and theories about how institution, geography, technology and culture shape the long-term economic development. The class will first focus on how did modern economic growth take place and spread worldwide; and then we move to apply these frameworks to China and explore the historical trajectory of the rise of China.

Prerequisite: None.

This course fulfills Economics Elective, and satisfies SSPC core curriculum.

**ECON-SHU 260: International Trade (LEC)**

This course will cover the basics of international trade theory and policy. It will introduce students to the main theoretical concepts in international trade, ranging from the Ricardian comparative advantage theory to the new trade theory under imperfect competition. Using the tools of microeconomic analysis, this course will explore the patterns of trade among countries, policies that impede or promote free trade as well as their welfare and distributional implications.

Prerequisite:ECON-SHU 3 (Microeconomics).

This course satisfies Economics Elective.

**GCHN-SHU 164: The Early Silk Road(s) (SEM)**

Much has been said and written about ‘The Silk Road’ since Ferdinand Freiherr von Richthofen coined the term in 1877. Fostered by spectacular finds made by so-called ‘explorers’ such as Sir Aurel Stein, Paul Pelliot, Sven Hedin and others it quickly became the subject of countless museum exhibitions and legends. In times when almost any location – virtual or real – is but one mouse click away, the catchphrase ‘Silk Road’ has not lost any of its original appeal. Quite the contrary, the term is almost ubiquitous in all kinds of media. Yet, it is never quite clear what exactly the Silk Road concept really entails. What does it mean to you, for instance? Searching for an answer, you will encounter numerous websites, books, scholarly and popular articles, or TV documentations that seek to unravel its many mysteries and even travel agencies that aim at revealing its myths.

By consulting archaeological as well as written sources this course is going to evaluate all aspects of early Silk Road history – trade, travel, war, religion, ideologies, and cultural exchange – from its earliest age through the Mongolian Era (13th century). The main goal is, however, not to look at every aspect in isolation as it is often done, but to bring them all together. This way it will become clear that actual reality was considerably more complex than is generally claimed. Only the interplay of several factors allowed The Silk Road to become a pre-modern ‘success story’ probably only rivaled by the internet.

Prerequisite: None.(This may be used as a topic course in the Humanities.)

This course satisfies the following: GCS Chinese Geographies; HUMN: Survey; SSPC core.

**GCHN-SHU 243: Chinese Environmental Studies (SEM)**

Why did scholars like Kang Youwei and Liang Qiyao advocate reform and constitutional monarchy, while others, like Sun Yat-sen and Qiu Jin, called for revolution and the overthrow of the empire? What led to the Chinese Civil War between the Nationalists and the Communists? What was the May Fourth Movement about? Who are Mr. Science and Mr. Democracy? What did Hu Shi and Chen Duxiu mean when they declared classical language ‘dead’? What are Lu Xun’s Diary of a Madman and Ding Ling’s Miss Sophia’s Diary really about? What did Mao Zedong mean when he claimed at the Yan’an Forum, in 1942: “There is in fact no such thing as art for art's sake […] literature and art are the cogs and wheels in the whole revolutionary machine”? What is meant by the Cultural Fever of 1980s China? What made the ‘hooligan’ (流氓) author Wang Shuo a national bestseller in the 1980s? What were the main points of debate between the New Left and the neo-Liberals in the 1990s?

**HIST-SHU 126: World History: Part I (SEM)**

This course examines the emergence of world societies and the interactions between them from prehistoric times to about 1450CE. A comprehensive study of specific periods and regions will be followed by an in-depth analysis of primary sources and cross-regional contacts.

Prerequisite: None.

**HIST-SHU 210: History of Death, Dying & Grief (SEM)**

This class will examine the changing nature of death, dying and grief since the late 19th century by focusing on modern wars as instruments of change. As both the number of mortalities and the manner of death changed, so too did private and public ways of dealing with death. Societies around the world modified their understandings of death and created new ways of dealing with the dead, in body and in spirit, as wars became deadlier and dying assumed an increasingly unfamiliar shape. Some of the questions we will consider in this class include:

-how is death represented in social memory during and after war?

-the changing ways of dying – what is a “good” death and what is a “bad” death on the battlefield and at home?

-how has the act of killing changed and how does it influence our understanding of death?

-how mourning practices change, both in the private and public sphere, as a consequence of war

-how do national commemorative practices interact with our private understandings of death and dying?

-in what kinds of spaces do the living and the dead interact?

-what elements of modern war foster these changes? Do all wars shape death and dying in the same way? What common features exist and what elements are culturally specific?

Prerequisite: None.

This course satisfies Humanities Topic Course.

**HIST-SHU 226: 5000 Years of Chinese History (SEM)**

Nowadays, the notion that China looks back on 5,000 years of history seems to be common knowledge. At first one might wonder: what is so special about that? There have been many advanced civilizations in ancient antiquity: Egypt, Babylonia, Greece, the Roman and Aztec empires are but a few examples that immediately spring to mind. On closer inspection, though, it is quite obvious that all of these civilizations have one thing in common: they no longer exist! China and Chinese culture, on the other hand, is still alive and kicking. It is the only civilization on the planet that claims to have developed for five millennia without interruption. But, is this really true? And, more importantly, where exactly does such an assertion come from? These are but two question this course is going to address. Some readers might dismiss them as quixotic musings of an early China specialist. They would be utterly wrong, however, to assume that these issues have no relevance for modern-day China. Precisely because Chinese culture survived for such a long time many contemporary habits are firmly rooted in ancient traditions, whether we are aware of it or not.

Since most of us are largely ignorant of the actual repercussions of China’s enduring history, this course ultimately aims at disclosing them. This means that we are going to analyze historiographical records and compare them with archeological evidence. In order to get a sense how history was perceived at various historical stages, we are also going to spend some time with commentators of early Chinese texts. Finally, we will, of course, try to figure out how the practice of historiography and archeology influences the China we all live in – for the moment at least – today.

Prerequisite: None.

This course satisfies the following: GCS Elective; HUMN: Topics; 13-14 Global Thematic Hist; SSPC core.

**HIST-SHU 231: WWII (LEC)**

The success of movies like Inglourious Basterds, The King’s Speech, and Pearl Harbor or television shows like Band of Brothers and Nazi Hunters has demonstrated that fascination with the era of the Second World War does not stop with scholars. The origins, nature, and effects of this conflict have continued to capture the imagination of the general public and historians. Both the barbarity and the heroism of this ‘total war’ have retained a central place in our historical consciousness, though in vastly different ways.

This course will examine the Second World War from a multi-faceted perspective. We will look at the social, cultural, military, and political contexts of the war from many national perspectives. An overarching goal of this course is to allow you to engage with some of the important historiographical debates that have emerged in past fifty years. Moreover, we will examine how these debates and the controversies that have ensued have shaped the way individuals and nations represent their wartime experiences.

Prerequisite: None.

This course satisfies Humanities Topic Course.

**HIST-SHU 302: History of Water (LEC)**

While global citizens have long been concerned about conserving and rationing our use of fossil fuels, the same cannot be said for an even more precious resource – water. Only in the last few years have government agencies, NGOs, and the market begun to tackle the problem of dwindling water resources. The current statistics and projections are dire. If we do not come up with new technologies to conserve water and use it more efficiently, more people will be without clean water or enough food. The United Nations estimates that by 2030 as many as 4 billion people will not have access to enough water for their basic needs.

During the course of this semester we will read about both contemporary issues that affect us as well as look at the historical context in which these problems developed. We will use case studies as a method for discussing these issues. Case Studies will include: the United States, in particular the American West and New York City; Early Modern Venice and Egypt, and modern day African and China. Reading loads will be moderate to heavy, but engaging. You can plan on reading about 100 pages a week divided between the two classes. A portion of your grade will be based on class discussion. Each student will be asked to also write 4 shorter (2-3) papers based on the readings throughout the term. Each student will also write a small research/topics paper (10-12 pages) on the topic of their choice. You will be asked to look at a current problem with water scarcity or contamination and find its historical precedents.

Prerequisite: None.

This course satisfies the following: GCS Elective; HUMN: Topics; 13-14 Global Thematic Hist; STS core curriculum.

**HUMN-SHU 230: Topics in the Humanities (SEM)**

Literature turns words into images, and images into words. Where do the sensory boundaries between literary and artistic media lie? We will read key texts on visual thinking and aesthetic experience across national traditions, from Greek philosophy to Chinese art, African modernism to American postmodernism. Combining close readings of novels, poetry, photography, and cinema with museum and exhibition visits, students consider the relationship between image and text, author and reader, perception and memory. Authors read include Sei Shonagan, Walter Benjamin, Virginia Woolf, Susan Sontag, Antoni Tàpies, Gao Xingjian, Teju Cole and others.

Prerequisite: None.

**INTM-SHU 101: Interaction Lab (SEM)**

In this foundation course students will be asked to think beyond the conventional forms of human computer interaction (i.e. the keyboard and mouse) to develop interfaces that consider the entire human body, the body’s capacity for gesture, as well as the relationship between the body and it’s environment. Students will learn the fundamentals of electronics and programming as they build projects using the Arduino microcontroller platform. Arduino is a small computer based on open source hardware and software. When used in conjunction with various sensors and actuators, Arduino is capable of gathering information about and acting upon the physical world. In addition to these physical computing techniques, students will also learn to harness the methods of traditional computation. The fundamentals of programming: variables, conditionals, iteration, functions, arrays and objects, will be explored using the Processing programming language. Processing has a simplified syntax and approachable computer graphics programming model, making it an ideal platform for first-time programmers. Students will gain a deeper appreciation of the expressive possibilities of computation as they learn to author their own software, and not simply use that which has been provided to them. Additional topics will include algorithmic drawing and animation techniques, digital modeling and fabrication, data exchange, manipulation, and presentation, as well as control of images, audio and video, including computer vision techniques. Structured weekly exercises are aimed at building specific skills, however students are free to pursue their own diverse interests in their midterm and final projects.

Prerequisite: None.

This course satisfies the following: IMA: Required Course; PC/AT core.

**INTM-SHU 120: Communications Lab (SEM)**

In this foundation course, designed to provide students with a framework to effectively communicate through digital means, students will explore the possibilities of digital media by successively producing projects that make use of digital images, audio, video, and the Web. Students learn in a laboratory context of hands-on experimentation, and principles of interpersonal communications, media theory, and human factors will be introduced in readings and investigated through discussion. Adobe Creative Cloud and other relevant software applications will be examined, and the basics of fundamental web languages HTML, CSS and JavaScript will be studied, to establish a diverse digital toolkit. Both traditional and experimental outputs, including online and interactive media platforms, will be explored. Weekly assignments, group and independent projects, as well as project reports will be assigned in each of the core areas of study.

Prerequisite: None.

This course satisfies the following: IMA: Required course; PC/AT core.

**INTM-SHU 165: Talking Fabrics (LEC)**

This course will explore the history of textiles and how to communicate through the medium of fabric using new technologies. We communicate using fabric every day. The clothes we wear, which bags we carry our belongings in, and the economic and social price we pay for textiles speak volumes about our identities. The art of fabric-making entered human culture so early that we often use it for important metaphors. Our history is woven together by the tales we spin from our common threads. This course will cover basic textile crafts such as sewing, embroidery and patternmaking along with techniques on how to integrate textiles with electronic circuitry. New methods of fabric-making such as 3D Printing textiles and laser cutting fabrics will also be covered.

Counts as: Arts & Entertainment and Skill Development

Prerequisite: None.

This course satisfies IMA Major Experimental & Physical Computing Courses.

**INTM-SHU 213: Unmanned Aerial Storytelling (LEC)**

It used to be difficult to put eyes in the sky. But things are changing rapidly. From balloons, to DIY drones, pro quadcopters, and high resolution imagery from satellites orbiting Earth – we will explore how the fields of storytelling, journalism, and conservation are being transformed from above. These technologies are more accessible than you may think. In this class, students will investigate the regulations, technologies, and practice of drones for storytelling. Students will gain a conceptual understanding of this space through programming toy drones, and by designing and participating in a drone storytelling feature. Students will also learn how aerial imagery can be used in innovative and interactive forms of media.

New Category: New Media & Entertainment

Old Category: Interactive Art & Entertainment

Prerequisite: None.

This course satisfies IMA Major New Media and Entertainment Courses.

**INTM-SHU 214: User Experience Design (LEC)**

User Experience Design (UXD) is a design process focused on producing interactive products and systems that provide a high level of satisfaction to users through concern for human factors such as ergonomics, accessibility, and usability. User experiences unfold over time, and can be crafted to an extent, however a user’s will and other unpredictable circumstances together shape the final outcome. Students in this class will critique existing projects, products, and services, and learn to create more successful user experiences based on real-world development processes, in addition to the application of industry standard techniques and tools. Students will create design concepts and mockups, develop user personas, wireframes, user experience sketches and flows, and ultimately video prototypes. While UXD principles are most often used to create commercial products such as hardware devices and software applications, the concepts and skills prove equally useful in the development of participatory art and performance projects.

New Category: Art & Design

Old Category: Design

Prerequisite: None.

This course satisfies IMA Major Art and Design Course Elective.

**INTM-SHU 221: Creating Immersive Worlds (LEC)**

This introductory course will focus on building virtual worlds and understanding what makes them compelling experiences for others. Throughout the course, students will become familiar with critical concepts such as play testing and object-oriented programming in addition to developing proficiency in software tools such as Unity (3D game engine), Blender (3D modelling), Adobe Photoshop (texturing) and GitHub (source code control). Students will work in collaborative teams to create interactive virtual worlds.

New Category: New Media & Entertainment

Old Category: Interactive Art & Entertainment

Prerequisite: None.

It satisfies IMA Major New Media and Entertainment Courses.

**INTM-SHU 222: Introduction to Robotics (LEC)**

Since the beginning of civilization, humans have fantasized about intelligent machines sensing and acting autonomously. In this course students will discover what robots are, learn how to design them, and use simple tools to build them. Students will use open source hardware to explore sensors and electronics, in addition to designing and building robot bodies and actuators through a variety of digital fabrication technologies. Using a set of community developed tools, students will become familiar with concepts such as mechatronics, inverse kinematics, domotics and machine learning. No previous programming or electronics experience is necessary, however students will be guided through a series of design challenges that their robots should be able to accomplish. With an emphasis on experimentation, peer learning, and team work, the objective of this course is to share in the excitement of robotics by enabling students to make their own creations.

New Category: Experimental Interfaces & Physical Computing

Old Category: Interactive Art & Entertainment & Skill Development

Prerequisite OR Corequisite: Interaction Lab

This course satisfies IMA Major Experimental & Physical Computing Courses.

**INTM-SHU 230: Topics in Comp & Data: Nature of Code (LEC)**

Can we capture the unpredictable evolutionary and emergent properties of nature in software? Can understanding the mathematical principles behind our physical world world help us to create digital worlds? This class focuses on the programming strategies and techniques behind computer simulations of natural systems. We explore topics ranging from basic mathematics and physics concepts to more advanced simulations of complex systems. Subjects covered include physics simulation, trigonometry, fractals, cellular automata, self-organization, and genetic algorithms. Examples are demonstrated in native JavaScript using p5.js. Much of the class time will be dedicated to in-class exercises and self-study as the course is available online through a video series and textbook.

Category: Computation & Data

Prerequisite: INTM-SHU 101 (Interaction Lab) or INTM-SHU 120 (Communications Lab).

This course satisfies IMA Major Computation and Data Courses.

**INTM-SHU 230: Topics in Comp & Data: Generative Language (LEC)**

This class examines the use of text as source material for generative art. The semester will begin with cutting up and remixing text utilizing basic find, replace, and randomization, and will then move on to topics such as regular expressions, Markov generators, Internet bots, natural language processing, and sentiment analysis. We will also look at using and analyzing data from popular social media APIs, as well as scraping and cleaning raw HTML, in order to generate new content. Students will create 3 text-based projects over the course of the semester, in addition to smaller weekly homework assignments, reading, and class discussion. The course will be taught in the Python programming language.

Category: Computation & Data

Prerequisite: Communications Lab or Interaction Lab

**INTM-SHU 236: Topics in Art & Design: Toy Design and Prototyping (LEC)**

Interactive installations leverage the viewer to create an experience that is more than just the sum of its components. What technologies, techniques, and fabrication skills can we leverage to achieve the “wow” factor and create enthusiasm and engagement? We will examine what sustained creative practice we can achieve by building compelling artistic content in a physical space. This class will utilize architecture and space planning, electronics, mechanical construction, cutting edge technologies and design ideals to create prototype artistic installations. Short term assignments will culminate in a large­scale final project.

Old Category: Skill Development

**INTM-SHU 245: Topics in Exp Interfaces & Physical Computing: NIME (LEC)**

This course will focus on designing, creating and performing with musical instruments that utilize recent discoveries in interactive media in order to explore the limits of human expression. Over the semester, students are asked to research examples of contemporary work by creators of musical interfaces and discuss a wide range of issues facing technology in the performing arts. Readings and case studies will provide background for class discussions on the theory and practice of designing gestural controllers for musical performance. Students will invent and prototype a complete system encompassing musical control, mapping input to sound, and the creation of sound itself. Interaction Lab is a prerequisite, but prior performing experience is not required. The performance discipline, being an inherently collaborative arena, places heavy emphasis on teamwork. An open mind to work with other artists, technologists and creative leaders is a must. The class will culminate in a performance where students will play their instruments live.  
  
New Category: Experimental Interfaces & Physical Computing  
Old Categories: Skill Development  
Prerequisite: INTM-SHU 101 (Interaction Lab).

**INTM-SHU 245: Topics in Exp Interfaces & Physical Computing: Animatronics (LEC)**

Assistive technology is a term that includes a wide variety of technologies for people with disabilities. This two-point survey course is designed to provide students with an overview of the field of assistive technology. Field trips, readings, and guest speakers will provide students with an understanding of current research and development as well as processes used in determining appropriate technologies. Weekly assignments and a final research project.

Category: Physical Computing & Experimental Interfaces

Prerequisite OR Corequisite: INTM-SHU 101 (Interaction Lab).

This course satisfies IMA Major Experimental & Physical Computing Courses.

**INTM-SHU 245: Topics in Exp Interfaces & Physical Computing: Intro to Assistive Technology (LEC)**

Note that the schedule for this 2-credit 2nd 7-week course has changed and will take place over 3 Saturdays: April 22, 29, and May 5, unless noted otherwise. The first class will begin Saturday, April 22 at 10:00am. Specific times will be posted shortly (2017.2.17)  
Assistive technology is a term that includes a wide variety of technologies for people with disabilities. This two-point survey course is designed to provide students with an overview of the field of assistive technology. Field trips, readings, and guest speakers will provide students with an understanding of current research and development as well as processes used in determining appropriate technologies. Weekly assignments and a final research project.  
Prerequisite: INTM-SHU 101 (Interaction Lab).  
This course satisfies 2 credits of the Experimental Interfaces and Physical Computing Courses category for the IMA major.

**INTM-SHU 252: The Minimum Viable Product (LEC)**

Increasing possibilities brought about by emerging forms of technology and decreasing costs of connecting people to things have not only enabled innovative human-centered design, but also opened the door to new business models and products. Experimentation and calculated risk taking are keys to successfully harnessing the possibilities of today’s most cutting-edge technologies and innovative methods to first build, understand and then redefine how humans and products interact.

In this 7 week course, student ‘co-founders’ will conceive of and produce a new media, physical or technology product designed to delight their customers while also allowing them to accelerate and validate a business model. Students will ‘get out of the classroom’ and put these products into potential customers’ hands. The course will touch upon topics such as how to design a minimum viable product, design a business model, talk and work with customers, and develop a product community.

New Category: Business of Interactive Media Course

Old Category: Business of Interactive Media Course

Prerequisite: None.

This course satisfies IMA Major Business and Emerging Media Courses.

**INTM-SHU 255: Topics in Business of Emerging Media: Shenzhen Style (LEC)**

This course will examine opportunities and challenges facing firms as they sell to China's rapidly growing consumer class. Students will learn in the classroom via mini-reviews of business fundamentals and lessons on product topics. Out of the classroom, students will learn by 'fishing where the fish are,' and will undertake fieldwork in Shanghai at electronics markets, malls, and other retail outlets. Students will conduct interviews during their fieldwork in order to determine user needs and desires in the area of consumer electronics and, from this information, they will specify the requirements for a new electronics product. The course will culminate in a two-day trip to Shenzhen where students will take a crash course in lean manufacturing and will work with real product designers and factories to build their new product.

New Category: Seminar

Old Category: Seminar

Prerequisite: None.

This course satisfies IMA Major Business and Emerging Media Courses.

**INTM-SHU 280: Topics in New Media & Entertainment: Digital Sculpting Facial Anim (LEC)**

The course aims to explore computer art creation through sculpture-based facial animation. Anatomy of the face and traditional clay sculpting will get introduced at the beginning. Then you will learn from the scratch of the digital modeling by using your face as the subject. Your low-poly face model will get further enhanced by digital sculpting. The final project will be a conceptual piece utilizing your digital face as the medium.

Category: New Media & Entertainment

Prerequisite: Communications Lab.

**INTM-SHU 280A: Topics in New Media & Entertainment: Interactive Storytelling (LEC)**

This course satisfies IMA Major New Media and Entertainment Courses

**INTM-SHU 280B: Topics in New Media & Entertainment: Intermedia (LEC)**

Through increased awareness and by tapping into their imagination, students in this class will be asked to create hybrid works of art and media. Students will be exposed to deep listening techniques to increase mindfulness; Expanded Cinema, an influential book by Gene Youngblood that helped to establish video as a medium for art; dance and movement research; as well as various emergent media so that they develop a truly interdisciplinary approach to their creative practice. Category: New Media & Entertainment

Prereq: Communications Lab

**INTM-SHU 280B: Topics in New Media & Entertainment: Interactive Documentary (LEC)**

This course will explore the creative potential of making nonfiction stories for digital platforms. Students will be introduced to a range of methodologies and tools for making interactive, participatory and immersive narratives including 360 video and VR platforms. Class time will be divided into screenings of documentary work, discussions on nonfiction storytelling and related media (including photography, video games, animation, comics, podcasts, soundwalks), and production time. There will be field trips, guest lecturers and student presentations. Students will be introduced to traditional and experimental documentary forms and will learn film/video/audio production methods from research to production to post-production. It is highly recommended that students come with a specific project or subject matter in mind. There will be two shorter assignments and one final project.

Category: New Media & Entertainment

Prerequisite: Communications Lab

**INTM-SHU 282: Fairy Tales for the 21st Cent (SEM)**

Fairy tales, myths, and stories of magic have always served as a way for both children and adults to make sense of the unpredictabilities of the world around them. How do these stories serve us today? How do new technologies allow us to reinterpret them so that they have new meaning for our times? Through readings, weekly exercises, and a final project, students in this course will explore the historic role and structure of fairy tales as well as the potential contemporary frameworks that allow us to entertain the impossible. Students will work with stories of their choosing however we will examine their implementation through traditional material and book art techniques, as well as projection mapping, 3D and VR (using Unreal Engine.)

Prerequisite: INTM-SHU 120 (Communications Lab).

This course satisfies IMA Major New Media and Entertainment Courses.

**INTM-SHU 295: Seminar Topics: Contemporary Media Theory (LEC)**

Social media tools, such as Twitter, Weibo, Facebook, or YouTube, offer users two new capabilities. First, they let amateurs publish material without professional intermediaries. Second, they provide tools for those users to coordinate their actions, online and off. This increase in both freedom of speech and of assembly affects several areas of contemporary life; one of the most important is the public sphere, that part of society in which political issues are argued over.

For most of its existence, the public has been represented in the public sphere only by proxy, with the conversation managed by professional media outlets who decided which information and opinions should be distributed. Direct participation by citizens creates a staggering expansion in the volume and range of opinions being expressed, and dramatic improvement in the former audience's ability to engage in collective and often insurgent action.

In this course, we will discuss how groups typically excluded from the political process use social media to pursue their goals. We will pay particular attention to the use of social media to affect interactions between citizens and governments, discussing interventions or events like the Green Uprising in Iran, the Arab Spring, and various versions of the Occupy movement. We will discuss both the novel political capabilities offered by social media -- rapid coordination among dispersed groups -- and their common weaknesses -- difficulty in providing sustained political action over long periods.

New Category: Seminar

Old Categories: Seminar

Prerequisite: None.IMA: Seminar; and STS Core Req; 2/3 of the seats reserved for IMA majors until Nov 21.

This course satisfies STS Core Req.

**JOUR-SHU 9202: Journalism (LEC)**

It provides an introduction to the work of the reporter, with particular focus on covering China, and offers students a chance to learn and practice basic journalism skills, including news writing, descriptive & feature writing, and writing for TV etc. Feedback on assignments is given in individual meetings. Visiting speakers and field trips also offer insights into the role of the journalist and the challenges faced.

Prerequisites: None.

**LWSO-SHU 9251: Law Culture and Politics in China (LEC)**

In its remarkable rise, China studies the world. But, in applying lessons from abroad, China often modifies them to reflect China’s own cultural values and traditions, as they have evolved over millennia.

In Beijing and Shanghai as well as Washington and New York, officials, experts, and students use the same global vernacular of “governance” to discuss approaches to pressing public problems. Students in either country will hear terms (often in English) such as rule of law, democracy, transparency, environmental sustainability, and CSR (corporate social responsibility.) But the practical meanings of such terms are shaped by what might be called different “operating systems.”

This course will seek to provide students with basic “vocabulary” (words, concepts and frameworks) of history, political, legal and economic systems needed to begin to “translate” between American and Chinese governance systems. To do so, the course will draw on the diverse backgrounds of NYU Shanghai students, and students’ daily experiences as students in at NYU Shanghai. We hope to learn about China (and the US), but also to reflect—in the light of 911, the 2008 global economic crisis, the explosion of social media and cyberissues, and climate change—on the ways in which NYU Shanghai students may learn how to navigate and help address the 21st century’s core challenges.

**MATH-SHU 9: Precalculus (LEC)**

This course is designed as a preparation for calculus, including study of basic properties of polynomials, rational functions, exponential and logarithmic functions, and trigonometric functions. Systems of linear equations and matrix operations are also covered.

Prerequisite: Placement via NYU SH Mathematics Placement Examination.

This course satisfies Math core curriculum.

**MATH-SHU 10: Great Ideas in Mathematics (LEC)**

Great Ideas in Mathematics. This one-semester course serves as an introduction to great ideas in mathematics. During the course we will examine a variety of topics chosen from the following broad categories. 1) A survey of pure

mathematics: What do mathematicians do and what questions inspire them? 2) Great works: What are some of the historically big ideas in the field? Who were the mathematicians that came up with them? 3) Mathematics as a reflection of the world we live in: How does our understanding of the natural world affect mathematics (and vice versa). 4) Computations, proof, and mathematical reasoning: Quantitative skills are crucial for dealing with the sheer amount of information available in modern society. 5) Mathematics as a liberal art:

Historically, some of the greatest mathematicians have also been poets, artists, and philosophers. How is mathematics a natural result of humanity's interest in the nature of truth, beauty, and understanding? Why is math a liberal art?

Prerequisite: None. For students in Humanities.

This course satisfies Math core curriculum.

**MATH-SHU 121: Calculus**

This course presents the foundations of calculus for functions of a single variable. Topics addressed include limits, continuity, rules of differentiation, approximation,antiderivatives, indefinite and definite integrals, the fundamental theorem of calculus, integration techniques, and improper integrals.

Prerequisite: Placement via NYU SH Mathematics Placement Examination or a grade of C or better in MATH-SHU 009 (Precalculus).

This course satisfies: Required Math course; Math core curriculum.

**MATH-SHU 123: Multivariable Calculus (LEC)**

This course explores calculus of functions of several variables. Topics covered include power series, differentiation and integration of functions of several variables, including directional derivatives, the gradient, line and multiple integrals, and the theorems of Green, divergence, and Stokes.

Prerequisite: Grade of C or better in MATH-SHU 121 (Calculus) .

Equivalent to MATH-UA 123 , MATH-AD 112.

This course satisfies: Required Math course; Math core currilulum.

**MATH-SHU 140: Linear Algebra (LEC)**

This first course in linear algebra covers systems of linear equations, vectors, linear transformations, matrices and their determinants, vector spaces, basis and dimension, eigevectors and eigenvalues, quadratic forms, and matrix decompositions. In addition to its role as an essential topic within mathematics, linear algebra is also critically useful throughout the sciences: for example, in estimation theory, chemical equations, electrical networks, and heat distributions.

Prerequisite: Grade of C or better in Math-SHU 121 (Calculus) or 201 (Honors Calculus).

Equivalency: This course counts for MATH-UA 140.

This course satisfies: Required Math course; Math core currilulum.

**MATH-SHU 141: Honors Linear Algebra I (LEC)**

This is the first semester of a 2-semester course in linear algebra for advanced mathematics majors. Topics covered include systems of linear equations, matrices, LU decomposition, determinants, vector spaces, linear independence, basis and dimension, subspaces and quotient spaces, linear transformations, eigenvalues and eigenvectors, Jordan canonical forms, inner products, orthogonality, quadratic forms, extrema of functions, and symmetric and positive matrices.

Prerequisite: Placement on NYU SH mathematics placement exam.

Co- or pre-requisite: MATH-SHU 201 (Honors Calculus).

This course satisfies: cconstrained Math Elective/ Required Honors Math course; Math core curriculum.

**MATH-SHU 201: Honors Calculus (LEC)**

This is a rigorous course in single-variable calculus for mathematics majors, providing preparation for advanced courses in analysis. Topics covered

include number systems, functions, graphs, vectors, conic sections, polar coordinates, limits, continuity, least upper bounds, the derivative, convexity and concavity, inverse functions, parametric curves, Riemann sums, integrals, and the fundamental theorem of calculus.

Prerequisite: Grade A or A- in math-shu 121 (calculus) OR Placement via NYU SH Mathematics Placement Examination.

This course satisfies Honors Math Requirement; Math core curriculum.

**MATH-SHU 234: Mathematical Statistics (LEC)**

This course is an introduction to the mathematical foundations and techniques of modern statistical analysis for the interpretation of data in the quantitative sciences. Topics covered

include the mathematical theory of sampling, normal populations and distributions, Chisquared,t, and F distributions, hypothesis testing, sequential analysis, correlation, regression, analysis of variance, and applications to the sciences.

Prerequisite: Grade of C or better in MATH-140 (linear algebra), MATH-123 (multivariable calculus) and MATH-235 (probability & statistics).

This course satisfies Honor Math Elective and Math Elective.

**MATH-SHU 235: Probability and Statistics (LEC)**

This course comprises a combination of the theory of probability and the mathematical foundations with techniques of modern statistical analysis. It is designed to acquaint the student with both probability and statistics in the context of their applications to the sciences. In probability: mathematical treatment of chance; combinatorics; binomial, Poisson, and Gaussian distributions; law of large numbers and the normal distribution; application to coin-tossing, radioactive decay, and so on. In statistics: sampling; normal and other useful distributions; testing of hypotheses; confidence intervals; correlation and regression; and applications to scientific, industrial, and financial data.

Prerequisite: Grade of C or better in MATH-SHU 121 (Caluculus) and 140 linear algebra. Not open to students who have taken MATH- 233 (Theory of Probability) and/or MATH-UA 234. (Mathematical Statistics

Equivalency): This course counts for MATH-UA 235.

This course satisfies Required Math course.

**MATH-SHU 265: Linear Algebra& Differential Equation (LEC)**

This course satisfies Data Science Required, Math Required, EE Required, CHEM Additional Required, PHYS Additional Required

**MATH-SHU 329: Honors Analysis II (LEC)**

This course is a continuation of Analysis I, with emphasis on functions of several variables. Topics covered include the topology of Euclidean space, the Stone-Weierstrass theorem, the implicit and inverse function theorems in several variables, Jordan regions, linear transformations, differentiation of integrals, and integration of differential forms.

Prerequisite: Grade of C or better in MATH-SHU 328 (Honors Analysis I) and MATH-140 (linear algebra).

Equivalency: This course counts for MATH-UA 329.

This course satisfies: Honors MATH Required, MATH Constrained Math Electives

**MATH-SHU 339: Real Variables (LEC)**

This course is a continuation of the analysis sequence with a focus on measure and function spaces. Topics covered include Lebesque measure and integration, abstract measure spaces, Lebesgue differentiation, the Radon-Nikodym theorem, Fubini’s theorem, Lp and Hilbert spaces, the Riesz representation theorem, and Fourier series.

Prerequisite: MATH-SHU 328 (Honors Analysis I) or 329 (Honors Analysis II). (This is a high level course in analysis which requires a very good background in proving theorems. Students who did not have a high grade in Honors Analysis I or Honors Analysis II are strongly encouraged to consult the course instructor to see whether they have enough background.)

This course satisfies: Honor Math Electives; Math Electives.

**MATH-SHU 345: Intro to Stochastic Processes (LEC)**

This is an introductory course in stochastic processes. Stochastic processes are widely used as modeling tools in many fields of application, including finance, physics, biology and engineering. The course will include an introduction to measure theory, thebasic theory of discrete and continuous time Markov chains,branching processes, Poisson point processes Brownian motion and martingales. In the final part of the course, more advanced topics such as stochastic integrals, free fields, Markov loops and Ising model may be included as time permits and according to the background of the students.

Prerequisites: MATH-140 (linear algebra) AND MATH-SHU 233 (Honors Theory of Probability)

This course satisfies: Honor Math Electives; Math Electives.

**MATH-SHU 362: Honors Ordinary Differential Equations (LEC)**

This course satisfies:Required Honors Math course

**MCC-SHU 9451: Global Media Seminar: China (SEM)**

This course looks at the transformation of China’s media landscape since the 1990s through market reforms and new technology. Topics include the rise of 'commercial' newspapers, magazines and TV stations; animation and new media; the role of advertising, and tensions between political control and demands for greater freedom of expression on the Internet and social media. Students follow latest developments in the Chinese media; field trips and talks by media professionals provide historical, regulatory and social context.

Prerequisite: None.

**MGMT-SHU 21: Managerial Skills (LEC)**

Many companies bestow a management title on key talent and expect appropriate behavior to follow. That is not the most effective way to develop future business leaders. Your expertise will take you just so far. Increasing self-awareness and being open to feedback are important first steps in leading today's business for tomorrow's results. DEVELOPING MANAGEMENT SKILLS is a course that focuses primarily on the practical aspects of managing. This course is highly interactive and, while based on solid research, it stresses a hands-on approach to improving your management skills. The focus is on developing:

Your Personal Skills: self-awareness; managing stress; solving problems & creativity

What behaviors help or get in your way as you strive for personal/professional success?

How do your values influence your decisions and problem-solving approaches?

How do your learning styles help or hinder how you handle ethical dilemmas?, etc.)

Your Interpersonal Skills: coaching; counseling; supportive communication; gaining power & influence; motivating self & others; managing conflict

Your Group Skills: empowering & delegating; building teams, leading change, running meetings.

Each session will give you an opportunity to “assess”, “analyze”, “practice”, “learn”, “teach”, and “apply” the above skills to your own work or life situation so that you can turn good ideas into effective practice. You will not only learn about management skills but you will begin to apply those skills in class, at work, at home, etc., to help you become a more effective business leader. This is not the course for you, if you prefer classes where you can sit passively by and be an ""academic tourist"".

In the self-assessment step you assess your own skills in the topic under discussion. Usually, these will be at the beginning of each chapter. Class lectures and discussions will involve such topics as: self-awareness, creative problem-solving, communication, stress management, gaining power, motivating others, managing conflict, empowering others, giving and receiving feedback, delegating, and team building, etc...not necessarily in that order. You will analyze, write about, practice and apply these topics through case studies, group exercises, and being responsible to teach some topics to the class.

NOTE: We will NOT be reading each chapter in class. The text is YOUR resource to use as we go along as a starting point. Use it. We will seldom refer to it during class. It can serve as the basis for class discussion and reflection. However, it is not to be considered the only resource available to you. This is your opportunity to explore these topics through outside sources, including but not limited to professional and popular journals/books/organizations, Human Resources professionals, web sites, etc. Your chance to network beyond your comfort zone!

You will be required to keep a journal/log from day one. A self-awareness journal allows you to keep track of the issues that help or get in the way of your career/management goals and the action-steps you take to achieve them. This will be especially important for your final project. You will be required to hand in a one-page summary of highlights about ¾ of the way through the course.

A secondary goal is to provide you an opportunity to develop your skills in critical thinking, oral and written communication, and your ability to influence others through rational and creative approaches. Therefore, at the end of this course you will be able to:

Demonstrate your understanding and competence with respect to fundamental managerial skills: Self-awareness, stress management, creative problem solving, supportive communication, gaining power and influence, motivating others, managing conflict, building effective teams, etc.

Analyze, develop, practice, and demonstrate your ability to use these fundamental personal, interpersonal and team building skills through self-assessments, textbook learning, cases, experiential exercises, written application exercises and a final paper.

Prerequistie OR Corequisite: MGMT-SHU 301 (Management & Organizations)

**MGMT-SHU 301: Management and Organizations (LEC)**

This course addresses contemporary management challenges stemming from changing organizational structures, complex environmental conditions, new technological developments, and increasingly diverse workforces. It highlights critical management issues involved in planning, organizing, controlling, and leading an organization. Ultimately, it aims to strengthen students’ managerial potential by providing general frameworks for analyzing, diagnosing, and responding to both fundamental and complex organizational situations. It also provides opportunities for students to enhance their communication and interpersonal skills, which are essential to effective management. The structure of the course encourages learning at multiple levels: through in-class lectures, exercises, and discussions; in small teams carrying out projects; and in individual reading, study, and analysis.

Prerequisite: None.

This course satisfies Business and Finance/ Marketing Major: Business Elective.

**MKTG-SHU 1: Introduction to Marketing (LEC)**

Evaluates, from the management point of view, marketing as a system for the satisfaction of human wants and a catalyst of business activity. Deals with the subject at all levels, from producer to consumer, and emphasizes the planning required for the efficient use of marketing tools in the development and expansion of markets. Concentrates on the principles, functions, and tools of marketing, including quantitative methods. Utilizes cases to develop a problem-solving ability in dealing with specific areas.

Prerequisite: None.

This course satisfies the following: Business and Finance core elective. Business and Marketing required core course. It can count for the CAS Business Studies Minor and the Stern Business Studies Minor. Business majors have priority for this course and study away students have priority for a limited number of seats.

**MKTG-SHU 2: Consumer Behavior (LEC)**

This course presents a comprehensive, systematic, and practical conceptual framework for understanding people as consumers—the basic subject matter of all marketing. It draws on the social sciences to evaluate the influence of both individual and ecological factors on market actions. Students discuss relevant psychological and sociological theories and study how they can be used to predict consumers' reactions to strategic marketing decisions. Basic methodologies for research in consumer behavior are developed and applied. Course emphasis is on developing applications of behavioral concepts and methods for marketing actions.

Pre-requisite: MKTG-SHU 1 (Intro to Marketing).

**MKTG-SHU 3: Advertising Management (LEC)**

This course provides students with a comprehensive framework and tools to understand the advertising process and to appreciate managerial and theoretical perspectives in advertising. It tackles the stages in developing an advertising plan- from analyzing the situation and defining clear advertising objectives to execution. Students learn tools related to various skill areas in advertising, including account planning, media planning and buying, and copywriting/art direction, while developing a broader appreciation of how each skill area fits into the overall structure of the advertising process. Coursework involves a comprehensive group project that utilizes learning in all functional areas of advertising, while simulating the development of an advertising campaign.

Prerequisite: None.

This course satisfies Marketing Elective.

**MKTG-SHU 57: Digital Marketing (LEC)**

This course provides an introduction to fundamental concepts in digital marketing. Students will learn through business case studies reflecting recent frameworks in the field, and in-class exercises on metrics and methods for evaluating the success of digital marketing. Students will also explore the psychology of virality and social influence in digital contexts.

Pre-requisite: MKTG-SHU 1 (Intro to Marketing).

This course satisfies Marketing Elective.

**NEUR-SHU 201: Introduction to Neural Science (LEC)**

Introductory lecture course covering the fundamental principles of neuroscience. Topics include principles of brain organization, structure and ultrastrucIntroductory lecture course covering the fundamental principles of neuroscience. Topics include principles of brain organization, structure and ultrastructure of neurons, neurophysiology and biophysics of excitable cells, synaptic transmission, neurotransmitter systems and neurochemistry, neuropharmacology, neuroendocrine relations, molecular biology of neurons, development and plasticity of the brain, aging and diseases of the nervous system, organization of sensory and motor systems, structure and function of the cerebral cortex, and modeling of neural systems.

Prerequisite: CCSC-110 (Foundations of Science 4 Biology) & Corequisite: BIOL-SHU 22 (Foundations of Biology II)

This course satisfies: Required NS Course; STS core.

**NEUR-SHU 265: Neural Bases: Speech & Language (LEC)**

How does our brain work to enable us to speak and understand language? Are there special parts of the brain dedicated to speech and language? What is it like to be abnormal at speech or lose language? This course provides an introduction of the neuroscience research of speech and language, and interdisciplinary field at the heart of human cognitive neuroscience. Lectures cover basic aspects of language processing in the healthy brain, ranging from early sensory perception to higher level semantic interpretation, as well as a range of neurological and development language disorders, including aphasias, dyslexia, and other speech and language impairment. Functional neuroimaging and electrophysiological techniques will be introduced. The goal of this course is to let students acquire basic knowledge of neurolinguistics, as well as familiarise the ideas of interdisciplinary research in the intersection of cognitive science and neuroscience.

Prerequisite: None.

This course satisfies: NS Elective (can count as an approved upper-level Psychology course); STS core.

**NEUR-SHU 302: Model &Simulation in Neuroscience (LEC)**

This course introduces students in neuroscience, and mathematics to the use of mathematical methods in modeling and computer simulation to investigate phenomena in neuroscience. The course material to be covered is models of electrophysiology of neurons and synapses, neural networks and examples, synaptic plasticity for memory and learning together with computer simulations. Mathematical tools in linear algebra and differential equations, and programming in Matlab is introduced as needed within the course.

Prerequisites: MATH-SHU 121 (Calculus), CCSC-SHU 100 (Mathematics for the Sciences) or MATH-SHU 160 (Network and Dynamics), or permission by the instructor. Familiarity with linear algebra, ordinary differential equation, and programming are recommended but not required.

This course satisfies: NS Elective; STS core.

**PHIL-SHU 40: Ethics (LEC)**

This course examines fundamental questions of moral philosophy: What are our most basic values, and which of them are specifically moral values? What are the ethical principles, if any, by which we should judge our actions, ourselves, and our lives?

Prerequisite: None.

This course satisfies HUMN Topics.

**PHIL-SHU 76: Epistemology (SEM)**

This course considers questions such as the following: Can I have knowledge of anything outside my own mind—for example, physical objects or other minds? Or is the skeptic's attack on my commonplace claims to know unanswerable? What is knowledge, and how does it differ from belief?

Prerequisite: None.

This course satisfies HUMN Topics.

**PHIL-SHU 80: Philosophy of Mind (LEC)**

Examination of the relationship between the mind and the brain, of the nature of the mental, and of personal identity. Can consciousness be reconciled with a scientific view of the world?

Prerequisite: None.

This course satisfies HUMN Topics.

**PHYS-SHU 11: General Physics I (LEC)**

This is an introductory physics course covering primarily mechanics and thermodynamics. The mechanics component will cover Motion along a Straight Line, Motion in Two and Three Dimensions, Newton’s laws of motion, Forces, Kinetic Energy and Work, Potential Energy and Conservation of Energy, Center of Mass and Linear Momentum. The thermodynamics component will cover Temperature, Heat, and the First Law of Thermodynamics, The Kinetic Theory of Gases, Entropy and the Second Law of Thermodynamics. In addition, some introduction to the foundations of physics such as vectors and measurement will be given. In addition to the course material, the students will do open-ended research projects that encourage creative applications of physics concepts.

Prerequisite: None.

**PHYS-SHU 91: Found of Physics I Honors (LEC)**

Measurement, Motion Along a Straight Line, Vectors, Motion in Two and Three Dimensions, Force and Motion, Kinetic Energy and Work, Potential Energy and Conservation of Energy, Center of Mass and Linear Momentum, Torque and Angular Momentum, Rotation and Rigid-Body Motion, Gravitation, Equilibrium, Stability, Elasticity, Oscillations and Harmonic Motion, Special Relativity.

Prerequisite: None.

**PSYC-SHU 101: Introduction to Psychology (LEC)**

This course highlights the fundamental principles and interesting experiments within the field of psychology, aiming to help students understand mind and behavior of themselves and others. It provides a comprehensive overview of scientific study of thought and behavior, covering a wide range of topics such as the biological and evolutionary bases of behavior, sensation and perception, learning, memory, intelligence and thinking, lifespan development, emotion and motivation, human personality, social behavior, behavioral disorders, and psychological treatment of disorders. Opportunities to apply knowledge gained in class are available through various in-class and out-of-class activities. By the end of this course you will have gained a much better understanding and appreciation of who you are and how you work.

Prerequisite: None.

This course satisfies: Social Science Foundation; ED core.

**PSYC-SHU 329: Parenting and Culture (LEC)**

Examination of parenting views and practice across socio-cultural groups, discussion of similarities and differences in parenting around the globe, how parenting changes over the life course of the child, and how parenting shapes children’s development.

Prerequisite: PSYC-SHU 101 (Introduction to Psychology).

This course satisfies: Social Science Focus; STS core.

**RELS-SHU 9270: Religion and Society in China (SEM)**

This course is a survey of the major historical and contemporary currents of China’s religious thought and practice, including Buddhism, Confucianism, Daoism and “popular religion”. It will focus on the interactions between such teachings and practices, as well as on the role of religion in Chinese society. You will study topics such as divination, visual culture, ritual, ancestor worship, morality, longevity techniques, healing practices and meditation. A selected number of primary and secondary sources will be discussed in each lecture; documentary films and visits to religious sites will be also key constituents of the course  
Prerequisite: None

**SOCS-SHU 150: Intro to Comparative Politics (LEC)**

How did the modern nation-state emerge? How can we explain variation in levels of development, democracy, internal conflict, and political systems across countries? This course provides an introduction to the field of comparative politics with a focus on core concepts, theoretical approaches, methods, and historical cases. We examine how people create institutions and governance structures, the role of national identities in state-building, and contemporary issues such as increases in intra-state violence, models of economic development, the spread of democracy, and domestic inequalities. Students gain the skills to collect and assess country-level data and explore contemporary global challenges and the ways in which international institutions, countries, and individuals address these challenges.

Prerequisite: None.

This course satisfies Social Science Foundation.

**SOCS-SHU 210: Stats for Behavioral & Social Sciences (LEC)**

Students gain familiarity with data description, variance and variability, significance tests, confidence bounds, and linear regression, among other topics. Students work on social science data sets, learn approaches to statistical prediction, and learn to interpret results from randomized experiments.

Prerequisite: None

This course satisfies Social Science Method.

**SOCS-SHU 241: Cultures of Business and Work (LEC)**

Anthropologists often study the unfamiliar cultural practices of marginalized people in faraway corners of the world. But what happens if we turn an analytical eye to powerful corporations, small businesses, and the workaday world of middle-income people as well? In this course we examine cultures of business – the norms, values, and unwritten rules of workplaces. We explore why factory floors in China are laid out how they are, why Japanese businessmen have to sing karaoke after work to get promoted, and why Silicon Valley success stories follow familiar narratives. In order to understand these diverse business settings, we examine major analytical approaches to business and work that focus on political economy, race, ethnicity, and gender. Throughout the class, we discuss what “corporate culture” and “office culture” mean, and consider the implications of this for anthropology’s longstanding investigation into “culture” more broadly. Through seminar discussions, current event presentations, and a final case study paper, students develop their own analytical perspectives on business and work.

Prerequisite: None.

This course satisfies Social Science Focus.

**SOCS-SHU 270: Social Change in Contemporary China (LEC)**

This course surveys post-1949 Chinese society, focusing on socioeconomic changes since 1978. It draws from scholarly work on China in sociology economics, and political science. It explores the basic institutional make-up of Chinese society, the structural changes brought forth in the economic reform era, and how these institutions configure social life in contemporary China. Attention is paid to both changes from and continuities with the pre-reform past. After taking this course, students will be equipped with background information necessary to understand China’s complex economic, political, and social phenomena, and the impact of reform on social structures/institutions, individuals’ life chances, and social relations in contemporary China.

Prerequisite: None.

This course satisfies: Social Science Core; GCS Elective; SSPC core.

**SOCS-SHU 272: US Constitution - Relevant to China? (LEC)**

This course covers some basic political concepts and legal doctrines lying at the foundation the United States’ Constitution, with the goal of assessing whether and to what extent these concepts and doctrines are relevant to China. The basic American concepts include the ideas of popular sovereignty and inalienable individual rights (in particular, freedom of speech), federalism, and separation of powers. The basic doctrines include judicial review to enforce the Constitution against “political” actors; Executive powers to act in the absence of, and interpret, legislation; Limits on the legislature’s power to enforce legislation; and the duty of subnational officials to extend the equal protection of the laws to all citizens, regardless of race or geographic origin. In addition to examining these ideas using American sources, we will also apply them to present-day controversies in China, examining whether these American ideas might improve governance by Chinese officials or inform the interpretation of the Chinese Constitution. Students will be divided into two teams, one team supporting and the other team opposing the use in Chinese law and politics of some version of an American constitutional concept or doctrine. The teams will hold oral arguments, and each team member will submit four briefs of roughly 1,250 words each, attacking or defending four American positions arguing their team's positions on topics ranging from the powers of the Supreme People’s Court to engage in judicial review to the powers of the Chinese executive to detain citizens without judicial process. Underlying both the discussion of American law and its application to Chinese controversies is a broader question: How is it possible for any law -- mere words on a piece of paper -- practically to control the actions of very powerful political actors like members of Congress, state legislatures, governors, Presidents, and judges?

Prerequisite: None.

This course satisfies: Social Science Focus; Humanities Topics; SSPC core.

**SOIM-SHU 65: Organizational Communication & Its Society (LEC)**

Students learn how organizations communicate with multiple types of audiences, focusing on the interconnections between business and society. The course uses the stakeholder model of the corporation to introduce the strategic implications of communication for modern organizations. Students focus on strategic and tactical aspects of corporate communication to study and practice the ways in which organizations communicate to their varied internal and external stakeholders. Assignments develop students? abilities in speaking and writing to these varied audiences, both to inform and to persuade. The course emphasizes bridging theoretical fundamentals, and action learning is stressed, which includes applying communication strategy to the following: oral and written business assignments; presentation delivery techniques; visual communication analysis and practice; team communication.

Pre-requisites: None, but priority to business majors; not open to freshmen.