**BIOLOGY**

**BIOL-SHU 22 *Foundations of Biology II.***

***Prerequisite: CCSC-110 or BIOL-21.*** This course satisfies:Biology Major: Requirement: Foundations of Science II (5+6)

**BIOL-SHU 261 *Genomics and Bioinformatics.*** 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: Biology Major Electives.

**BIOL-SHU 263 *Developmental Biology*.** Multicellular organisms undergo a series of complex temporal and spatial changes in gene expression following fertilization, which results in the highly organized, coordinated cell divisions needed for growth and development. This course introduces students to the principles and experimental strategies of developmental biology. It covers the cellular and molecular basis for patterning in the embryo; the determination of cell fate; cell differentiation; the genes controlling these events; how the genes are identified and studied; and the cellular proteins that effect shape, movement, and signaling among cells. *Prerequisite: BIOL-250, or Foundations of Science III Biology, or Foundations of Biology II.* This course satisfies: Biology Major Electives.

**BIOL-SHU 267 *Microbiology*.** Microbiology. Bacterial viruses. Assembly of macromolecular structures. Regulation of gene expression. Transduction. Phage that carry disease causing genes. Phage display. Animal viruses: HIV, influenza, polio. Bacteria. DNA replication. Cell walls. Division into Gram positive and negative. Control of gene expression. Turning on large sets of genes. Conjugation and transformation. Antibiotics and antibiotic resistance. Transposons. Immunology. Mechanisms of bacterial virulence. Major chemical cycles mediated by bacteria. Archaea and extreme environments. Protists and protozoa. The eukaryotic cell and single- celled organisms with sophisticated functions. Algae and algal products. *Prerequisites: none* Recommended: BIOL-SHU 21 and 22 – Foundations of Biology I and II, and BIOL-SHU 264 Genetics. This course satisfies: Biology Major Electives.

**BUSINESS AND FINANCE / BUSINESS AND MARKETING**

**BUSF-SHU 101 *Statistics for Business and Economics.*** 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 Business and Finance Major: Prerequisite Courses; Business and Marketing Major: Prerequisite Courses.

**BUSF-SHU 142 *Information Technology in Business & Society*.** Students in this course learn the essential tools used by today’s knowledge workers, including spreadsheet modeling and analysis and database querying. They learn to recognize the large-scale systems that run modern organizations, and how to evaluate IT investments in products, services, and systems. They learn about the economics of information pricing, technological lock-in, and network effects. And they discuss a set of special topics, which may include digital music, information privacy, data mining and digital piracy. This course satisfies Business and Finance Major: Business Core Classes**;** Business and Marketing Major:Business Core Classes.

**BUSF-SHU 200 *Topics in Business Social Media and Business*.** This course satisfies Business and Finance Major: Non-Finance Elective. Business and Marketing Major: Non-Marketing Major.

**BUSF-SHU 202 *Foundations of Finance.*** 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 and ECON-150*.This course satisfies Business and Finance Major: Business Core Classes

**BUSF-SHU 206 *Investing and Financing in and with China (formerly Doing Business in China).*** What does it take to be successful in China? How do domestic and foreign businesses do in the world's most dynamic economy? How do Chinese entrepreneurs work in a dynamic country? How do investors think about cross border investing into and out of China? How do investors think about cross border investing into and out of China? What are the leading opportunities in Chinese markets today? How are Chinese firms reshaping global business?

Course overview: This course is designed to prepare students for a good overview of investments, financing as well as conducting business in and with China. The class format will include lectures, case studies, discussions, guest speakers and student presentations to explore the opportunities and risks of international and domestic investments in China as well and the outward expansion of Chinese firms. The course will be require the student's active participation and parts will involve group work. Leading industry guest speakers and a site tour may be arranged for further learning enhancement, schedules permitting. The course materials will draw heavily on the lecturer's experiences.

Target students / audience: The target students are NYU Shanghai business & finance majors, economics majors and study abroad students from Stern. This course is suitable for any student interested in understanding international business, emerging markets, investments, cross border business and China. No prior knowledge or experience with China's business environment is required. *Prerequisites: Foundations of Finance, Corporate Finance and Economics of Global Business (or Macroeconomics).*This course satisfies Business and Finance Major: Additional Finance Elective;.Business and Marketing Major:Non-Marketing electives

**BUSF-SHU 210 *Business Analytics.*** This course introduces the basic principles and techniques of applied mathematical modeling for managerial decision making. You will learn to use some important analytic methods (e.g. forecasting, data mining, optimization, Monte Carlo simulation), to recognize their assumptions and limitations, and to employ them in decision making. The course is entirely hands-on. The emphasis will be on model formulation and interpretation of results, not on mathematical theory. The emphasis is on models that are widely used in diverse industries and functional areas, including finance, marketing, and operations. *Prerequisite: A prior Statistics Course.*This course satisfies Business and Finance Major: Business Core Courses; Business and Marketing Major:Business Core Courses.

**BUSF-SHU 211 *Design Thinking*.** Design thinking is a novel approach to problem-solving you can apply to any discipline. It gives you the superpower to rapidly develop concepts, products, services, strategies, and systems that are both innovative and responsive to actual user needs and desires. This course takes an up-close and personal look at the origins and spread of design thinking, helps you understand the strengths and weakness of the method, and shows you how to use it to solve anything creatively. At the heart of design thinking is collaboration. Get ready to learn from your friends, embrace the power of storytelling, and make things that matter. Prerequisite: None. This course satisfies Business and Finance Major:Non-Finance Elective. Business and Marketing Major:

**BUSF-SHU 220 *Topics in Business - 2 credit: Chinese and International Accounting*.** This course satisfies Business and Finance Major:Non-Finance Elective; Business and Marketing Major:Non-Marketing elective.

**BUSF-SHU 232 *Entrepreneurship Explored*.** This course investigates the conspicuous activities of entrepreneurship such as raising capital, running factories, organizing supply chains and working out how to take existing products to new markets alongside the more private and primary first move behind entrepreneurial activity: sensitivity to pleasures and pains that others might overlook. You will gain useful tools and strategies you may apply whether you want to start a startup, thrive in a large organization, and everything between. Most classes use cases, an effective way to gain accelerated experience by absorbing a large number of stories of new ventures in a short time. These cases are complemented by visits from guest entrepreneurs and economists, who will share their ideas about entrepreneurship and economic dynamism, as well as field trips to Shanghai startups, and a team design challenge. This course is not just for students who want to be entrepreneurs. Any student who is driven to create change should enroll. Prerequisite: None. This course satisfies Business and Finance Major:Non-Finance Elective;Business and Marketing Major:Non-Marketing elective.

**BUSF-SHU 250 *Principles of Financial Accounting.*** 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 Business and Finance Major: Additional Finance Electives.

**BUSF-SHU 288 Doing Business in China.** The course is designed to help the students to better understand business practices, environment, and cultures in China. Special focus will be placed on the understanding of the political, institutional, and financial contexts within which business activities unfold. The course will also discuss the implications of regional and global factors in shaping opportunities and constraints on businesses in China as well as the impact of Chinese business on international markets. Learning goals of the course are to: 1. Become knowledgeable in select concepts of the businesses in China; 2. Obtain essential knowledge on the evolution and development of business in China; 3. Develop an awareness of the political, socioeconomic, and cultural aspects of life in China, including critiques of common intercultural stereotypes around values and assumptions related to Chinese society and business practices; 4. Gain practical experience in interacting with diverse Chinese business communities. This course satisfies Business and Finance Major: China Business Studies Courses;Business and Marketing Major:China Business Studies Courses.

**BUSF-SHU 304 *Futures and Options.*** 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.* This course satisfies Business and Finance Major:Additional Finance Elective;Business and Marketing Major:Non-Marketing elective.

**BUSF-SHU 305 *Debt Instruments and Markets.*** 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.*This course satisfies Business and Finance Major:Additional Finance Elective;Business and Marketing Major:Non-Marketing elective.

**BUSF-SHU 321 *Equity Valuation*.** 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: Foundations of Finance AND Corporate Finance.This course satisfies Business and Finance Major:Additional Finance Elective

**BUSF-SHU 351 *Competitive Advantage from Operations.*** 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 and Finance Major:Non-Finance Elective;Business and Marketing Major:Business Core Courses.

**MGMT-SHU 21 *Managerial Skills*.** 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. Pre-req OR Co-req: Management & Organizations. This course satisfies Business and Finance Major: Non-Finance elective.

**MGMT-SHU 301 *Management and Organizations*.** 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 Major: Non-Finance elective; Business and Marketing Major:Non-Marketing elective.

**MKTG-SHU 1 *Introduction to Marketing.*** 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 Business and Finance Major: Business Core Courses; Business and Marketing Major: One Required Marketing Core Course.

**MKTG-SHU 2 *Consumer Behavior*.** 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. This course satisfies Business and Finance Major: Non-Finance Elective; Business and Marketing Major: Non-Marketing Elective.

**MKTG-SHU 9 *Research for Customer Insights*.** This course provides students with both research and managerial perspectives in the development and application of marketing research tools and procedures. It describes the development of research designs from problem formulation to analysis and submission of the research report. It also covers the analysis of techniques in marketing research, such as focus groups, experimental design, surveys, sampling, statistical analysis, and reporting. Cases are utilized in the development of methods and in specific areas of application. This course satisfies Business and Finance Major: Non-Finance Elective; Business and Marketing Major: Non-Marketing Elective.

**SOIM-SHU 6 *Law, Business & Society.*** This course challenges undergraduate students to think deeply about legal systems and the continual evolution of business practice and business law. This process is multidimensional and involves social, political, ethical, and technological factors. In the course, students examine how key areas of business law influence the structure of societal and business relationships, while honing their analytical, communication, and writing skills. While focusing on the American legal tradition, the course taught in Shanghai Spring 2016 will involve select points of comparison with legal and business practice in China. Stephen Harder is the managing partner of the China practice of the international law firm Clifford Chance. He is based in Shanghai where his practice focuses on cross border project transactions of Chinese institutions. When based previously in Europe and New York, he acted as counsel for the Russian and Polish privatization programs and the Polish sovereign debt restructuring. He has written on "China's Sovereign Wealth Fund: The Need for Caution" in the International Financial Law Review, and spoken recently at Harvard and Columbia on "China Ventures Forth - Advising China on Foreign Investments" and "China in the Balance: Needed Reforms, Vested Interests and the Choices Facing China's New Leaders". He has also written on "Political Finance in the Liberal Republic" in the Annals of the American Academy of Political and Social Sciences. He received his undergraduate degree in Chinese Studies from Princeton and his MBA and JD degrees from Columbia. Open to all Seniors, Juniors, with preference to Stern program students. Interested sophomores need to request permission from the instructor.

SOIM-SHU 65 *Organizational Communication and Its Social Context.* 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. This course satisfies Business and Finance Major: Non-Finance Elective; Business and Marketing Major: Non-Marketing Elective.

**SOIM-SHU 165 *Advanced Organizational Communication*.** Advanced Organizational Communication builds upon the oral and written communication skills developed in its prerequisite course, Organizational Communication & its Social Context. This advanced course provides opportunities for students to continue developing their communication skills in a variety of contexts while working and presenting to multiple audiences. In this course, students will have the opportunity to persuade real life stakeholders to take action; such activities include making a stock pitch to a financial expert, speaking to a large audience of peers / professors at an NYUSH Student-run Speaker Series, and developing a social impact plan for an actual corporate client. Presentations will vary in size and delivery method (virtual, in-person, board-room style, auditorium style, etc.). In some cases, you will work to adapt the same presentation into multiple formats. Additionally, we will incorporate role-plays, impromptus, team communication (running meetings, supportive communication, consensus building), and group discussions throughout the course. Two writing assignments will reflect content from the oral presentations in typical business document format. The course will be highly participative, real world, and interactive. The professor will do everything he can to engage real-life audience members and facilitate practical, experiential learning. Participation, taking risks, and working beyond one’s comfort zone are essentials for success in this class. Prerequisite: Organizational Communication & its Social Context. This course satisfies Business and Finance Major: Non-Finance Elective; Business and Marketing Major: Non-Marketing Elective.

**CHEMISTRY**

**CHEM-SHU 125 *Foundations of Chemistry I.*** 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, liquids, solids, and solutions; periodicity of the properties of elements; chemical bonding; intermolecular forces; equilibrium; kinetics, thermodynamics; acid-base reactions; electrochemistry, coordination chemistry, and nuclear chemistry. *Prerequisite or Corequisite: MATH-121 or MATH-201.* This course satisfies Chemistry, Biology, Neural Science, Physics, Major: Foundations of Science I

**CHEM-SHU 225 (formerly 201) *Organic Chemistry I.*** 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 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. The course incorporates modern analytical methods that are the cornerstone of contemporary organic chemistry. *Prerequisite: CCSC-SHU 109 or CHEM-SHU 126.* This course satisfies Chemistry Major: Additional Required Courses.

**COMPUTER ENGINEERING**

**CENG-SHU 201 *Digital Logic.***  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.

**CENG-SHU 350 *Embedded Systems.*** This course presents an overview of Embedded Systems covering a selection of topics including Microcontroller Architecture, Assembler Programming, Interrupts, Peripheral Interfacing, Embedded System Design, Higher-Level Languages on Embedded Systems, as well as a brief introduction to Real-Time Operating Systems. Practical Lab Exercises complement the lectures. The students will further specialize and consolidate their knowledge through semester-long hands-on projects.  *Prerequisite: CSCI-SHU 11 or CSCI-SHU 101 AND CENG-202 or CENG-SHU 201..* This course satisfies: Major: CE Required, EE Additional Electives.

*Prerequisite: Senior Standing.*

**COMPUTER SCIENCE**

**CSCI-SHU 11 *Introduction to Computer Programming.***  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 *Introduction to Computer Science.*** 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; Major: NS Electives, CS Required, Data Science Required, CE Required, EE Required.

**CSCI-SHU 210 *Data Structures.*** Use and design of data structures, which organize information in computer memory. Stacks, queues, linked lists, binary trees: how to implement them in a high-level language, how to analyze their effect on algorithm efficiency, and how to modify them. Programming assignments. *Prerequisite: Intro to Computer Science or Instructor's consent. Equivalency: This course counts for CSCI-UA 102 Data Structures (NY).* This course satisfies: Core Curriculum: Programming and Computational Thinking; Major: CS Required, Data Science Required, CE Required.

**CSCI-SHU 215 *Operating Systems.*** 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: Major: CS Required, Data Science Concentration in Computer Science, CE Required.

**CSCI-SHU 222 *Introduction to Game Programming.***  A programming intensive introduction to the creation of computer games. Using mostly two-dimensional sprite-based programming, we examine and experiment with animation, physics, artificial intelligence and audio. In addition, the course explores the mathematics of transformations (both 2D and 3D) and the ways they may be represented. *Prerequisite: Data Structures OR CS-UY 2134 (Data Structures and Algorithms) OR ICS with Instructor Permission.* This course satisfies: Major: CS Electives.

**CSCI-SHU 235 *Information Visualization*.** 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: Major: CS Electives, Data Science Data Analysis Required.

Students are expected to spend about two to three hours a week per credit (a 4-credit IS would involve about ten to twelve hours a week) on their project.

**CSCI-SHU 2314 *Discrete Mathematics.*** 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: Major: Honors MATH Mathematics Electives, MATH Mathematics Electives, CS Required, Data Science Concentration in CS, CE Required.

**CORE CURRICULUM**

**CCSC-SHU 130 *Introduction to computer programming with Mathematica.*** (2 credit) 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, and a wide range of other fields. It is designed for symbolic as well as numerical calculations, and for visualization of technical information.

The course will include the following topics: A brief introduction to computer science, Mathematica as a sophisticated symbolic and numeric calculator, programming in Mathematica and the concepts behind the language. Procedural, functional and rule based programming, parallel computing using multiple cores, dynamic interfaces (animation), image, audio and video processing. Students will solve interesting problems taken from various fields, including algebra, calculus, statistics, optimization, data analysis, science, engineering, economics and finance, and will complete a project which they will choose from within their own areas of interest. *Pre-requisite: Calculus or Honor Calculus.*

**CCSC-SHU 155 *Biology and Biotechnology: Essential, Commercial Aspects, Ethical Considerations*.** (2 credit) The course presents the essential elements of biology and biotechnology in order to enable non-scientists to have a basic understanding and an ability to read non-technical material. The techniques of genetic engineering and antibody production and the use of stem cells for medical pursuits will be covered in a manner amenable to all educated persons. Included in the biology part are both evolution and simple genetics with examples mostly from humans. Topics such as cancer and the ebola virus are currently of great interest. Students with a wide range of backgrounds should benefit. *Prerequisite: None.*

**Social Foundations**

**CCSF-SHU 101L *Global Perspectives on Society*.** 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 for CCSF-101: none.* This course satisfies: Core Curriculum: Social Foundations.

**CREATIVE WRITING**

**WRIT-SHU 159 *Creative Writing.*** This workshop course offers a broad introduction to the art of capturing the world around you in your own original fiction and poetry. Through close readings of classic and contemporary examples, intensive in-class workshops, and vigorous revision, students will learn to make their stories and poems live on the page through attention to plot, character, dialogue, language, heartbreaking images and the mystery of the perfect line break. The course is designed for both those certain of their creative writing ambitions and those looking for a unique challenge that will strengthen their command of language in any genre: anyone can learn to tell the truth by making it up. Equivalency: This course counts for CRWRI-UA 815 Creative Writing: Introduction to Fiction and Poetry *Prerequisite: None.*

**WRIT-SHU 200 *Topics in Creative Writing: Write → Translate → Publish.***  In this two-credit creative writing workshop, students will not only write their own short works -- poems, flash fiction, quick one-acts, prose poems, parables and allegories, and other forms of "microliterature" -- but they will also collaborate across languages to translate their work and that of others from English and into Chinese and vice-versa (other languages may come into play: creative work in any student’s native or preferred language is admissible). The creative work of writing and translating will be accompanied by short readings in translation theory, by exploring cutting-edge trends in innovative writing both in China and elsewhere, and by reading exemplary works in translation (often side-by-side comparative translations). We will complete the semester's work by curating, designing and producing a bilingual English-Chinese volume of collected work produced by workshop participants. This last phase may involve both print and digital production, depending on how students in collaboration with guest lecturers and the course instructor decide to curate and present the best of the semester's creative writing and translation work.

创作、翻译及出版本创意写作课两学分。学生不仅会自创简篇短致----诗、微小说、速写剧、散文诗、寓言故事和其他“微文体”----还会协同进行中英文（也可能包括其他语言）创作的翻译互换。伴随写作和翻译, 我们还会介绍简短的翻译理论，探察中外创意写作的前沿趋势，并阅读模范的翻译作品。学期末，我们会将课程参与者的作品收纳、设计、制作成册，中英双语对照（当然也可能包括学生的其他母语或偏好使用的其他语言)。学期的最后阶段可能会用到印刷和数码制作。这要看学生在与主讲和客座教授的合作中如何决定策划并展示一学期来最佳的创意和翻译作品。

**ECONOMICS**

**ECON-SHU 1 *Principles to Macroeconomics*.** 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 stock and bond markets; and the role of government policy. This course satisfies: Major: ECON Prereq; Social Science Foundational.

**ECON-SHU 2 and ECON 150 *Principles of Microeconomics*.** Focuses on individual economic decision-makers—households, business firms, and government agencies—and how they are linked together. The emphasis is on decision making by households and firms and how these decisions shape our economic life. Explores the different environments in which businesses sell their products, hire workers, and raise funds to expand their operations; the economic effects of trade between nations; and the effects of various government policies, such as minimum-wage legislation, rent controls, antitrust laws, and more. *Prerequisite: MATH-SHU 121 or 201.* This course satisfies: Major: BUSF Prereq, BUSM Prereq, ECON Prereq, Social Science Foundational.

**ECON-SHU 10 *Intermediate Microeconomics*.** 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.  *Prerequisites: Principles of Microeconomics or Microeconomics for Business or for students who entered NYU-SH pre Fall 2015 Microeconomics and either Calculus or Mathematics for Economics.* This course satisfies: Major: ECON Required.

**ECON-SHU 260 *International Trade*.** 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: Introductory Microeconomics.* This course satisfies: Major: ECON Electives.

**ECON-SHU 342 *Behavioral Economics*.** This course explores the effects of psychological factors on economic behavior. We will analyze the observations from the real world that cannot be well explained by classical economic models, and enrich the standard model by incorporating psychological phenomena, such as bounded rationality, loss aversion, time inconsistency and social preferences. We will present both theoretical models and empirical evidence from experiments or real world data. Applications include marketing, asset pricing, game theory, consumption and savings, and public policy. Prerequisites: Intermediate Microeconomics. This course satisfies: Major: ECON Electives.

**GLOBAL CHINA STUDIES**

**GCHN-SHU 164 *The Stuff of Legends: The Many Meanings of the Early Silk Road(s)***. 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. *Prerequisites: None.* This course satisfies: Core Curriculum: SSPC; Major: GCS Chinese Geographies, HUMN Survey.

**GCHN-SHU 243 *Chinese Environmental Studies***. How and why has the understanding of humans’ relationship to nature changed in China, and how effectively has the Chinese state responded to environmental challenges at the local, national and global levels? Examines changing approaches to resource exploitation and sustainable development taking into account the impact of different political frameworks. *Prerequisite: None.* This course satisfies: Core Curriculum: SSPC; Major:GCS Electives, Social Science Focus.

**GCHN-SHU 342 *The Political Economy of East Asia***. 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: ECON-150 and SOCS-160.* This course satisfies: Major: GCS Elective, Social Science Focus, Business non-finance/marketing elective or China Business Studies.

**RELS-SHU 9270 *Religion and Society in China: Ghosts, Gods, Buddhas and Ancestors.*** 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. This course satisfies: Core Curriculum: SSPC or CA; Major: GCS Electives, HUMN Topic.

**JOUR-SHU 9202 *Methods and Practice: Journalism.*** 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.* This course satisfies: Core Curriculum: SSPC.

**LWSO-SHU 9251 *Topics in Law & Society: Law, Culture, & Politics in China*.** This course will study China’s governance in the context of America’s own governance system. We will consider how to compare American and Chinese governance systems, and whether and how concepts can be translated between them—so that the countries, and their citizens can learn from, and cooperate with, one another. In the process, we hope to learn about China, but also to reflect—in the light of 9/11 and Iraq-- more deeply on our own understanding of how American governance works—and how it is seen by the world. This course satisfies: Core Curriculum: SSPC; Major: GCS Electives; Social Science Focus.

**HUMANITIES**

**HUMN-SHU 225 *Topics in Asia-Pacific History Asia-Pasic History in the 20th Century*.** This course uses the geographic framework of the “Pacific Rim” to understand the historic connections between Asia and North America during the long 20th century. Traditionally, Asian history and U.S./ North American history have been treated as distinct areas of studies. While there is good reason for distinguishing these fields from one another, there are equally good reasons for looking at the intersection of them. Most importantly, history does not unfold within neat geographic boundaries. People, commerce, ideas, culture have all crisscrossed these geographic borders. To fully understand transnational history, then, we historians must also be willing to abandon tradition. This course examines the emerging historiography on the linkages between Asia and North America. We will pay particular attention to the movement of labor and capital, and to a lesser extent the exchange of ideas and culture. This emphasis on labor and capital reflects my own bias as a historian, and I welcome debate on how we think about the historical forces creating transpacific connections. The secondary themes are changes in identity and citizenship, reconfiguration of family, and the rise of transnational social networks, which are the result of labor and capital circulations. *Prerequisites: None.* This course satisfies: Core Curriculum: SSPC; Major: GCS Required, HUMN Topic.

**HUMN-SHU 229 *Masters of Asian Cinema.*** This course introduces students to the basic concepts and methods in film studies by focusing on a select number of eminent auteurs in Asian cinemas. Our objectives are many: first, we situate within their particular socio-historical contexts the masterworks by master-directors like Akira Kurosawa, Yasujiro Ozu, Zhang Yimou, John Woo, Wong Kar-wai, Hou Hsiao-Hsien, Sanjay Leela Bhansali, Mani Ratnam, and Deepa Mehta. In doing so, we learn the divergent developments between and within Japanese, Chinese, and South Asian film industries. We then analyze how these directors make various stylistic choices to address issues of kinship, nation, gender, historical memory, modernity, and globalization. Against the background of 20th century cross-cultural encounters, we also study the contributions of these auteurs to world cinemas and the cross-fertilization in style between these film masters. This course satisfies: Core Curriculum: CA; Major: GCS Electives, HUMN Survey.

**HUMN-SHU 230-001 *Topics in the Humanities: European Modernities and the Global Avant-Garde****.* Was there a unified global movement in the twentieth century we can properly call ‘modernist’? While modernism has often been considered a primarily European movement with global repercussions, this course seeks to explore constellations of modernisms in European, Latin American, Asian, and African aesthetic and cultural movements of the early twentieth century. From American Orientalist poetry to Bauhaus architecture in Shanghai, the course reads a broad range of artistic, literary, architectural,  scientific and cultural artifacts alongside contemporaneous theories of modernity, cosmopolitanism, internationalism and the avant-garde. Central concerns include debates on the artistic relationship between form and function; the experience of the modern city; representations of consciousness, perception, and time; and considerations of the artist’s role in society. Authors read include Achebe, Borges, Joyce, Kawabata, Lu Xun, Neruda, Pound, Proust, Tagore, Woolf, Yeats, and others. This course satisfies: Major: HUMN Topic.

**HUMN-SHU 240 *Gender, Sexuality, and Culture.*** This course invites students to think about some of the most carefully controlled but also fervently sought-after questions since the time of Plato: what is the difference between gender and sex? What is the relationship between our gendered bodies, behaviors, and identities? How does sex, something we do, translate to the discourse of sexuality, something we talk about? What is the measurement of normality? If art indeed imitates and even changes life, in what ways do images of gender performance in literary and visualculture also reproduce and perhaps reshape our own experiences as gendered and sexed beings in a society? What can gender and sexuality tell us about the construction of culture, its boundaries, and its “outlaws”? Through the reading of philosophical, literary, historical, medical, and visual texts, and through discussions of case studies in mass media, we learn to see gender and sexuality as an evolving historical phenomenon rather than essentialist notions. We ask how the development of human interest in sexuality coincides with the burgeoning of governing techniques in modern times to police and promote sex simultaneously—as desirable and useful on the one hand, but also forbidden and harmful on the other. Lastly, as humanists, we ask how the boundary of our body (that is, our inside and outside in the most literal sense) is marked less by our blood cells, skin pores, or molecules than by our use of language. *Prerequisite: None.* This course satisfies: Major: HUMN Critical Concept Core Course.

**HUMN-SHU 366 (formerly 266) *Shanghai Stories.*** This course provides an introduction to the history and culture of Shanghai through the eyes of fiction writers. We will read short stories (in English translation) by Chinese, British, American, Japanese, French, Polish, and South African writers who lived in the city between 1910 and 2010. Their stories will take us on an imaginary city tour through time and space: from businessmen, politicians, and prostitutes gathering in the nightclubs of the old Bund, to Jewish refugees struggling to find a home in the poor shikumen neighborhoods of Hongkou, to teachers and students fighting political battles at the university campuses during the Cultural Revolution, and young urban youth pursuing cosmopolitan lifestyles in the global city of today. The course also includes trips to various places featured in the stories and guest lectures by some of Shanghai’s most famous writers today. *Prerequisite: None.* This course satisfies: Core Curriculum: SSPC or CA; Major: GCS Electives, HUMN Topic.

**HIST-SHU 208 *War and Peace: Europe Since 1900*.** This course will provide a broad introduction to the political, social and cultural history of Europe since 1900. The location of the most violent conflict in human history during the first half of the twentieth century, Europe’s postwar development was based on a principle of peace through prosperity and the political ideal of an ‘ever closer union’. In recent years, however, the combined economic and migrant crises have put this postwar consensus to a test. Taking the continent’s delicate union as its central concern, the seminar will familiarize students with key themes, methods and problems in Modern European History. Structured chronologically, individual sessions will examine European modernity and fin-de-siècle culture; empires and colonialism; the causes, experiences and effects of the First and Second World Wars; the Holocaust; Europe’s role in the Global Cold War; the crisis-ridden 1970s; and the crucial question of whether a distinctive European identity has developed over time. This course satisfies: Major: HUMN Topic.

**HIST-SHU 250 *China at the Center? An Exploration of Chinese Foreign Relations.*** China at the Center? An Exploration of Chinese Foreign Relations from Pre-imperial to Late Imperial Times The main title of this course is an allusion to a book authored by Mark Mancall in 1984. However, there are some crucial differences between his approach to Chinese foreign relations and the subject of this course. Mancall has claimed – as have so many scholars before and after him – that Chinese interactions with the outside world were dictated by an ideology that saw China’s culture as superior to the surrounding ‘barbarians.’ This concept is now widely known as the so-called ‘tributary system.’ We are going to explore whether such assertions indeed have any merit. One little hint: things might not have been as easy as they appear at first glance. Over the course of the semester we will be tracing Chinese foreign relations from roughly the 6th century BCE (was there even a ‘China’ that could set itself apart from the ‘other’?) through the 19th century CE, that is to say the period when the Qing dynasty (1644-1911) was forced to interact with western powers such as the British Empire. Even today when there seems to be an abundance of media coverage, the meanings of bilateral or multilateral exchanges take quite some effort to deduce; too many details remain hidden from the public eye. The (ancient) past, of course, is even less generous with data. Nevertheless, there is plenty of information to be had; we just have to look for it. Thus, participants in this course will have the opportunity to immerse themselves in various kinds of sources: historiographical records, material culture, or personal diaries to name but a few. In doing so, our main objective will be that we develop a critical, analytical attitude toward said sources that will ultimately lead us to a more nuanced understanding of Chinese dealings with the outside world. This course satisfies: Core Curriculum: SSPC; Major: GCS Electives, HUMN Topic.

**HIST-SHU 302 *History of Water.*** 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. *Prerequisite: None.* This course satisfies: Core Curriculum: STS; Major: HUMN Topic.

**HIST-SHU 329 *Futures of the Twentieth Century*.** The present is only one possible outcome of the many ways in which it has been imagined in the past. While historians usually do not aim to predict the future, they have become increasingly interested in how societies and cultures projected their development in the past. While such scenarios are often fascinating in themselves, they are of particular historical interest as gauges and indicators of how societies understood themselves and evaluated their then present conditions. Largely chronologically organized, this course explores the future’s multifaceted history in twentieth-century Europe and the United States, from the emergence of ‘scientifiction' in the 1920s to the ‘end of utopia’ during the crisis-ridden 1970s. Particular attention will be paid to ‘enhancements’ of the human body, futuristic technologies (flying cars, time machines, computers) and human habitats (the classless city of tomorrow, underwater settlements, space colonies). This course satisfies: Major: HUMN Topic.

**LIT-SHU 225 *Global Shakespeare*.** The substantive goal of Global Shakespeare will be to assess the influence—by way of translation, performance and criticism as an index to more general forms of cultural adaptation and appropriation—of “Shakespeare” as a global phenomenon. The scare quotes are meant to designate the Bard and his works, in the first instance as the product of the English Renaissance, but beyond that as a fund of “cultural capital” with its own global investment that continues to pay dividends after four centuries. More than any other “western” literary figure, Shakespeare has served as the metric by which subsequent ages have calibrated their own relationship to the dominant (artistic and national) culture he has come to represent. Thus we have the Shakespeare translation by Schlegel and Tieck, a classic of German romanticism; the Japanese Shakespeare of Kurosawa’s Throne of Blood (the film that repositions Macbeth somewhere between feudal- and post-Hiroshima Japan, with stylistic elements drawn from Noh drama); the post-colonial Une Tempete of the contemporary Afro-Caribbean writer Aimé Césaire; and a hip-hop Romeo and Juliet directed by Tian Qinxin. This last raises one question we will want to address, insofar the director claims that even though everything else has changed, not least the language, the spirit of Shakespeare has been preserved. What is this “spirit” that seems both to guarantee that whatever changes are wrought, some essential core remains that allows the director to claim that it’s still Shakespeare? This disembodied spirit- “Shakespeare” seem capable of moving effortlessly through time and space, coming to rest in ever-new habitations but always under the same name. One way to think about the director’s claim is to ask what the word (translated as “spirit”) actually means to her in Chinese. This question focuses in turn on the pedagogical goal of the course. In addition to tackling the plays on the syllabus in English, the students will be asked to read the plays, alongside the English text, in whatever other language they possess—“Shakespeare” speaks Chinese, obviously, but also French, Spanish, Dutch, and even Hindi and Hungarian, among the many languages into which the plays have been translated. This side-by-side reading should go a long way toward alleviating the anxiety that ESL readers bring to Shakespeare, while at the same time offering a valuable tool for analysis at the micro-level. What are the nuances of “to be or not to be” when it becomes “Sein oder Nichtsein” (the verbs transformed into nouns)? Attention to small details may well lead to a wider perception of cultural difference. Students might be asked, as their research project, to investigate the significance of “Shakespeare” in their own country (on the model, but hardly to extent, of Alexander Huang’s Chinese Shakespeares). Foregrounding and at the same time alleviating the problem of language is one way of making for a more user-friendly Shakespeare. Another is to include international productions of the plays on film. A good resource for this is to be found at HTTP://GLOBALSHAKESPEARES.MIT.EDU. Furthermore, in order to allow for a careful reading of the plays, the list will be limited (as I see it now) to: Romeo and Juliet, Macbeth, Hamlet, Lear, and The Tempest. This course satisfies: Major: HUMN Topic.

**LIT-SHU 245 *Literature and Science in the Renaissance*.** The course—which might otherwise be called science and the imagination, or the imagination of science—has a center and a periphery. At its core, the “scientific revolution,” extends roughly from the 1540’s (the decade of Copernicus’s De revolutionibus orbium coelestium) to the 1680’s (the decade of Newton’s Principia). This is the narrative that describes the movement of what Donne calls, with much trepidation, the “new philosophy, the shift from the Ptolemaic view of a geocentric world to our modern understanding of the solar system. A central document in that history and on our list is Galileo’s Starry Messenger of 1610. But the same period also witnesses advances in mathematics (including the invention of perspective), physiology and anatomy (including the influential work of Vesalius), urban planning (the rationalized “ideal city”) and much more—all underpinned by a neo-skeptical turn in philosophy revealing deeper shifts in the concept of knowledge and of the empirical methods by which it is to be produced. Thus the works in the history of science by Kuhn, Shapin, and Popkin. Taking in this broader view, we will be interested in Bacon’s The New Atlantis, which we will read both as a document in the history of the scientific method and, like the Utopia of Thomas More (which Bacon has at hand as he writes), and as a new kind of utopian fiction—“science fiction”—that we will follow into the works of Neville, Godwin, Wilkins, Cavendish, and Shakespeare. We will read Machiavelli’s The Prince as an inaugural document in what has come to be called political science, and a document entailing a revisionary account of history, fortune, and human agency. We will begin and end with Donne, including along with his “Songs and Sonnets” a careful reading of the “First Anniversary,” an “Anatomy of the World” which expands its meditation on the death of its nominal subject (the deceased 14-year-old daughter of a would-be patron) to consider the death of the world order as it was known, and the advent of a new world with “all coherence gone.” Referencing the following books: Thomas More, Utopia (Norton Critical ed., edited R.M Adams) Niccolò Machiavelli, The Prince (Norton Critical ed., edited R.M. Adams) Three Early Modern Utopias: Thomas More: Utopia / Francis Bacon: New Atlantis / Henry Neville: The Isle of Pines (Oxford World's Classics, ed. Susan Bruce Francis Godwin, The Man in the Moone (Broadview, ed. Poole) Shakespeare The Tempest (Norton Critical ed.) Paper Bodies: A Margaret Cavendish Reader (Broadview, ed. Bowerabank and Mendelson Thomas S.Kuhn, The Copernican Revolution (Harvard) Steven Shapin, The Scientific Revolution (Chicago) Richard Popkin, The History of Skepticism: From Erasmus to Spinoza (California) John Donne, Complete English Poems (Penguin, ed. Smith) Galileo, Dialogue Concerning the two Chief World Systems (Modern Library paperback) John Wilkins, Discovery of a World in the Moon. This course satisfies: Core Curriculum: STS; Major: HUMN Topic.

**PHIL-SHU 70 (formerly HUMN-** **SHU 204) *Logic.*** This is an introductory course in formal logic. No prior knowledge of logic, mathematics or philosophy will be assumed. We will study a number of logical systems, and learn some methods for producing derivations and determining validity in these systems. We will also learn how to translate sentences and arguments from ordinary language into these systems, and examine some applications of logic to traditional philosophical problems. *Prerequisite: None.* This course satisfies: Major: HUMN Survey.

**PHIL-SHU 130 *Philosophy of Technology: Thinking Machines.*** This course aims to train students to think philosophically about our rapidly changing—and ever more intimate—relationship with machines. We focus in particular on the following subjects: artificial intelligence, robots, cyborgs, automation and science fiction speculation. *Prerequisite: Students must have completed one full year of study.* This course satisfies: Core Curriculum: STS; Major: HUMN Critical Concept Core Course or Digital Approaches Core Course or Topic, IMA Seminars.

**INTERACTIVE MEDIA ARTS**

**INTM-SHU 101 *Interaction Lab.*** 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. Required Course. *Prerequisite: None.* This course satisfies: Core Curriculum: Programming and Computational Thinking; Major: IMA Required.

**INTM-SHU 120 *Communications Lab.*** 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.. Required Course. *Prerequisite: None.*This course satisfies: Major: IMA Required.

**INTM-SHU 165 *Talking Fabrics.*** 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. *Prerequisite: INTM- 101* This course satisfies: Major: IMA Experimental Interfaces & Physical Computing Electives.

**INTM-SHU 209 *This is the Remix***. Now, more than ever, technology allows us to reshape existing content in order to create new messages and expressions. What does it mean to utilize "found media" in order to create new work -- and how can we use the process to comment on the status quo of our current cultural and social landscapes? This class explores remix, recontextualization, and reappropriation as artistic tools. We will examine current and past usage of the remix, from its well-known place in popular music to broader forms like YouTube mashups, cut-ups and text generators, Internet memes, culture jamming, and parody. Students will have the opportunity to experiment with both traditional and programmatic methods of remix, such as audio and video editing, by exploring Web APIs (YouTube, SoundCloud, and Echo Nest), and through the application of generative coding techniques. The class will also cover common legal issues surrounding remix culture, such as fair use, debate over current copyright laws, and the Creative Commons community and licensing system. All of these ideas will be further investigated through weekly reading assignments, class discussion and presentations, and the development of original remix projects utilizing the themes and techniques discussed in class. *Prerequisite: Communications Lab.* This course satisfies: Major: IMA New Media & Entertainment Electives.

**INTM-SHU 222 *Introduction to Robotics.*** 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 teamwork, the objective of this course is to share in the excitement of robotics by enabling students to make their own creations. *Prerequisite OR Corequisite: Interaction Lab.* This course satisfies: Major: IMA Experimental Interfaces & Physical Computing Electives.

**INTM-SHU 225 *Media and Participation.*** Making words and images public used to be difficult, complex, and expensive. Now it's not. That change, simple but fundamental, is transforming the media landscape. A publisher used to be required if you wanted to put material out into the public sphere; now anyone with a keyboard or a camera can circulate their material globally. New, cheap forms of communication have opened the floodgates to a massive increase in the number and variety of participants creating and circulating media. This change, enormous and permanent, is driving several effects in the media landscape today. This course covers the transition from a world populated by professional media makers and a silent public to one where anyone who has a phone or a computer can be both producer and consumer. This change, brought about by the technological and economic characteristics of digital data and networks, is upending old industries -- newspapers, music publishing, moviemaking -- faster than new systems can be put in place. The result is chaos and experimentation as new ways of participating in the previously sparse media landscape are appearing everywhere. This course will provide a brief history and economics of the previous media landscape, the design of digital networks that upend those historical systems, and new modes of participation for sharing words, images, audio and video. We will look at the dynamics of both English-language services, such as Twitter, Facebook and Instagram, and, in translation, Chinese-language services such as Sina Weibo, Weixin and QQ. The class will consist of class discussion around readings and lectures, in-class presentations and analysis of new uses of media that you observe (or participate in) outside class. There will be two written analyses of the media landscape, one at mid-term and one final paper. *Prerequisite: None.* This course satisfies: Core Curriculum: SSPC or CA; Major: GCS Required, HUMN Digital Approaches Core Course, IMA Seminars, Social Science Focus.

**INTM-SHU 230-003 *Topics in Computation & Data: The Code of Music*.** This course explores music through the lens of computation and interaction design. The first half of the course will include a structured exploration of rhythm, melody, harmony, and timbre. Each week, students will examine elements through listening modules, programmatic manipulation through code, the creation of visualizations, as well as the implementation of interface design. The second half of the course will examine algorithmic composition techniques, including markov chains, formal grammar, and cellular automata. Students will develop final projects which may include physical devices, digital applications, and spatial installations. Course examples will be written in Javascript, using libraries such Tone.js and P5.js, but students will be free to use other languages and frameworks. *Prerequisite: Interaction Lab or Communications Lab.* This course satisfies: Major: IMA Computation & Data Electives.

**INTM-SHU 235 *Topics in Art & Design - 2pt Digital Fabrication*.**

*Prerequisite: none*. This course satisfies: Major: IMA Art & Design Electives.

**INTM\_SHU 236 *Topics in Art & Design 4pt Interactive Installation*.** 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. *Prerequisite: Interaction Lab.* This course satisfies: Major: IMA Art & Design Electives.

**INTM-SHU 245 *Topics in Experimental Interfaces & Physical Computing - 2pt Animatronics.*** Animatronics is a multi-disciplinary field which integrates anatomy, mechatronics and puppetry resulting in the lifelike animation of physical objects. In this course we will explore what factors bring electronic devices to emulate humans and animals. Using open source software we will first develop characters. By tapping into common prototyping techniques, we will then create advanced movements in mechanisms that will look and perform as if they are alive. We will also learn how to create sequences of actions, as well as how to control them remotely. Each student is expected by the end of the course to be able to develop their own animatronic being, and to make it behave in a lifelike way.This course satisfies: Major: IMA Experimental Interfaces & Physical Computing Electives.

**INTM-SHU 246-001 *Topics in Experimental Interfaces & Physical Computing - 4pt Digital Farm*** Students in this class will research how plant rearing technology is currently used in both large and small scale farming, and how we could apply these techniques to empower small scale and urban growers. Commodity crop farming is a billion dollar industry with big players selling black box systems incorporated into their farming machinery. It seems bizarre to consider that major farming companies like John Deere and Caterpillar likely spend as much time on digital rights management as a mid level software company. Rather than take on a market of that scale we will be focusing on how we can design systems and interfaces for our LAF (Local Area Farm) which incorporates plants situated around NYU Shanghai in areas we have designated as good for supporting plant life. Areas of exploration include: hydroponics, watering, and monitoring vs soil, development of devices for urban farming, calculating solar exposure and artificial light control, as well as germinating seeds vs seedlings.

*Prerequisite: None.* This course satisfies: Major: IMA Experimental Interfaces & Physical Computing Electives.

***INTM-SHU 246-003 Topics in Experimental Interfaces & Physical Computing - Kinetic Interfaces.*** Students in this course will use computer vision and motion tracking tools and techniques to create kinetic interfaces that exploit the body’s capacity for movement to control software and hardware systems. The applicability of kinetic interfaces to practical as well as creative applications will be investigated as students are challenged to design their own solutions. Webcams, the Leap Motion Controller and the Microsoft Kinect will all be considered as input devices. Students will be introduced to the topics of pixel manipulation, as well as face, hand, blob and skeletal tracking. And Projection mapping, a technique that turns surfaces within an environment into dynamic display surfaces, will be explored as an output method.

*Prerequisite: Interaction Lab.* This course satisfies: Major: IMA Experimental Interfaces & Physical Computing Electives.

**INTM-SHU 252 *The Minimum Viable Product*.** 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. This course satisfies: Major: IMA Seminars.

**INTM-SHU 255 *Topics in Business of Interactive Media The Consumer Class*.** This course satisfies: Major: IMA Business of Interactive Media Electives.

**INTM-SHU 270 *Generating and Expressing Data*.** Human beings are producing, consuming and sharing data at any given moment. However, what kinds of data are meaningful to us? How do we capture and collect that data? What are the best ways to present it? What stories do we want to tell with data? This course will explore these questions and more. Students will learn basic techniques for data collection and filtering. Student projects can be digitial, physical, visual, musical, or (with approval) take any form imagined. *Prerequisite: INTM-101.* This course satisfies: Major: IMA Computation & Data Electives.

**INTM-SHU 280 *Topics in New Media & Entertainment Exploring Location Through Emerging Media Video Games.*** This course focuses on video game design and development using Blender, a multi-purpose 3D computer graphics tool, and Unity, a popular 3D game engine. Students will learn the basics of 3D modeling, animation, shaders and materials, as well as the asset pipeline for Blender in the first ­7 weeks. Students will apply these skills to create a 3D animation project for the midterm. The second half of the class focuses on scripting and game development using Unity. Students will produce an interactive 3D game for their final projects. Class time will be split between discussions of video games and related media (including game history, mainstream and indie games, art games, and other interactive projects), presentation and critique of student work, as well as demonstrations of Blender and Unity. *Prerequisite: Interaction Lab or Communications Lab.* This course satisfies: Major: IMA New Media & Entertainment Electives.

**INTM-SHU 285 *Seminar Topics Science Fiction Cinema*.** This course is based on an analysis of Science Fiction films (and related readings). Each term the course will explore a particular theme (e.g. time & technology; memory & identity etc.). In Fall 2016 we will focus on the emergence of technological intelligence and the possibility of machinic consciousness. *Prerequisite: none.* This course satisfies: Major: IMA Seminars.

**MATHEMATICS/HONORS MATHEMATICS**

**MATH-SHU 9** ***Precalculus.*** 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 NYUSH mathematics placement exam.* This course satisfies: Core Curriculum: Mathematics.

**MATH-SHU 10** ***Quantitative Reasoning: 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: Core Curriculum: Mathematics.

**MATH-SHU 121 (formerly 110) *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- 9.*

**MATH-SHU 123 (formerly 151) *Multivariable Calculus.*** 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-121.*

**MATH-SHU 141 (formerly 206) *Honors Linear Algebra I (formerly Advanced Linear Algebra I)*.** This is the first semester of a 2-semester sequence in linear algebra for advanced mathematics majors. Topics covered include fields, vector spaces, linear independence, dimension, linear transformations, rank, matrices, eigenvalues, eigenvectors, determinants, characteristic polynomials, and the Cayley-Hamilton theorem. Examples from applications are also covered, including interpolation problems, traffic flows, genetics, the fundamental theorem of algebra, electric circuits, static mechanics, and consumption matrices in economics. *Prerequisite: Placement on NYU SH mathematics placement exam.* This course satisfies: Major: Honors MATH Required Mathematics.

**MATH-SHU 201 *Honors Calculus (formerly Calculus Emphasizing Proofs)*.** 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: Placement via NYU SH Mathematics Placement Examination.*

**MATH-SHU 235 (formerly 150) *Probability and Statistics.*** 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- 121 and 140. Not open to students who have taken MATH- 233.*

**MATH-SHU 241 *Number Theory*.** This course builds on the ideas of abstract algebra, but also employs analytic techniques. Topics include valuations, Dedekind domains, Minkowski’s theorem, ramification, the Riemann-Roch theorem and Riemann-Hurwitz formula, connections to Riemann surfaces and algebraic curves, reciprocity, zeta functions, and the prime number theorem. *Prerequisite: Grade of C or better in MATH-SHU 349.* This course satisfies: Major: Honors MATH Electives, MATH Mathematics Electives.

**MATH-SHU 250 *Mathematics of Finance*.** Introduction to the mathematics of finance. Topics: linear programming with application to pricing. Interest rates and present value. Basic probability, random walks, central limit theorem, Brownian motion, log-normal model of stock prices. Black-Scholes theory of options. Dynamic programming with application to portfolio optimization. Prerequisites: MATH-SHU 123 or 233 or 235. This course satisfies: Major: Honors MATH Electives, MATH Mathematics Electives, BUSF Additional Finance Electives.

**MATH-SHU 252 *Numerical Analysis.*** In numerical analysis, one explores how mathematical problems can be analyzed and solved with a computer. This has very broad applications in mathematics, physics, engineering, finance, and the life sciences. This course gives an introduction to numerical analysis for mathematics majors. Theory and practical examples using Matlab will be combined to study a range of topics, from simple root-finding procedures to differential equations and the finite element method. *Prerequisite: Grade of C or better in MATH-123 and 140 or MATH-141 and 329.* This course satisfies: Major: Honors MATH Electives, MATH Mathematics Electives.

**MATH-SHU 265 *Linear Algebra and Differential Equation*.** This course satisfies: Major: Data Science Math Required, EE Required, CHEM Additional Required, PHYS Additional Required.

**MATH-SHU 329 (formerly 203) *Honors Analysis II*.** 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-328.* This course satisfies: Major: Honors MATH Required, MATH Constrained Math Electives.

**MATH-SHU 362 *Honors Ordinary Differential Equations.***

**NEURAL SCIENCE**

**NEUR-SHU 201 *Introduction to Neural Science.*** An introductory lecture course covering the fundamental principles of neuroscience. Topics will 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 cerebral cortex; modeling of neural systems. *Prerequisite: CCSC-110****.*** This course satisfies: Major: BIOL Electives, NS Additional Required.

**NEUR-SHU 265 *Neural Bases of Speech and Language.*** 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: Core Curriculum: STS; Major: NS Electives

**NEUR-SHU 302 *Modeling & Simulations in Neuroscience*.** 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: Calculus, Mathematics for the Sciences or 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: Major: NS Electives.

**PHYSICS**

**PHYS-SHU 91 *Foundations of Physics I Honors*.** 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, Oscillations and Harmonic Motion, Lagrangian and Hamiltonian formulation of mechanics, Temperature, Heat, the First Law of Thermodynamics, Kinetic Theory of Gases, Entropy, the Second Law of Thermodynamics, Electric Force and Field, Electric Flux and Gauss’s Law, Electric Fields in Matter, Maxwell’s Equations for Electrostatics. This course satisfies: Core Curriculum: ED; Major: Science Majors Foundations of Science I, Honors MATH Science Requirement, MATH Science Requirement, CE Prereq, EE Prereq.

**PHYS-SHU 95 *Foundations of Physics III.***

*Prerequisites: CCSC-108 or PHYS-93.* This course satisfies: Major: PHYS Foundations of Science III.

subject and a formal written report on the research in publication form), which is defended in front of a committee of three faculty (which includes the faculty sponsor), chosen by the student in consultation with the faculty mentor. (The defense may be a brief oral presentation followed by a question-and-answer session.) The Thesis and defense must be evaluated by the committee, with the cover page of the thesis signed by all committee members, with a copy of the Thesis submitted to the Dean of Arts & Sciences. (It is recommended that the student meet with the faculty committee at least once mid-semester to evaluate and guide the student's progress on the thesis work.)

**SOCIAL SCIENCE**

**SOCS-SHU 135 *Environment and Society***. Topics examined include environmental history and concepts of nature and the environment; the rise of environmentalism; environmental skepticism; anthropogenic global change; population and consumption, ecological footprint analysis, and other environmental indicators; environmental justice; public goods and collective action problems; regulatory regimes; environmental politics; environmental values; environmental movements, protest, and disobedience; and the future of environmentalism.

*Prerequisite: None.* This course satisfies: Core Curriculum: SSPC; Major: Social Science Foundation.

**SOCS-SHU 160 *Introduction to International Politics.*** What are the causes of war? Why are some countries able to cooperate over issues like trade or the environment, while others are not? What is the role of international organizations and alliances, such as the UN, NATO, and the EU in the international state system? This course will give students an introduction to thinking analytically and systematically about outcomes in the international system, will teach them the prevailing major theories about these issues, and will equip students to begin to formulate their own answers to these questions. Students will learn a set of formal tools to analyze complex world events, which will prepare them for upper level international relations and other social science courses, as well as to become comfortable applying social science methodologies and theories to better understanding the world around us. The class will use some basic math, including introductory game theory, and some background in inferring statistical results will be helpful, but is not required. Over the course of the semester students will be challenged to apply the models and theories from class to real world situations. *Prerequisite: None.* This course satisfies: Core Curriculum: SSPC; Major: Social Science Foundation.

**SOCS-SHU 210 *Statistics for the Behavioral and Social Sciences***. 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: Major: Social Science Methods.

**SOCS-SHU 229 *Capitalism, Socialism, Communism: Theory and Practice*.** The ideological clash between capitalist and communist regimes shaped much of the politics of the 20th century, and continues to frame the discourse of world politics with the rise of communist China as a global power. In this course, we study the varieties of capitalism, socialism, and communism envisioned by theorists and put into practice by nations. We examine the economic and political aspects of these regime types in their imagined and existing forms to develop a taxonomy with which to classify and evaluate contemporary regimes. Course case studies include the U.S., Sweden, and China, and students complete a case study of another regime as a final project. *Prerequisite: CCSF-SHU 101 Global Perspectives on Society.* This course satisfies: Core Curriculum: SSPC; Major: Social Science Focus.

**SOCS-SHU 234 *Image as Evidence*.** Images surround us; we think through images, they shape our words and our worlds. Images entertain us, define us, haunt us. For all these reasons, images present a persistent problem for the social sciences––namely how to tame the force of images to provide evidence about the various worlds in which we as humans live, and in doing so, to push our methods and analyses beyond solely discursive modes of working and thinking. Through key readings and films, Image as Evidence explores the ways social scientists and others have wrestled with the image as a form of evidence in order to make otherwise hidden and invisible phenomena visible, to grasp nature, the senses, cognition, human suffering, and the movement of time. The course explores how images can be manipulated, meanings twisted, and truth (despite much aversion to the word) unmade. The effort of scholars to constantly renew their relationships to images challenges us to “look” differently, and in looking, helps us to consider our ethical and critical relation to the world. This course satisfies: Major: Social Science New Challenges in Social Science Core.

**SOCS-SHU 245 *Ethnographic Thinking*.** While ethnography––literally “to write” (grapho) “people” (ethnos)––has become synonymous with anthropology, it signifies a range research methodologies widely used within the social sciences. The course considers discussions and debates about ethnographic research, ethics, and representation within the social sciences and beyond. The readings survey ethnographic theory and practice through a number of conceptual and methodological domains, including the problems they raise. Course topics are: objectivity, critiques of representation, participant-observation, cultural relativism, ethno-history, archives, conflict, interpretation and discourse analysis, verifiability, and life histories. This course satisfies: Major: Classic Problems in Social Science Core.

**SOCS-SHU 272 *The U.S. Constitution: Is It relevant to China?*** 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: Core Curriculum: SSPC; Major: HUMN Topic, Social Science Focus.

**PSYC-SHU 101** ***Introduction to Psychology.*** 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: Core Curriculum: ED; Major: Social Science Foundational.

**PSYC-SHU 329** ***Parenting and Culture.*** This course is designed to expose upper-level students to the complexities of parenting across the lifespan and across cultures, with special emphasis on the bi-directional and systemic nature of the parent-child relationship. It covers the fundamental issues and special topics in parent child relationships, including 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. The course also touches on differences between mothering and fathering.*Prerequisite: PSYC-SHU 101 Introduction to Psychology.* This course satisfies: Major: Social Science Focus.