17.205 Health Policy

Prereq.: —
U (Spring)
3-0-9 HASS

Analyzes the health policy problems facing America including adequate access to care, the control of health care costs, and the encouragement of medical advances. Considers market and regulatory alternatives as well as possible foreign models including Canadian, Swedish, Japanese, British, and German arrangements. Emphasis on historical development, interest group behavior, and organizational influences in setting and implementing policy.
H. M. Sapolsky

17.207 Race and Science

Prereq.: —
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Examines comparatively the historical and contemporary role of science in constructing knowledge about human differences in terms of race. Particular attention is paid to the social and political context of scientific inquiry and to its political consequences for public policy. Considers the role of science in constructing national identities. Topics include: various national immigration policies, international eugenics movement, Nazi science, I.Q. and educational testing.
M. Nobles

17.208 Comparative Social Policy: Challenges to the Welfare State
(New)

Prereq.: —
G (Fall)
3-0-9

Examines current challenges to welfare states in Europe and the US, including global economic pressures and their employment effects, gender, and demographic changes. Examines responses of European nations and the US to these problems, including the extent of marketization or privatization of welfare state provision and financing. Considers whether domestic political and institutional factors produce different responses to such challenges. Health care and welfare are among the social policy areas covered.
S. Giaimo

17.209 Race and the American Legal System

Prereq.: Previous law-related subject or permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Considers the treatment of race from slavery to the present, relying on legal materials such as case law, legislation, and legislative history. Explores how the legal system has accommodated racial difference and racism, and examines remedies such as affirmative action.
M. Burnham

17.210 Issues in Technology Policy in the Post-Cold War Era

Prereq.: —
G (Spring)
3-0-9

An overview of the broadening scope of technology policy, in the areas of health, environment, and industrial performance. Reviews the arguments for/against expansion of the scope of technology policies, particularly in areas designed to affect industrial performance.
Staff

17.211 American Public Policy for Washington Interns
(Revised Units)

Prereq.: —
U (Fall, Spring)
2-0-4 HASS
Can be repeated for credit

Examines US policymaking process, with special attention to making of policy for science and technology. Spring term attends to origins and development of American policymaking institutions and their roles in settling controversial policy questions. Fall term focuses on development of representative policies in the US, such as pollution controls, biotechnical engineering, and telecommunications. Must take two terms for credit.
C. Stewart

American Politics

17.241 Introduction to the American Political Process

Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 4

Studies American national government with reference to recent political history, emphasizing the representation of competing interests and principles in specific policy struggles. Topics include: the Founding, constitutional interpretation, legislative processes, Presidential power, public opinion and voting, group mobilization, political steering of the bureaucracy and the economy.
D. T. Kryder, S. Ansolabehere

17.245 The Supreme Court and Constitutional Law

Prereq.: —
U (Fall)
3-0-9 HASS

Considers constitutional rights, processes, concepts of limited government, civil rights and liberties, criminal procedure. Focus on Supreme Court caselaw.
M. A. Burnham

17.251 Congress and the American Political System

Prereq.: 17.241, 17.201J, 17.301, 17.319, 17.252, 17.273, or permission of instructor
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

17.252 Congress and the American Political System

Prereq.: Permission of instructor
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Focuses on both the internal processes of the House and Senate and on the place of Congress in the American political system. Attention to committee behavior, leadership patterns, and informal organization. Considers relations between Congress and other branches of government, as well as relations between the two houses of Congress itself. Graduate students are expected to pursue the subject in greater depth through reading and individual research.
C. Stewart

17.253 American Political Economy

(Subject meets with 17.254)
Prereq.: 17.241
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

17.254 American Political Economy

(Subject meets with 17.253)
Prereq.: 17.241
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Analysis of contemporary and historical issues in US political economy, with special emphasis on public finance and economic regulation. Selected topics in trade and tax policy, agricultural, transport, labor, and environmental regulations, and local public finance treated in some detail. Focuses primarily on the neoclassical/rational-choice approach; strengths and weaknesses of this approach are discussed. Where necessary, devotes time to developing tools used in rigorous microeconomic analysis. Graduate students are expected to pursue the subject in greater depth through reading and individual research.
J. M. Snyder, Jr.

17.258 Politics of Race and Ethnicity in America

(Subject meets with 17.259)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

17.259 Politics of Race and Ethnicity in America

(Subject meets with 17.258)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

How have racial and ethnic solidarity and conflict affected the development of the American polity since the eighteenth century? Special attention paid to parties and elections, economic change, repression and violence, and social movements. Uses comparative perspective when appropriate. Graduate students expected to pursue the subject in greater depth through reading and individual research.
D. T. Kryder

17.260 Graduate Seminar in American Politics

Prereq.: 17.241
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Analyzes the American political system, with primary emphasis on the national level. Examines American political culture, federalism, American party system, representation and public policy, and major institutional components of the national policy process. Focuses on core works in contemporary American politics and public policy. Critiques both research methodologies and the explicit and implicit theoretical assumptions of such work.
D. T. Kryder, J. M. Snyder, Jr.

17.261 Congress and the Policy Process

(Subject meets with 17.262)
Prereq.: 17.251
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

17.262 Congress and the Policy Process

(Subject meets with 17.261)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Analyzes the development of the United States Congress by focusing on the competing theoretical lenses through which legislatures have been studies. Particularly compares sociological and economic models of legislative behavior, applying those models to floor decisionmaking, committee behavior, political parties, relations with other branches of the Federal government, and elections. Graduate students expected to pursue the subject in greater depth through reading and individual research.
C. Stewart

17.264 Dynamics of Electoral Politics

Prereq.: 17.241 or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Analyzes mass voting behavior in the US, past and present. Evaluates leading theories of American electoral politics in light of inferences from data analysis. Some comparative analysis of electoral dynamics and theories of electoral politics in other Western political systems. Attention to American voting behavior since 1960.
S. Ansolabehere

17.267 The President

(Subject meets with 17.268)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

17.268 The President

(Subject meets with 17.267)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9

Examines the US President as constitutional executive; sharer of governing authority with Congress and the Courts; party leader; chief manager of executive agencies; foreign policy leader; and focus for national political, economic, and social aspirations. Graduate students are expected to pursue the subject in greater depth through reading and individual research.
D. T. Kryder

17.269 Presidential Elections

Prereq.: —
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Examines the dynamics of presidential elections: events preceding the primaries, the conduct of the general election itself, and the policy consequences of the electoral process. The class conducts a survey of votes. Topics include the players (candidates, voters, parties, consultants, the Electoral College), campaign resources (money, information, media attention), the major campaign events (primaries, conventions, general elections), and prospects for reform.
S. Ansolabehere

17.275 Social Movements in Comparative Perspective
(New)

Prereq.: —
U (Spring)
3-0-9 HASS

Why do people join mass political organizations and social movements? What accounts for the ultimate success or failure of these organizations? How have social movements altered political parties and institutions? Critically considers a range of theoretical treatments and a variety of national cases. Graduate students are expected to pursue the subject in greater depth through reading and individual research.
M. Nobles

Science, Technology, and Policy

17.301J Science, Technology, and American Government

(Same subject as STS.082J)
Prereq.: —
U (Fall)
3-0-9 HASS

Examines the development of policy toward science and technology in the US from the early days of the Republic to the present time, with emphasis on major issues posed by the advance of technology. Attention is given to the policy and budgetary processes of the government today, selected issues such as competitiveness and risk assessment, and policy prospects for science and technology in the university and in industry.
E. B. Skolnikoff

17.302J Science, Technology, and Public Policy

(Same subject as STS.524J)
Prereq.: Permission of instructor
G (Fall)
3-0-9 H-LEVEL Grad Credit

Examines the historical development of science and government in the US, and the policy process in the Executive Branch and the Congress that determines Federal policy for science and technology. Current issues in science policy are explored and a number of controversial technology-rich issues are analyzed, such as economic competitiveness, risk management, and climate change.
E. B. Skolnikoff

17.319 Environmental Politics and Policy

Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 4

Examines the collision of politics, economics, values, and science in making and carrying out environmental policy at national, state, and local levels. Case studies of environmental policymaking explore the roles of governmental institutions, business, interest groups, the public, and the media in areas of air and water pollution, hazardous waste disposal, public lands management, and wildlife protection.
S. M. Meyer

17.328J Science and Technology in International Affairs

(Same subject as STS.525J)
Prereq.: 17.302J or permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Examines the generic relationship between science and technology and central aspects of international affairs, including economic structure, security relationships, and global dangers. Explores process of interaction, the nature of changes in the international political system, and implications for national and international government. Undergraduates may be admitted with permission of the instructor.
E. B. Skolnikoff

International Relations/Arms Control and Defense Studies

International Relations and Foreign Policy

17.403 American Foreign Policy: Past, Present, and Future

Prereq.: —
U (Fall)
3-0-9 HASS-D, Category 4

Subject's mission is to explain and evaluate America's past and present foreign policies. What accounts for America's past wars and interventions? What were the consequences of American policies? Overall, were these consequences positive or negative for the US? For the world? Using today's 20/20 hindsight, can we now identify policies that would have produced better results? History covered includes World Wars I and II, the Korean and Indochina wars, and the Cuban Missile Crisis. Recent and contemporary crises and issues also covered.
S. Van Evera

17.405 Seminar on Middle East Politics

(Subject meets with 17.406)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-6 HASS

17.406 Seminar on Middle East Politics

(Subject meets with 17.405)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Focuses on evolution of contemporary politics and economics. Divided into four parts: 1) historical background, 2) domestic and regional politics of the Arab East, Iran and the Gulf, the Maghreb, and Israel; 3) energy: the world oil and energy picture; 4) Middle East and world politics: geostrategic shifts, Arab-Israeli conflicts and peace process, the Iran-Iraq war, the Gulf War, and their interaction with energy issues. Graduate students are expected to pursue the subject in greater depth through reading and individual research.
N. Choucri

17.410 Political Economy of Global Change

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9

Tracing the evolution of international environmental issues in political and economic terms, this subject explores types of human determinants and consequences of global change, the ranges and types of uncertainties, and the potential attendant implication for policy. Of concern are linkages among individuals, nation-states, transnational organizations and firms, international systems, and global environments. Special focus is placed on comparative public policy for environmental management, on challenges of sustainable development, and on evolving modes and models of international and institutional responses to global change.
N. Choucri

17.412 Evolution of International Environmental Law: Implications for Technology

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9

Graduate-level subject designed as directed research in the general area of international relations, focusing on issues related to: international institutions, international political economy, internal-external linkages, environmental management, and critical potential trade-offs and their management (such as trade-environment, security-stability, among others). Students engage in either a research initiative or project of their choosing, or on an issue or problem jointly selected with the instructor.
N. Choucri

17.420 Theories of International Relations

Prereq.: Permission of instructor
G (Fall)
3-0-9 H-LEVEL Grad Credit

Critical analysis of contending theories of international relations. Focus is on alternative historical forms, theoretical assumptions, analytical structure, and basic core. Comparative analysis of realism(s), liberalism(s), European, nonwestern, and new emergent theories. Discussion of connections between theories of international relations and major changes in international relations. Open to undergraduates by permission of instructor.
N. Choucri

17.422 Contending Paradigms of International Political Economy

Prereq.: Permission of instructor
G (Spring)
3-0-6 H-LEVEL Grad Credit

Interdisciplinary analysis of ways in which nations undertake dual international objectives: pursuit of power and pursuit of wealth. Surveys major competing paradigms of international political economy, including neoclassical economics, development and ecological economics, lateral pressure, dependency and interdependence perspectives, and structural views of power relations. Examines political and economic dimensions of international trade, capital flows, foreign investment, intellectual property rights, international migration, and select issues in foreign economic policy. Examines the evolution of international economic institutions and attendant political implications. Open to undergraduates by permission of instructor.
N. Choucri

17.423 Causes and Prevention of War

Prereq.: —
U (Spring)
4-0-8 HASS

Examines the causes of war, with a focus on practical measures to prevent and control war. Topics covered include: causes and consequences of national misperception; military strategy and policy as cause of war; US foreign policy as a cause of war and peace; and the likelihood and possible nature of another world war. Historical cases are examined, including World War I, World War II, Korea, and Indochina.
S. Van Evera

17.424 International Political Economy of Advanced Industrial Societies

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit

Seminar provides an overview of international political economy with specific reference to the advanced industrial societies. Integrates international and comparative perspectives and fuses microeconomic and institutionalist approaches. Compares and contrasts the role of states in regulating intergroup conflicts over domestic markets with the role of regimes in regulating interstate conflicts over international markets. Examines the rise and decline of economic powers, industrial policy and trade relations, financial and monetary politics, and economic integration.
K. Oye

17.428 American Foreign Policy: Theory and Method

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit

Examines the causes and consequences of American foreign policy since 1898. Readings cover theories of American foreign policy, historiography of American foreign policy, central historical episodes including the two World Wars and the Cold War, case study methodology, and historical investigative methods. Open to undergraduates by permission of instructor.
S. Van Evera

17.430 Research Seminar in International Relations

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit

While this seminar provides an overview of recent literature, its principal purpose is to help graduate students develop skills suited to production of research papers and/or dissertations. Begins by reviewing general theoretical and methodological issues, then turns to specific empirical studies that examine the effects of systems structure, national attributes, bargaining processes, institutions, ideas, and norms on security affairs and political economy. The last two sessions of the seminar are devoted to evaluating research proposals generated by all members of the class.
K. Oye

17.432 Causes of War: Theory and Method

Prereq.: —
G (Fall)
3-0-9

Examines the causes of war. Major theories of war are examined; case-study and large-n methods of testing theories of war are discussed; and the case-study method is applied to several historical cases. Cases covered include World Wars I and II. Open to undergraduates only by permission of instructor.
S. Van Evera

Defense and Arms Control Studies

17.460 Defense Politics

Prereq.: —
G (Fall)
3-0-9 H-LEVEL Grad Credit

Examines the politics affecting US defense policies before, during, and after the Cold War. Includes consideration of intra- and inter-service rivalries, civil-military relations, contractor influences, congressional oversight, and peace movements in historical and contemporary perspectives.
H. M. Sapolsky

17.462 Innovation in Military Organizations

Prereq.: —
G (Spring)
3-0-9

Explores the origins, rate, and impact of innovations in military organizations, doctrine, and weapons. Emphasis on organization theory approaches. Comparisons with non-military and non-US experience included.
B. Posen, H. M. Sapolsky

17.468 Foundations of Security Studies

Prereq.: —
G (Fall)
3-0-9 H-LEVEL Grad Credit

Aims to develop a working knowledge of the theories and conceptual frameworks that form the intellectual basis of security studies as an academic discipline. Particular emphasis on balance of power theory, organization theory, civil-military relations, and the relationship between war and politics. The reading list includes Jervis, Schelling, Waltz, Blainey, von Clausewitz, Brodie, Allison, Steinbruner, and Huntington. Students write a seminar paper in which theoretical insights are systematically applied to a current security issue.
B. Posen

17.471 American National Security Policy

Prereq.: —
U (Fall)
3-0-9 HASS

Introduces the student to the problems and issues confronting American national security and the process by which American national security policy is formulated. The nature of the international system (post-World War II), the theoretical requirements for deterrence and defense, and alternative strategies for implementing American national security policy are discussed. The roles of the President, National Security Council, Department of Defense and armed services, the Congress, and public opinion in formulating national security policy are examined.
S. M. Meyer

17.476J Analysis of Strategic Nuclear Forces

(Same subject as STS.516J)
Prereq.: —
G (Fall)
3-0-9 H-LEVEL Grad Credit

Introduces the assessment of strategic nuclear forces. Emphasizes the development of force requirements and methods for analyzing alternative force postures in terms of missions, effectiveness, and cost. The history of the US-Soviet strategic competition provides the backdrop against which the evolution of nuclear strategy and forces is considered.
T. Postol

17.477J Technology and Policy of Weapons Systems

(Same subject as STS.076J)
Prereq.: —
U (Spring)
3-0-9 HASS

See description under subject STS.076J.
T. Postol

17.482J US General Purpose Forces

(Subject meets with 17.483J, STS.071J, STS.532J)
Prereq.: —
G (Spring)
2-0-7 H-LEVEL Grad Credit

17.483J US General Purpose Forces

(Subject meets with 17.482J, STS.071J, STS.532J)
Prereq.: —
U (Spring)
3-0-9 HASS

Examines the evolving roles and missions of US General Purpose Forces within the context of modern technological capabilities and Grand Strategy, which is a conceptual system of interconnected political and military means and ends. Topics include US Grand Strategies; the organization of the US military; the defense budget; and the capabilities and limitations of naval, air, and ground forces. Also examines the utility of these forces for power projection and the problems of escalation. Analyzes military history and simple models of warfare to explore how variations in technology and battlefield conditions can drastically alter effectiveness of conventional forces.
B. Posen, T. Postol

17.484 Comparative Grand Strategy and Military Doctrine

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

A comparative study of the grand strategies and military doctrines of the great powers in Europe (Britain, France, Germany, and Russia) from the late nineteenth to the mid-twentieth century. Examines strategic developments in the years preceding and during World Wars I and II. What factors have exerted the greatest influence on national strategies? How may the quality of a grand strategy be judged? Exploration of comparative case study methodology also plays a central role. What consequences seem to follow from grand strategies of different types? Open to undergraduates with permission of instructor.
B. Posen

See also 17.301J, 17.302J, 17.328J, 17.403, 17.405, 17.406, 17.420, 17.428.

Comparative Politics/ Political Development/ Communist Studies

Theories and Research Methods

17.501 Introduction to Comparative Politics: Paths of Development
(New)

Prereq.: —
U (Fall)
3-0-9 HASS

Investigates the historical origins of major political and economic differences among countries of the world. Questions addressed include: Why did democracy emerge first, and establish itself most firmly, in Western Europe and North America? Why did communism arise in Russia and China? Why did the Soviet empire break down? What is so unique about Japan? Why have certain Latin American and East Asian countries been so successful in achieving economic development? Why have African countries experienced so many coups? Why are so many countries in Asia, Eastern Europe, Latin America, and Africa currently undergoing transitions to democracy?
F. Schaffer

17.510 Language and Politics

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9

Explores language as a medium of both political action and inquiry. General discussion of the nature of language, language change, and the relations of language to culture. Examines the ways that literacy and orality affect politics, and how speaking itself is often a form of political action. Investigates how language is used as an instrument of both domination and liberation, and to both conceal and reveal. Examines current debates on the structure of concepts and discusses the implications of this debate for political research.
F. Schaffer

17.512 Political Culture and Democracy
(Revised Content)

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9

Explores the strengths and weaknesses of political culture theory by examining critically its contributions to the study of democracy. Six interrelated questions are asked: Are there cultural preconditions for the establishment and consolidation of democracy? If so, which elements are most important? How broadly must these elements be distributed among various groups and strata of society? Where do democratic norms come from? How important is culture relative to other factors? What are the most important critiques of cultural explanations?
F. Schaffer

17.514 Philosophy of Science and the Methodology of Comparative Politics
(New)

Prereq.: Graduate work in comparative politics or permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Offers tools to analyze the philosophical and methodological issues encountered in designing and conducting dissertation projects in comparative politics. Topics include: nature of the scientific endeavor; differences between natural and social sciences; explanation vs understanding as approaches to human behavior; function of categories in comparative politics; evolutionary arguments; functionalist arguments; rational-choice arguments; arguments from small-N comparisons. A number of empirically-based studies by practicing social scientists employing various methodological and philosophical approaches are considered.
D. Woodruff

17.515 Democracy in Comparative Perspective

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Raises questions about what actually counts as a democracy and what it means to call a regime democratic by examining the functioning of (arguably) democratic political systems in a variety of contemporary and historical contexts. Case studies drawn from Ancient Athens, Africa, the Middle East, the Soviet Union, Europe, and the United States. Theoretical insight provided by thinkers such as Thucydides, Rousseau, Marx, Mill, Schumpeter, Dahl, and Mansbridge.
F. Schaffer

17.516 Retribution and Reparations
(New)

Prereq.: —
G (Spring)
3-0-9

Emerging democracies are now confronted with what has been termed "the torturer problem." The questions are old ones: what is to be done about the abuser(s) and what is to be done for the abused? Seminar broadly examines the comparative, historical and philosophical dimensions of the related topics of retribution, reparation, and reconciliation.
M. Nobles

17.522 Comparative Politics of Race and Ethnicity

Prereq.: —
Acad Year 1996-97: G (Fall)
Acad Year 1997-98: **Not offered**
3-0-9

Examines the related phenomena known as "race," "ethnicity," and "racial/ethnic" politics. Particular attention is paid to determining, by way of competing theories and various national cases, what makes politics distinctively "racial and/or ethnic." Examines first how theorists approach race and ethnicity; then analyzes the consequences of racial/ethnic identification for modern governance and economic development. Topics include: ethnic/racial competition and conflict, electoral party systems, and race/ethnic target public policies.
M. Nobles

17.523 Ethnicity and Race in World Politics

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Ethnic and racial conflict appear to be the hallmark of the new world order. What accounts for the rise of ethnic/racial and nationalist sentiments and movements? What is the basis of ethnic and racial identity? What are the political claims and goals of such movements and is conflict inevitable? Introduces students to dominant theoretical approaches to race, ethnicity, and nationalism, and considers them in light of current events in Africa, Europe, and the Americas.
M. Nobles

17.524 Nationalism

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9

Explores the related phenomena termed nationalism: national consciousness and identity, nations, nation-states, and nationalist ideologies. Analyzes nationalism's emergence and endurance as a factor in modern politics and society. Topics include: nationalism and the state, class structure, communism, democracy, and violence.
M. Nobles

17.526 Dissertation Workshop in European Studies

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 [P/D/F]

Subject is designed for Ph.D. students embarking on dissertation research in the field of European politics. Aimed particularly at those in their third or fourth years. Only students who have passed their General Examinations are admitted. Subject focuses on issues associated with designing and undertaking a substantive piece of research. Begins by examining a number of examples of successful research with a view to examining how they were designed, what research problems they confronted, and how these were surmounted. In this context, articles on specific methodological issues are read. In the second half, participants' research proposals are discussed with an eye to both their substantive and methodological dimensions.
S. Berger

17.528 Domestic Politics of Trade and Integration

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Analyzes the impact of trade and financial flows and regional integration on the domestic politics of advanced industrial states. Pressures for harmonization and convergence of domestic institutions and practices and the sources of national resistance to these are examined. Cases include European Union and West European states, US and Japan.
S. Berger

See also 17.156J.

Advanced Industrial Societies

17.530J Politics and Enterprise in Europe

(Same subject as 15.231J)
Prereq.: 15.219 or 15.220 or permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-6 H-LEVEL Grad Credit

See description under subject 15.231J.
J. N. Ziegler

17.532 Japan and the New World Order

Prereq.: Permission of instructor
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Explores Japan's role in world orders, past, present, and future, focuses on Japanese conceptions of security, rearmament debates, the relationship of domestic politics to foreign policy, the impact of Japanese technological and economic transformation at home and abroad, alternative trade and security regimes, relations with Asian neighbors, Russia, and the alliance with the United States. Seminar culminates in a two-day Japanese-centered crisis simulation, based upon scenarios developed by students.
R. J. Samuels

17.534 Domestic Politics of Western Europe

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-6 H-LEVEL Grad Credit

Compares politics and society in France, Great Britain, Germany, and Italy. Analyzes "cases" of the integration of feudal remnants and the problem of controlling the economy. Open to undergraduates.
R. Locke

17.539 Politics and Policy in Contemporary Japan

(Subject meets with 17.540)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-6 HASS

17.540 Politics and Policy in Contemporary Japan

(Subject meets with 17.539)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Analyzes contemporary Japanese politics, focusing primarily upon the post-World War II period. Includes examination of the dominant approaches to Japanese politics and society, the structure of the party system, the role of political opposition, the policy process, foreign affairs, and interest groups. Attention to defense, foreign, industrial, social, energy, technology policy processes. Graduate students are expected to pursue the subject at greater depth through reading and class presentations.
R. J. Samuels

See also 17.156J, 17.158, 17.166J.

Developing Countries

17.541J Introduction to Latin American Studies

(Same subject as 21F.884J, 21A.224J)
Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 4

See description under subject 21F.884J.
M. Diskin, E. Garrels

17.543 Political Change in Latin America

Prereq.: —
U (Spring)
3-0-9 HASS

Introduction to the dynamics of political change in Latin America today. Emphasis on the conflict between democracy and authoritarianism, the relationship between economic and political change, and the process of empowerment of excluded social groups. Special attention to Mexico, Central America and Brazil, economic development, the environment, ethnicity, the role of women, and human rights.
Staff

17.544 Comparative Politics of Latin America

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit

Latin American politics in comparative perspective. Focus on conflict between democracy and authoritarianism. Case studies of different political systems and economic policies, especially in Mexico, Brazil, and Chile. Special attention to regime change, social movements, and the construction of citizenship. Open to advanced undergraduates.
Staff

17.547 Chinese Politics and Political Economy

(Subject meets with 17.548)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-6 HASS

17.548 Chinese Politics and Political Economy

(Subject meets with 17.547)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Analyzes contemporary Chinese politics, both pre-Communist and Communist. Focus on the process of modernization and political development of Chinese civilization. Graduate students are expected to pursue the subject at greater depth through reading and individual research.
Z. Cui

17.550J Property Rights Under Transition

(Same subject as 11.467J, 4.257J)
Prereq.: 11.210 or permission of instructor
G (Fall)
3-0-9 H-LEVEL Grad Credit

See description under subject 11.467J.
K. R. Polenske

17.558J Political Economy and Technology in the Middle East

(Same subject as 1.255J, 21H.977J)
Prereq.: —
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Provides a focus on, and context for, technology change, with specific reference to contemporary conflicts and competing ideologies, Islam and politics, post-colonial experiences, and patterns of social pressures. Examines role of technological and scientific institutions. Changing environment of international business is explored, as are patterns of investments in the region. Provides students with interdisciplinary approach to development in the Middle East. Open to undergraduates with permission of instructor.
N. Choucri, P. S. Khoury, F. Moavenzadeh, R. Gakenheimer

17.559J Technology, Policy, and Sustainability in the Middle East

(Same subject as 1.25J)
Prereq.: —
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9

17.560J Technology, Policy, and Sustainability in the Middle East

(Same subject as 1.256J)
Prereq.: —
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Employs historical and contemporary perspectives to analyze the role of religion and politics in shaping socioeconomic and technological development in the Middle East. Emphasis is on the role of the technological change in contemporary development (and comparisons with other regions). Examines institutional changes within states and throughout the region for the management of socioeconomic and technological change, and strategies of privatization. Focuses on three broad dimensions of statehood: population, resources, and technology. Examines their interdependence and the impact of their flows across national boundaries (i.e., population, migration, technology transfer, and energy resources). Graduate students are expected to pursue the subject in greater depth through reading and individual research. 17.559J may *not* count toward HASS Requirement.
N. Choucri, F. Moavenzadeh, R. Gakenheimer

17.575 Introduction to Contemporary African Politics

Prereq.: —
U (Fall)
3-0-9 HASS

Consideration of the general characteristics of African state structures and political processes and institutions, as well as of the careers and programs of particular leaders and of policy issues of widespread significance in Africa today. Case studies of several African countries and leaders. Lectures meet with graduate subject 17.438.
F. Schaffer

17.577 The Politics of Change in the Third World
(Revised Content)

Prereq.: —
U (Fall)
3-0-9 HASS-D, Category 4

Introduction to contemporary processes of transformation in the developing world. Special attention devoted to issues of democratization, economic liberalization, state-building, and the changing politics of group identities. The ending of the cold war has affected the pattern of relationships between less-developed countries and industrialized nations. Other international factors such as the dominant role of financial agencies and non-governmental organizations also considered. Assigned readings include selections from the general theoretical literature as well as country case studies.
R. Joseph

17.588 Field Seminar in Comparative Politics: Intellectual Origins, Current Trends
(Revised Content)

Prereq.: Permission of instructor
G (Fall)
Units arranged H-LEVEL Grad Credit

An introduction to the field of comparative politics for first-year graduate students in political science. Taught as an intellectual history covering the period from the eighteenth century to the present.
D. Woodruff

See also 17.168, 17.170, 17.406, 17.438.

Communist Studies

17.601J Soviet Politics and Society, 1917–1991
(Revised Content)

(Same subject as 21H.467J)
Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 4

Explores political and historical evolution of Soviet state and society from 1917 Revolution to its demise in 1991: (1) creation of a revolutionary regime; (2) causes and nature of the Stalin revolution; (3) post-Stalinist efforts to achieve radical political and social reform; (4) causes of the Soviet collapse.
E. Wood, D. Woodruff

17.602 Soviet and Post-Soviet Politics and Political Economy

(Subject meets with 17.603)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

17.603 Soviet and Post-Soviet Politics and Political Economy

(Subject meets with 17.602)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Seeks to put today's radical transformations in the countries of the former Soviet Union (primarily Russia) into a historical context. Begins with review and analysis of main stages of Soviet development, then explores topics relevant both to the system's evolution and the current political scene. Key topics include: state power and bureaucracy; politics and organization of the Soviet economy; role of the Party; causes of the Soviet collapse; conceptions of the post-Soviet transition; politics of economic reform; and center-regional relations. Additional work expected of graduate students.
D. Woodruff

17.614J Russian Science, Technology, and Society

(Subject meets with STS.021, STS.103J)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9

See description under subject STS.021.
L. R. Graham

Models and Methods

17.801 Political Science Laboratory

Prereq.: —
U (Fall)
3-5-4 Institute LAB

Introduces students to the conduct of political research using quantitative methodologies. The methods are examined in the context of specific political research activities like public opinion surveys, voting behavior, Congressional behavior, comparisons of political processes in different countries, and the evaluation of public policies. Students participate in joint class projects and conduct individual projects. May *not* count toward HASS Requirement.
C. Stewart

17.805 Theory of Collective Choice: Institutions and Positive Political Theory

(Subject meets with 17.806J, 14.296J)
Prereq.: —
U (Spring)
3-0-9 HASS

17.806J Theory of Collective Choice: Institutions and Positive Political Theory

(Subject meets with 14.296J, 17.805)
Prereq.: —
G (Spring)
3-0-9

Examines political institutions from a rational choice perspective. The now burgeoning rational choice literature on legislatures, bureaucracies, courts, and elections constitutes the chief focus. Some focus on institutions from a comparative and/or international perspective. Graduate students are expected to pursue the subject in greater depth through reading and individual research.
J. M. Snyder, Jr.

17.808J Theory of Collective Choice: Empirical Tests

(Same subject as 14.295J)
Prereq.: 17.806J
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Focuses on the relationship between the behavioral models developed by formal theorists and the statistical models used in empirical estimation. The main questions are: How do researchers make the link between theory and the data? How do they generate and estimate statistical models that allow careful testing of the behavioral models? What constitutes a good "test" of a model? These questions studied through reading and discussion of articles that combine both empirical and theoretical analysis.
S. Ansolabehere

17.816 Field Research Methods in Comparative Politics and Political Development

Prereq.: Permission of instructor
G (Fall)
2-2-8 H-LEVEL Grad Credit

Introduces a variety of approaches and methods for conducting research in Europe and in developing countries, including elite interviewing, participant observation, case studies, electoral analysis, cross-cultural survey research, and documentary research. Attention to conceptual, practical, and ethical issues of conducting research abroad, e.g., the role of language in social research, the limits and uses of official sources, and ethical responsibilities of social scientists. Not open to first-year graduate students.
M. Weiner

17.842 Quantitative Research in Political Science and Public Policy

Prereq.: —
G (Fall)
3-0-9 H-LEVEL Grad Credit

An introduction to the application of elementary statistics to political analysis. A basic literacy subject, teaching the student how to read and interpret the quantitative literature in various subfields of political science and public policy. Students develop elementary statistical computation skills and learn to use a statistical computing package.
J. M. Snyder, Jr., S. Ansolabehere

17.844 Categories and Concepts in Political Science

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9

Examines competing theoretical perspectives on the formation, function, use, and abuse of concepts in political science and the social sciences more generally. Topics include classical, radial, and family resemblance categories, neologism, contested concepts, metaphor, translation, and conceptual stretching and change. Particular concepts to be analyzed include freedom, justice, power, and democracy. Students also analyze the structure of concepts of their choosing.
F. Schaffer

17.846 Multivariate Political Analysis

Prereq.: 17.801 or 17.842 or equivalent
G (Spring)
2-2-8 H-LEVEL Grad Credit

Focus on multivariate data analysis procedures, emphasizing regression. Considers model specification, autocorrelation, instrumental variables, and causal modelling. Students must have taken at least one previous subject in statistics. Open to qualified undergraduates.
S. Ansolabehere

General Subjects

17.UR Undergraduate Research

Prereq.: —
U (Fall, Spring)
Units arranged [P/D/F]
Can be repeated for credit

17.URG Undergraduate Research

Prereq.: —
U (Fall, Spring)
Units arranged
Can be repeated for credit

Undergraduate research opportunities in Political Science in theoretical and applied research. For further information, contact the Departmental Coordinator.
R. J. Samuels

17.901 Political Science Internship and Research

Prereq.: —
U (Fall, IAP, Spring, Summer)
Units arranged
Can be repeated for credit

17.902 Political Science Internship and Research

Prereq.: —
U (Fall, IAP, Spring, Summer)
Units arranged [P/D/F]
Can be repeated for credit

Independent research enabling students to do work in an agency, state, or local government, or other public organization. The academic component involves close contact between the student and a faculty advisor and written work. Work may be done during the summer.
R. J. Samuels

17.903 Community Service: Experience and Reflection

Prereq.: —
U (Fall, IAP, Spring, Summer)
Units arranged [P/D/F]
Can be repeated for credit

Seminar involves students in the community that exists beyond the labs and classrooms of the MIT campus. Through a combination of community service and academic study, students learn about political, economic, and social issues that confront residents in Boston and Cambridge. Students volunteer in a community service agency or private organization devoted to community needs and development. Students also responsible for directed readings, three short writing assignments, and four evening seminar sessions. Subject can only be repeated for credit if area of community service is different.
D. T. Kryder

17.905–17.911 Reading Seminar in Social Science

Prereq.: —
U (Fall, IAP, Spring, Summer)
Units arranged
Can be repeated for credit

Reading and discussion of special topics in the fields of social science. Open to advanced undergraduates by arrangement with individual staff members. 17.909 is taught P/D/F.
R. J. Samuels

17.913 Pre-thesis Reading Seminar

Prereq.: —
U (Fall, Spring)
3-0-6 [P/D/F]
Can be repeated for credit

Intensive reading on topics of interest to students preparing for senior thesis under guidance of thesis supervisor. A written paper required, forming a substantial part of the senior thesis.
R. J. Samuels

17.915 Junior Colloquium in Political Science and Public Affairs

Prereq.: Two Political Science subjects or permission of instructor
U (Spring)
2-0-10 HASS

Seminar identifies, explores contributions of political science to critical issues in US and world affairs. Designed to help departmental majors and minors understand the way political scientists choose and ask questions and seek answers to those questions. Topics and readings chosen from fields of comparative politics, international relations, and domestic policy.
D. L. M. Blackmer

17.912, 17.914, 17.916–919 Special Topics in Political Science

Prereq.: —
U (Fall, IAP, Spring, Summer)
Units arranged [P/D/F]
Can be repeated for credit

17.920 Special Topics in Political Science

Prereq.: —
U (Fall, IAP, Spring, Summer)
Units arranged
Can be repeated for credit

Reading and discussion of special topics in the field of social science.
R. J. Samuels

17.ThU Undergraduate Political Science Thesis

Prereq.: —
U (Fall, Spring)
Units arranged
Can be repeated for credit

Program of undergraduate research, leading to the writing of an S.B. thesis. To be arranged by the student under approved supervision.
R. J. Samuels

17.950–17.960 Reading Seminar in Social Science

Prereq.: Permission of instructor
G (Fall, Spring, Summer)
Units arranged H-LEVEL Grad Credit
Can be repeated for credit

Reading and discussion of special topics in the fields of social science. Open to advanced graduate students by arrangement with individual staff members. 17.959 is taught P/D/F.
R. J. Samuels

17.ThG Graduate Political Science Thesis

Prereq.: Permission of instructor
G (Fall, Spring)
Units arranged H-LEVEL Grad Credit
Can be repeated for credit

Program of graduate research and writing of thesis; to be arranged by the student with supervising committee.
R. J. Samuels

Course 18

Mathematics

For degree requirements, see listing in Chapter VII under the School of Science.

General Mathematics

18.01 Calculus

Prereq.: —
U (Fall, Spring)
5-0-7 CALC I
Credit cannot also be received for 18.014 or 18.01A

Differentiation and integration of functions of one variable, with applications. Concepts of function, limits, and continuity. Differentiation rules, application to graphing, rates, approximations, and extremum problems. Mean-value theorem. Definite and indefinite integration. Fundamental theorem of calculus. Applications of integration to geometry and science. Elementary functions. Techniques of integration. Approximation of definite integrals, improper integrals, and l'Hôpital's rule.
Fall Term: *D. S. Jerison*

18.01A Calculus

Prereq.: One full year of high school calculus
U (Fall)
5-0-7 CALC I
Credit cannot also be received for 18.01 or 18.014

Intended for students who have a had a full year of high school calculus. Covers the same material as 18.01. Taught in the first half of the Fall term.
A. P. Mattuck

18.014 Calculus with Theory

Prereq.: —
U (Fall)
5-0-7 CALC I
Credit cannot also be received for 18.01 or 18.01A

Covers the same material as 18.01, but at a deeper and more rigorous level. Emphasizes careful reasoning and understanding of proofs. Assumes knowledge of elementary calculus. Topics: axioms for the real numbers; the Riemann integral; limits, theorems on continuous functions; derivatives of functions of one variable; the fundamental theorems of calculus; Taylor's theorem; infinite series, power series, rigorous treatment of the elementary functions.
J. Munkres

18.02 Calculus

Prereq.: 18.01 or 18.013 or 18.014
U (Fall, Spring)
5-0-7 CALC II
Credit cannot also be received for 18.023, 18.024 or 18.02A

Calculus of several variables. Vector algebra in 3-space, determinants, matrices. Vector-valued functions of one variable, space motion. Scalar functions of several variables: partial differentiation, gradient, approximation techniques. Multiple integrals with applications. Vector fields, line and surface integrals, exact differentials, Green's theorem, Divergence Theorem, Stokes's Theorem. Two versions offered Fall Term: 18.02 and 18.02S. 18.02 includes additional topics in linear algebra.
Fall Term: *H. Rogers*
Spring Term: *Staff*

18.02A Calculus

Prereq.: 18.01A
U (Fall, IAP, Spring)
5-0-7 CALC II
Credit cannot also be received for 18.02, 18.023 or 18.024

Covers material taught in the first half of 18.02 (vectors, vector functions of one variable, partial differentiation, multiple integration) in the second six weeks of the Fall term. Second half of 18.02A can be taken either during IAP (daily lectures) or during the first half of the Spring term.
Staff

18.023 Calculus with Applications

Prereq.: 18.01 or equivalent
U (Fall)
5-0-7 CALC II
Credit cannot also be received for 18.02, 18.024 or 18.02A

Calculus of several variables. Vector algebra, analytic geometry, planetary motion, orbit stability, partial differentiation, functions of several variables. Taylor series, extremal problems, numerical methods, multiple integrals, approximate and asymptotic methods of evaluation, applications, vector calculus, gradient, curl, theorems of Stokes, Green, and Gauss, conservation laws, fluid motion.
A. Toomre

18.024 Calculus with Theory

Prereq.: 18.014
U (Spring)
5-0-7 CALC II
Credit cannot also be received for 18.02, 18.023 or 18.02A

Continues 18.014. Parallel to 18.02, but at a deeper level, emphasizing careful reasoning and understanding of proofs. Considerable emphasis on linear algebra and vector integral calculus.
J. R. Munkres

18.03 Differential Equations

Prereq.: 18.02 or 18.023 or 18.014
U (Fall, Spring, Summer)
5-0-7 REST
Credit cannot also be received for 18.034

Study of ordinary differential equations. Standard solution methods for one first-order equation, including graphical and numerical methods. Higher-order forced linear equations with constant coefficients. Complex numbers; Laplace transform. Matrix methods for first-order linear systems with constant coefficients. Non-linear systems; phase-plane analysis. Series solutions to second-order equations. Modeling of physical problems and interpretation of the analytic or graphical solutions.
Fall Term: *H. R. Miller*
Spring Term: *G.-C. Rota*

18.034 Differential Equations

Prereq.: 18.024
U (Spring)
4-0-8 REST
Credit cannot also be received for 18.03

Intended as an alternative to 18.03 for students who have taken the calculus sequence 18.014/18.024. Covers the same material as 18.03 with more emphasis on theory. First order equations, separation, initial value problems. Systems, linear equations, independence of solutions, undetermined coefficients. Singular points and periodic orbits for planar systems.
Information: R. B. Melrose.

18.04 Complex Variables with Applications

Prereq.: 18.03 or 18.034
U (Fall, Spring)
4-0-8

Complex algebra and functions; analyticity; contour integration, Cauchy's theorem; singularities, Taylor and Laurent series; residues, evaluation of integrals; multivalued functions, potential theory in two dimensions; Fourier analysis and Laplace transforms.
Fall Term: *H. P. Greenspan*
Spring Term: *A. Toomre*

18.05 Introduction to Probability and Statistics

Prereq.: 18.01 or 18.013 or 18.014
U (Fall, Spring)
4-0-8 REST

Elementary introduction with applications. Basic probability models. Combinatorics. Random variables. Binomial, Poisson, geometric, exponential, and normal laws. Statistical estimation and testing. Confidence regions. Introduction to linear regression and analysis of variance.
Fall Term: *R. M. Dudley*
Spring Term: *H. Rogers*

18.06 Linear Algebra

Prereq.: 18.02 or 18.023 or 18.024
U (Fall, Spring, Summer)
4-0-8 REST
Credit cannot also be received for 18.700

Basic subject on matrix theory and linear algebra, emphasizing topics useful in other disciplines, including systems of equations, vector spaces, determinants, eigenvalues, similarity, and positive definite matrices. Applications to Gauss elimination with pivoting, least-squares approximations, stability of differential equations, networks, linear programming, and Markov processes. Compared with 18.700, more emphasis on matrix algorithms and many applications.
Fall Term: *S. Lee*
Spring Term: *G. Strang*

18.062J Mathematics for Computer Science

(Same subject as 6.042J)
Prereq.: 18.02 or 18.023 or 18.024
U (Fall, Spring)
5-0-7

See description under subject 6.042J.
C. E. Leiserson, F. T. Leighton, R. L. Rivest

18.075 Advanced Calculus for Engineers I

Prereq.: 18.03
G (Fall, Spring, Summer)
3-0-9 (H except II, VI, VIII, XII, XIII, XVI, XVIII, XXII)

Functions of a complex variable; calculus of residues. Ordinary differential equations; integration by power series; Bessel and Legendre functions. Expansion in series of orthogonal functions, including Fourier series.
T. Witelski

18.076 Advanced Calculus for Engineers II

Prereq.: 18.04 or 18.075
G (Spring, Summer)
3-0-9 (H except II, VI, XVI, XVIII, XXII)

Solution of classical partial differential equations of science and engineering: curvilinear coordinates, separation of variables, eigenfunction expansions. Fourier and Laplace integral transforms. Quasilinear equations. Characteristics.
Information: A. Toomre.

18.085 Mathematical Methods for Engineers I

Prereq.: 18.03 or 18.034
G (Fall, Spring, Summer)
3-0-9 H-LEVEL Grad Credit

Review of linear algebra, applications to networks, structures, and estimation, Lagrange multipliers, differential equations of equilibrium, Laplace's equation and potential flow, boundary-value problems, minimum principles and calculus of variations, Fourier series, discrete Fourier transform, convolution, applications.
Fall Term: *G. Strang*
Spring Term: *Staff*

18.086 Mathematical Methods for Engineers II

Prereq.: 18.03 or 18.034
G (Fall, Spring, Summer)
3-0-9 H-LEVEL Grad Credit

Scientific computing: Fast Fourier Transform, finite differences, finite elements, spectral method, numerical linear algebra. Complex variables and applications. Initial-value problems: stability or chaos in ordinary differential equations, wave equation vs heat equation, conservation laws and shocks, dissipation and dispersion. Optimization: network flows, linear programming.
Information: G. Strang.

18.089 Review of Mathematics

Prereq.: —
G (Summer)
Units arranged

Reviews calculus and differential equations. Primarily for students in Course XIII-A. Degree credit allowed only in special circumstances.
Information: D. A. Vogan.

18.093 Tutoring in Mathematics

Prereq.: 18.02 or 18.02A or 18.023 or 18.024
U (Fall, Spring)
Units arranged [P/D/F]
Can be repeated for credit

For undergraduates who are teaching mathematics recitation. Limited enrollment, based on positions available. Permission must be secured in advance to register for this subject.
Information: D. A. Vogan.

18.095 Mathematics Lecture Series

Prereq.: 18.01 or equivalent
U (IAP)
2-0-4 [P/D/F]
Can be repeated for credit

Ten lectures by mathematics faculty members on interesting topics from both classical and modern mathematics. All lectures accessible to students with calculus background and an interest in mathematics. At each lecture, reading and exercises are assigned. Students prepare these for discussion in a weekly problem session.
Information: D. A. Vogan.

18.098 Independent Activities

Prereq.: —
U (IAP)
Units arranged [P/D/F]
Can be repeated for credit

For undergraduates desiring credit for studies or for special individual reading on an undergraduate level on a P/D/F basis during IAP. Specific programs and credit arranged in consultation with individual faculty members and subject to departmental approval.
Information: D. A. Vogan.

18.099 Independent Activities

Prereq.: —
U (Fall, IAP, Spring)
Units arranged
Can be repeated for credit

For undergraduates desiring credit for studies during IAP or for special individual reading on an undergraduate level during the regular terms. Specific programs and credit arranged in consultation with individual faculty members and subject to departmental approval.
Information: D. A. Vogan.

Analysis

18.100 Analysis I

Prereq.: 18.03 or 18.034
U (Fall, Spring)
3-0-9 (H except XVIII)

Two options offered, both covering fundamentals of mathematical analysis: convergence of sequences and series, continuity, differentiability, Riemann integral, sequences and series of functions, uniformity, interchange of limit operations. Both options show the utility of abstract concepts and teach understanding and construction of proofs. *Option A*, offered first term only, chooses less abstract definitions and proofs, and gives applications where possible. *Option B* is more abstract and for students with more mathematical maturity. Places greater emphasis on point-set topology.
Information: R. B. Melrose.

18.101 Analysis II

Prereq.: 18.100; 18.700 or 18.701
U (Fall)
3-0-9 (H except XVIII)

Continues 18.100, in the direction of manifolds and global analysis. Differentiable maps, inverse and implicit function theorems, n-dimensional Riemann integral, change of variables in multiple integrals, manifolds, differential forms, n-dimensional version of Stokes' theorem. 18.901 helpful but not required.
Information: R. B. Melrose.

18.103 Fourier Analysis — Theory and Applications

Prereq.: 18.100
U (Spring)
3-0-9 (H except XVIII)

Continues 18.100. Roughly half the subject devoted to the theory of the Lebesgue integral with applications to probability, and half to Fourier series and Fourier integrals.
V. W. Guillemin

18.104 Seminar in Analysis

Prereq.: 18.100
U (Fall)
3-0-9

Seminar for mathematics majors. Students present and discuss the subject matter, taken from current journals or books. Topics vary from year to year. Topic for 1996-97: Quantum calculus. Develops quantum calculus with applications to calculus, combinatorics, number theory, and statistical mechanics.
V. Kač

18.112 Introduction to Functions of a Complex Variable

Prereq.: 18.03 or 18.034
U (Spring)
3-0-9 (H except XVIII)

A deeper and more extensive treatment of complex variables than 18.04, with more challenging problems. Mathematical rigor is, however, not stressed. Branch points and branch cuts. Cauchy's theorem, singularities, residues, contour integrals, conformal mapping. Schwarz-Christoffel transformation, analytic continuation, harmonic function, the Mittag-Leffler theorem.
V. Kač

18.115 Functions of a Complex Variable

Prereq.: 18.100
G (Fall)
3-0-9 H-LEVEL Grad Credit

Exponential and trigonometric functions, Cauchy integral formula, holomorphic and meromorphic functions. Infinite series and products, the gamma function. Harmonic functions, conformal mapping, Dirichlet's problem.
J. Stalker

18.116 Topics in Complex Variables

Prereq.: 18.115
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics vary from year to year. Typical topics: introduction to Riemann Surface Theory, function-theoretic and geometric approaches to Teichmüller theory.
Information: R. B. Melrose.

18.117 Topics in Several Complex Variables

Prereq.: 18.115, 18.125
G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Pseudoconvex domains and plurisubharmonic functions. Existence and approximation theorems for holomorphic functions via L^2-estimates for the $\bar{\partial}$-operator.
V. W. Guillemin

18.125 Measure and Integration

Prereq.: 18.100
G (Fall)
3-0-9 H-LEVEL Grad Credit

Compactness, continuity, metric spaces. Lebesgue measure and integration, product measures, signed measures, densities. Hilbert and Banach spaces.
R. M. Dudley

18.126 Functional Analysis

Prereq.: 18.125
G (Spring)
3-0-9 H-LEVEL Grad Credit

General theory of Hilbert and Banach spaces. Examples, including Sobolev spaces and L^p. The Fourier transform. Boundedness and compactness of operators. Spectral theory for self-adjoint operators. Applications to linear partial differential equations.
K. Liu

18.135 Geometric Analysis

Prereq.: 18.125
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Harmonic analysis on R^n. Radon transforms and applications. Spherical harmonics. Non-Euclidean Fourier analysis. Paley-Wiener type theorems, group-theoretic potential theory. Eigenfunctions, entire functionals, and hyperfunctions.
Information: S. Helgason.

18.152 Introduction to Partial Differential Equations

Prereq.: 18.100
U (Fall)
3-0-9

Initial and boundary value problems for ordinary differential equations. Sturm-Liouville theory and eigenfunction expansions. Initial value problems for the wave equation and heat equation. The Dirichlet problem for Laplace's operator and potential theory.
K. Liu

18.155 Distributions and Differential Equations

Prereq.: 18.103
G (Spring)
3-0-9 H-LEVEL Grad Credit

Distributions, Schwartz space, tempered distributions, convolutions and regularizations, Fourier transforms, Plancherel theorem, Payley-Wiener theorem; L^2 Sobolev spaces, Sobolev embedding theorems, L^2 elliptic regularity, compactness theorems; fundamental solutions, and second-order elliptic operators.
D. Jerison

18.156 Introduction to Microlocal Analysis

Prereq.: 18.155, 18.965
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Examines singularities of distributions. Distributions singular across a submanifold, singular points of ordinary differential equations, non-characteristic boundary-value problems. Pseudodifferential operators, regularity of elliptic differential operators, wavefront set, and microdistributions. Darboux's theorem. Hamilton-Jacobi theory.
Information: R. B. Melrose.

18.157 Partial Differential Equations

Prereq.: 18.155, 18.156
G (Spring)
3-0-9 H-LEVEL Grad Credit

Analysis and geometry of linear and nonlinear elliptic operators. Basic facts from Riemannian geometry and elliptic partial differential equations; variational methods; real Monge-Ampère equations; global geometric problems associated with prescribing curvature.
R. B. Melrose

18.158 Topics in Differential Equations

Prereq.: 18.125
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. Introduces a concept of natural functionals on solutions of a system of linear PDE and develops integral geometry from this point of view. Topics: elements of algebraic theory of D-modules. The Radon transform. Relation with representation theory. Integral geometry from the point of view of D-modules. Admissible families of curves and Einstein-Weyl 3-folds. Petrovsky theory of lacunas of hyperbolic equations. Prerequisities: generalized functions, elements of homological algebra.
Information: R. B. Melrose.

18.175 Theory of Probability

Prereq.: 18.125
G (Spring)
3-0-9 H-LEVEL Grad Credit

Ergodic theorems, laws of large numbers, convergence of probability measures, central limit theorems, stochastic processes, Brownian motion, martingales, strong Markov properties.
R. M. Dudley

18.177 Stochastic Processes

Prereq.: 18.175
G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

1996–97: Central topic: stochastic analysis. Emphasis on development and application of Ito's theory of stochastic differential equations. Second half devoted to applications which derive from differential geometry. Some knowledge of basic P.D.E. and differential geometry is recommended.
D. W. Stroock

18.199 Graduate Analysis Seminar

Prereq.: Permission of instructor
G (Fall, Spring)
3-0-21 H-LEVEL Grad Credit
Can be repeated for credit

Studies original papers in differential analysis and differential equations. Intended for first- and second-year graduate students. Permission must be secured in advance.
R. B. Melrose

18.238 Geometry and Quantum Field Theory

Prereq.: Permission of instructor
G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. Content for Fall 1996: An introduction to quantum guage theories for mathematicians. Basic concepts of path integration and renormalization, detailed study of two-dimensional Yang-Mills theory. No knowledge of physics is required but familiarity with connections, principal bundles, cohomology theory, and measure theory is assumed.
A. Szenes

18.248 String Theory

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year.
Information: I. M. Singer.

18.276 Mathematical Methods in Physics

Prereq.: —
G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. Recent developments in physics require mathematical techniques not usually covered in standard graduate subjects. Topics for 1996–97: vertex algebras and conformal field theory.
V. Kač

Applied Mathematics

18.303 Linear Partial Differential Equations

Prereq.: 18.03 or 18.034
U (Fall)
3-0-9

Introduces classical partial differential equations of applied mathematics: diffusion, Laplace/Poisson, and wave equations. Discussion of their origins and use in discrete random walks, heat conduction, potential theory, and waves of small amplitude arising in many areas of science and technology. Methods of solution emphasize separation of variables, Fourier series and transforms, Sturm-Liouville eigenvalue problems, and the cause-and-effect insights provided by Green's functions. 18.04 or 18.112 useful.
D. Z. Freedman

18.305 Methods of Applied Mathematics I

Prereq.: 18.04 or 18.075 or 18.112
G (Fall)
3-0-9 H-LEVEL Grad Credit

18.306 Methods of Applied Mathematics II

Prereq.: 18.04 or 18.075 or 18.112
G (Spring)
3-0-9 H-LEVEL Grad Credit

A comprehensive treatment of the advanced methods of applied mathematics. Fall Term: asymptotic behavior of ordinary differential and difference equations; asymptotic evaluation of integrals; regular and singular perturbation methods; boundary-layer techniques; WKB method; multiple scales. Spring Term: partial differential equations; transform methods; characteristics, initial and boundary-value problems; Green's functions; singular perturbation problems; nonlinear wave propagation.
18.305: *H. Cheng*
18.306: *D. Z. Freedman*

18.307 Methods of Applied Mathematics III

Prereq.: 18.04 or 18.075 or 18.112
G (Spring)
3-0-9 H-LEVEL Grad Credit

Selection of material from the following topics: calculus of variations (the first variation and the second variation); integral equations (Volterra equations; Fredholm equations, the Hilbert-Schmidt theorem); the Hilbert Problem and singular integral equations of Cauchy type; Wiener-Hopf Method and partial differential equations; Wiener-Hopf Method and integral equations; group theory.
H. Cheng

18.308 Wave Motion

Prereq.: 18.305
G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics selected according to interests of students and lecturer. Possible topics: 1) dispersive waves: modulation and average Lagrangian, group speed, wave action; 2) nonlinear geometrical optics: single and multiple phase waves, caustics, resonant interaction; 3) hyperbolic waves: characteristics, shocks, focusing, and reflection; 4) solitons, inverse scattering, complete integrability; 5) reacting gas dynamics: flames and detonations, acoustic interactions; 6) numerical methods for hyperbolic conservation laws.
R. R. Rosales

18.310 Principles of Applied Mathematics

Prereq.: 18.02 or 18.023 or 18.024
U (Fall)
3-0-9

Study of illustrative topics in discrete applied mathematics including sorting algorithms, information theory, coding theory, secret codes, generating functions, linear programming, game theory.
D. J. Kleitman

18.311 Principles of Applied Mathematics

Prereq.: 18.03 or 18.034
U (Spring)
3-0-9

Introductory survey of fundamental concepts in applied mathematics: propagation, stability, equilibrium, optimization. This independent half of the complete sequence emphasizes the ideas and topics that relate to a "continuous" mathematical approach: diffusion, waves, instabilities, characteristics, and first-order partial differential equations, with applications to traffic problems, fluid flow, physics, and biology.
R. R. Rosales

18.312 Algebraic Combinatorics

Prereq.: 18.702 or 18.703
U (Fall)
3-0-9

Applications of linear algebra and group theory to combinatorics. Topics include matching theory and extremal set theory, the matrix tree theorem, enumeration under group action, coverings and tilings, transfer matrices, and magic squares. No prior knowledge of combinatorics is assumed, though 18.314 is helpful.
Information: R. P. Stanley.

18.313 Probability

Prereq.: 18.02 or 18.023 or 18.024
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
4-0-8

Development of theory and applications of probabilistic concepts for scientists and engineers. Emphasizes formulation and solution of probabilistic problems by the algebra of random variables. Topics: sample space, Bernoulli and Poisson processes, uniform process, generating functions, discrete and continuous-parameter Markov chains. Introduces the Central Limit Theorem and the foundations of probability.
G.-C. Rota

18.314 Combinatorial Analysis

Prereq.: 18.02 or 18.023 or 18.024
U (Spring)
3-0-9

Combinatorial problems and methods for their solution. Enumeration, generating function techniques, and construction of bijections. Additional topics drawn from graph theory, matchings and network flows, partial orders, permutation groups and Polya theory. Prior experience with abstraction and proofs helpful.
D. J. Kleitman

18.315 Combinatorial Theory

Prereq.: Permission of instructor
G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. Topic for 1996–97: Symmetric functions.
S. Fomin

18.316 Seminar in Combinatorics

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. Readings from current research papers in combinatorics. Topics to be chosen and presented by the class.
D. J. Kleitman

18.318 Topics in Combinatorics

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. 1996–97: Survey of some algebraic structures that have been associated with combinatorial structures. Lattices, matroids and their representations, categories and grupoids, Hopf algebras, braids.
G.-C. Rota

18.325 Topics in Applied Mathematics

Prereq.: —
G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Selected topics in discrete and continuous applied mathematics. Topics vary from year to year. Topic for 1996–97: The probabilistic method in combinatorics. Topic for 1997–98: Current developments in mathematical biology. Topics might include: fluid mechanics of locomotion; phylotaxis; applications of reaction—diffusion equations to biology; continuum models of membranes and DNA. Stochastic models for motor proteins. Protein folding.
1996–97: *D. Spielman*
1997–98: *M. Brenner*

18.327 Wavelets and Filter Banks
(New)

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit

Wavelets are localized basis functions, good for representing short-time events. The coefficients at each scale are filtered and subsampled to give coefficients at the next scale. This is Mallat's pyramid algorithm for multiresolution, connecting wavelets to filter banks. Wavelets and multiscale algorithms for compression and signal/image processing are developed. Subject is project-based for engineering and scientific applications.
G. Strang

18.330 Introduction to Numerical Analysis

Prereq.: 18.03 or 18.034
U (Spring)
3-0-9

Basic techniques for the efficient numerical solution of problems in science and engineering. Root finding, interpolation, approximation of functions, integration, differential equations, direct and iterative methods in linear algebra. Knowledge of programming in Fortran, C, or Matlab helpful.
F. Waleffe

18.335J Numerical Methods of Applied Mathematics I

(Same subject as 6.337J)
Prereq.: 18.03, 18.06 or equivalent
G (Fall)
3-0-9 H-LEVEL Grad Credit

IEEE-standard, iterative and direct linear system solution methods, eigendecomposition and model-order reduction, fast Fourier transforms, multigrid, wavelets and other multiresolution methods, matrix sparsification.
A. Edelman, J. K. White

18.336 Numerical Methods of Applied Mathematics II

Prereq.: 18.330, 18.335, or equivalents
G (Spring)
3-0-9 H-LEVEL Grad Credit

Advanced introduction to applications and theory of numerical methods. Solution of differential equations, especially of time-dependent partial differential equations by finite difference and spectral methods. Well-posedness and stability. Fourier analysis. Boundary and nonlinear instabilities.
M. Brenner

18.337J Parallel Scientific Computing

(Same subject as 6.338J)
Prereq.: 18.06 or equivalents
G (Spring)
3-0-9 H-LEVEL Grad Credit

Advanced interdisciplinary introduction to modern scientific computing on parallel supercomputers. Numerical topics include dense and sparse linear algebra, N-body problems, and Fourier transforms. Geometrical topics include partitioning and mesh generation. Other topics include architectures and software systems with hands-on emphasis on understanding the realities and myths of what is possible on the world's fastest machines.
A. Edelman

18.338J Introduction to Numerical Algorithms
(New)

(Same subject as 6.336J)
Prereq.: 18.03, 18.06 or equivalents
Acad Year 1996-97: G (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Introduction to theoretical and practical aspects of numerical algorithms, emphasizing broadly applicable approaches. Application examples: problems in circuit analysis; electrostatics; mechanical elastostatics. Topics: equation formulation approaches; linear system solution by sparse direct factorization; nonlinear equation solution; Newton's method; issues of A-stability; local and global error analysis; solution of elliptic differential and integral equations; FFT and multipole-accelerated algorithms, more. Alternate years.
J. K. White, A. Edelman

18.354 Fluid Mechanics

Prereq.: 18.04 or 18.075
U (Fall)
3-0-9 (H except XVIII)

Study of the basic concepts and laws of fluid motion as illustrated by a variety of readily observable phenomena and applications in science and technology: viscosity, vortices, waves, boundary layers, instability.
H. P. Greenspan

18.355 Fluid Mechanics

Prereq.: 18.354, 12.800, 2.25, 16.121 or equivalent
G (Spring)
3-0-9 H-LEVEL Grad Credit

Compact reviews of linear theories in fluid dynamics: boundary layers; instability; wave theory; and hydromagnetics. Foundations of non-linear studies in shear flow, convection, and vortex waves. Preparation for the more specialized fluids subjects 18.308, 18.356, and 18.358.
W. V. R. Malkus

18.356 Rotating Fluids

Prereq.: 18.305, 18.354
G (Spring)
3-0-9 H-LEVEL Grad Credit

General theory of rotating fluids; transient flows; boundary layers, nonlinear interactions; wave motion, stability theory. Application to technological and geophysical problems.
H. P. Greenspan

18.357 Seminar in Fluid Dynamics

Prereq.: 18.354
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Current developments in the theory and practice of the centrifugal separation of mixtures are discussed following a presentation of the relevant theory of rotating fluids. A seminar format with readings of published research complemented by laboratory demonstrations.
Information: H. P. Greenspan.

18.358 Hydrodynamic Stability and Turbulence

Prereq.: 18.354
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Dispersive waves in fluids and instability of shear flows. Emphasis on nonlinear effects. Surface waves, internal waves, inertial waves, waves on thin films. Resonant and long-short interactions. Solitons and nonelastic solitary wave interactions. Wave turbulence. Instabilities, bifurcations and generic self-sustaining process in shear flows. Characteristics of turbulent boundary layers.
F. Waleffe

18.385 Nonlinear Dynamics and Chaos

Prereq.: 18.03 or 18.034
G (Fall)
3-0-9 H-LEVEL Grad Credit

Introduces nonlinear dynamics with applications to physics, engineering, and biology, emphasizes analytical methods, examples, and geometric thinking. Topics: One- and two-dimensional flows and their bifurcations. Nonlinear oscillators. Chaos. Lorenz equations. Iterated maps. Period doubling and renormalization. Fractals.
R. R. Rosales

18.386 Advanced Nonlinear Dynamics and Chaos

Prereq.: 18.385 or a solid background in nonlinear dynamics
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Topics: Melnikov's method. Conservative dynamical systems: Kam theorem; averaging. Applications to biology and physics.
M. Brenner

18.395 Group Theory with Applications to Physics

Prereq.: 8.321
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Selection of topics from the theory of finite groups, Lie groups, and group representations, motivated by quantum mechanics and particle physics. 8.322 and 8.323 helpful.
Information: D. Z. Freedman.

18.396J Supersymmetric Quantum Field Theories

(Same subject as 8.896J)
Prereq.: 8.323
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics selected from the following: 1) SUSY algebras and their particle representations, 2) Weyl and Majorana spinors, 3) Lagrangians of basic 4-dimensional SUSY theories, both rigid SUSY and supergravity, 4) supermultiplets of fields and superspace methods, 5) renormalization properties, and the non-renormalization theorem, 6) spontaneous breakdown of SUSY, 7) phenomenological SUSY theories. Some prior knowledge of Noether's theorem, derivation and use of Feynman rules, l-loop renormalization, and gauge theories is essential.
Information: D. Z. Freedman.

Theoretical Computer Science

18.400J Automata, Computability, and Complexity

(Same subject as 6.045J)
Prereq.: 6.046J
U (Spring)
4-0-8

See description under subject 6.045J.
N. A. Lynch

18.404J Theory of Computation

(Same subject as 6.840J)
Prereq.: 18.310 or 18.063
G (Fall)
4-0-8 (H except XVIII)

A more extensive and theoretical treatment of the material in 6.045J/18.400J, emphasizing computability and computational complexity theory. Regular and context-free languages. Decidable and undecidable problems, reducibility, recursive function theory. Time and space measures on computation, completeness, hierarchy theorems, inherently complex problems, probabilistic and quantum computation, interactive proof systems.
M. Sipser

18.405J Advanced Complexity Theory

(Same subject as 6.841J)
Prereq.: 6.840J/18.404J
G (Spring)
3-0-9 H-LEVEL Grad Credit

Current research topics in computational complexity theory. Nondeterministic, alternating, probabilistic, and parallel computation models. Boolean circuits. Complexity classes and complete sets. The polynomial-time hierarchy. Interactive proof systems. Relativization. Definitions of randomness. Interactive proof systems and probabilistically checkable proofs. Approaches to the P = NP? and related questions.
D. Spielman

18.409 Topics in Theoretical Computer Science

Prereq.: Permission of instructor
G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Study of an area of current interest in theoretical computer science. Topic varies from term to term. Topic for 1996–97: Algorithmic aspects of computational molecular biology.
B. Berger

18.410J Introduction to Algorithms

(Same subject as 6.046J)
Prereq.: 6.001; 6.042J
U (Fall, Spring)
4-0-8

See description under subject 6.046J.
Fall Term: *C. E. Leiserson*
Spring Term: *M. Goemans*

18.415J Advanced Algorithms

(Same subject as 6.854J)
Prereq.: 18.410J/6.046J or 6.851; 18.06 or 18.700
G (Fall)
3-0-9 H-LEVEL Grad Credit

Emphasizes fundamental algorithms and advanced methods of algorithmic design and analysis. Randomized algorithms. On-line algorithms. Linear programming. Network flows. Approximation algorithms. Basis reduction in lattices with applications.
M. X. Goemans

18.417 Introduction to Computational Molecular Biology

Prereq.: 6.001 or 18.410J/6.046J or permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit

Introduction to computational biology at the molecular level. Focuses on genomics, protein folding, and computational models of development. Also includes computational approaches to: physical and genetic mapping, protein structure prediction, molecular dynamics, virus shell assembly, sequence homology and alignment, evolutionary trees, and DNA computing. No biology background is assumed.
B. Berger

18.419 Seminar in Theoretical Computer Science

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall, Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

A seminar on advanced topics in theoretical computer science. Current literature presented by students and instructors with a view toward preparing students for research in theoretical computer science, and for developing the skills needed to present such results effectively.
Information: F. T. Leighton.

18.421 Algorithmic Algebra and Number Theory

Prereq.: 18.310 or 18.062J/6.042J or 18.701 or 18.703
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9

Review of basic concepts and methods of complexity theory. Existence and construction of efficient algorithms for classical problems in algebra, number theory, and logic. Integer and polynomial GCD computation, algebraic procedures in modular arithmetic, primality testing, factorization of polynomials over the rationals, structures and algorithms of recursion theory. The problem of P ≠ NP. Alternate years.
Information: H. Rogers, Jr.

18.423J Computability, Logic, and Programming

(Same subject as 6.044J)
Prereq.: 18.062J/6.042J or 18.310
U (Fall)
3-0-9

See description under subject 6.044J.
A. R. Meyer

18.425J Cryptography and Cryptanalysis

(Same subject as 6.875J)
Prereq.: 6.046J/18.410J or 6.851 or 18.421
G (Fall)
3-0-9 H-LEVEL Grad Credit

See description under subject 6.875J.
S. Goldwasser

18.426J Advanced Topics in Cryptography

(Same subject as 6.876J)
Prereq.: Permission of instructor
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

See description under subject 6.876J.
S. Goldwasser

18.433 Combinatorial Optimization and Linear Programming

Prereq.: 18.06 or 18.700, 18.310
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9

A thorough treatment of linear programming theory, Dantzig's simplex method, and duality theory. Matroid optimization, the assignment problem, the maximum flow problem. Approximation algorithms for combinatorial optimization. Ellipsoid method and its implications for combinatorial optimization. Polyhedral approaches to NP-complete problems.
Information: M. X. Goemans.

18.435J Theory of Parallel and VLSI Computation

(Same subject as 6.848J)
Prereq.: 6.046J/18.410J or 6.851
G (Fall)
3-0-9 H-LEVEL Grad Credit

Introduces parallel computation and very large scale integration. Design and analysis of systolic algorithms for routing, sorting, arithmetic, and graph problems on arrays, trees, hypercubes, and other fixed-connection networks. Network transformations, broadcast simulation, retiming. Packet routing and nonblocking networks. Mathematical models of hardware. Lower bounds, P-completeness, area-time trade-offs. Layout, placement, routing. 3-D models, volume/area universal networks, fat-trees. Parallel programming on a connection machine. Survey of other parallel architectures.
F. T. Leighton

18.437J Distributed Algorithms

(Same subject as 6.852J)
Prereq.: 6.046J
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

See description under subject 6.852J.
N. A. Lynch

Applied Mathematics: Statistics

18.440 Probability and Random Variables (Revised Units)

Prereq.: 18.02 or 18.023 or 18.024
U (Spring)
3-0-9

Topics in applications. Probability spaces, random variables, distribution functions, expected value. Binomial, geometric, hypergeometric, Poisson distributions. Uniform, exponential, normal, gamma and beta distributions. Mean, variance, moments, and generating functions. Conditional probability, Bayes theorem, joint distributions, and distributions of transformed random variables. Tchebychev inequality, law of large numbers, and central limit theorem.
D. W. Stroock

18.441 Statistical Inference

Prereq.: 18.440 or 18.313 or 6.041
U (Spring)
3-0-9 (H except XVIII)

Reviews probability and introduces statistical inference. Point and interval estimation. The maximum likelihood method. Hypothesis testing. Likelihood-ratio tests and Bayesian methods. Nonparametric methods. Analysis of variance, regression analysis and correlation. Chi-square goodness of fit tests. More theoretical than 18.443 and more detailed in its treatment of statistics than 18.05.
A. Sarkar

18.443 Statistics for Applications

Prereq.: 18.440 or 18.313 or 6.041
U (Fall)
3-0-9 (H except XVIII)

A broad treatment of statistics, concentrating on specific statistical techniques used in science and industry. Topics: hypothesis testing and estimation. Confidence intervals, chi-square tests, nonparametric statistics, analysis of variance, regression, time series, and experimental design. Treatment more oriented toward application and less toward theory than 18.441.
S. Fomin

18.445 Introduction to Stochastic Processes

Prereq.: 18.313 or 18.440 or 6.041
G (Spring)
3-0-9 H-LEVEL Grad Credit

Introduces the theory and application of stochastic processes. Empirical phenomena for which stochastic processes provide models. Markov-chains. Markov processes. Renewal theory. Semi-Markov processes. Queueing theory and Brownian motion.
Information: R. M. Dudley.

18.446 Applied Time-Series Analysis

Prereq.: 15.075 or 18.441 or 18.443
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Statistical methods commonly used to analyze time series. Topics: Trends and seasonality. Autocorrelation and stationarity. Models for stationary series. ARIMA models. Model specification, parameter estimation, and model checking. Forecasting. Seasonal time series models. Intervention analysis and outlier detection. Fourier analysis and estimation of the spectrum. Cross-correlation and bivariate time series models. Multiple time series and vector ARIMA models.
Information: R. M. Dudley.

18.457 Sampling, Simulation, and Monte Carlo

(18.454)
Prereq.: 18.440 or 18.313 or 6.041
G (Fall)
3-0-9 H-LEVEL Grad Credit

Topics selected from the following: design and analysis of sample surveys, resampling methods in statistical inference, random numbers and stochastic simulation, Monte Carlo integration and optimization, and Markov chain Monte Carlo.
A. Sarkar

18.458 Robust Statistics and Nonparametric Methods

Prereq.: 15.075 or 18.441 or 18.443; 18.440
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Nonparametric methods that give useful and valid results under a very wide class of underlying distributions. Introduction to robust statistical theory. Topics: Wilcoxon test, sign test, Wilcoxon-Mann-Whitney test, U-statistics theorems. Asymptotic relative efficiency of estimators. Kruskal-Wallis test. Robust estimators of location.
Information: R. M. Dudley.

18.465 Topics in Statistics

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics selected from recent literature. 1996–97: Topics in modern regression. Linear, nonlinear, generalized, and nonparametric methods for regression with one or many covariates. Unifying themes include diagnostics, model selection, and prediction. Recent developments including use of neural networks and wavelets.
A. Sarkar

18.466 Mathematical Statistics

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Decision theory, estimation, confidence intervals, hypothesis testing. Introduces large sample theory. Asymptotic efficiency of estimates. Exponential families. Sequential analysis.
Information: R. M. Dudley.

For additional related subjects in Statistics, see:

Civil and Environmental Engineering: 1.03, 1.151, 1.155, 1.202, 1.203J, 1.205, and 1.732

Electrical Engineering and Computer Science: 6.041, 6.231, 6.245, 6.262, 6.264J, 6.430J, 6.431, 6.432, and 6.435

Management: 15.034, 15.061, 15.065, 15.070, 15.074, 15.075, 15.076, 15.078, 15.098, 15.306, and 15.832

Mathematics: 18.05, 18.175, 18.177, 18.313, 18.440, 18.441, 18.443, 18.445, 18.446, 18.457, 18.458, 18.465, and 18.466

See also: 2.061, 2.830, 2.870, 5.70, 5.72, 7.02, 8.044, 8.08, 10.816, 11.220, 11.221, 16.322, 17.842, 17.846, 22.38, HST.191, and MAS.622J.

Logic

18.504 Seminar in Logic

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9

Seminar for mathematics majors. Students present and discuss the subject matter taken from current journals or books. Topics vary from year to year.
Information: S. D. Friedman.

18.510 Introduction to Mathematical Logic and Set Theory

Prereq.: —
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9
Credit cannot also be received for 18.511

Zermelo-Fraenkel set theory. Ordinals and cardinals. Axiom of choice and transfinite induction. Propositional and predicate logic. Elementary model theory: completeness, compactness, and Lowenheim-Skolem theorems. Gödel incompleteness theorem. 18.510 and 18.511 are offered in alternate years; they may not both be taken for credit.
S. D. Friedman

18.511 Introduction to Mathematical Logic and Recursion Theory

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9
Credit cannot also be received for 18.510

Propositional and predicate logic. Elementary model theory: completeness, compactness, and Lowenheim-Skolem theorems. Elementary recursion theory: enumeration and recursion theorems. Post's Problem. Gödel incompleteness theorem. 18.511 and 18.510 are offered in alternate years; they may not both be taken for credit.
Information: G. E. Sacks.

18.515 Mathematical Logic

Prereq.: Permission of instructor
G (Fall)
3-0-9 H-LEVEL Grad Credit

First-order logic. Compactness and ultraproducts. Lowenheim-Skolem theorems and categoricity. Quantifier elimination. Recursively enumerable sets and definability in arithmetic. Incompleteness and undecidability.
S. D. Friedman

18.535 Graduate Logic Seminar

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Students report on fundamental papers in mathematical logic. Open to all graduate students with an interest in logic. Topics vary from year to year.
Information: S. D. Friedman.

18.565 Recursion Theory

Prereq.: Permission of Instructor
Acad Year 1996-97: G (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Topics in recursion theory chosen from priority arguments, hyperarithmetic theory, ordinal recursion, E-recursion, theory of projective sets. A previous subject in logic recommended but not required.
G. E. Sacks

18.575 Model Theory

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Topics in model theory chosen from stability theory, O-minimal structures, model-theoretic algebra, models of arithmetic.
Information: S. D. Friedman.

18.585 Set Theory

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit

Topics in set theory chosen from large cardinals, combinatorial set theory, forcing, descriptive set theory, fine structure theory.
S. D. Friedman

Algebra and Number Theory

18.700 Linear Algebra

Prereq.: 18.02 or 18.02A or 18.023 or 18.024
U (Fall)
3-0-9 REST
Credit cannot also be received for 18.06

A rigorous treatment of linear algebra, including vector spaces, systems of linear equations, bases, linear independence, matrices, determinants, eigenvalues, inner products, quadratic forms, and canonical forms of matrices. Compared with 18.06, more emphasis on theory and proofs.
T. Pantev

18.701 Algebra I

Prereq.: 18.700 or 18.100B or permission of instructor
U (Fall)
3-0-9

18.702 Algebra II

Prereq.: 18.701
U (Spring)
3-0-9

More extensive and theoretical than the 18.700–18.703 sequence. Experience with proofs helpful. First term: group theory, geometry, and linear algebra. Second term: rings and fields — ideals, polynomial rings, factorization, modules, Jordan form for matrices, extension fields, Galois theory.
D. A. Vogan

18.703 Modern Algebra

Prereq.: 18.02 or 18.023 or 18.024
U (Spring)
3-0-9

A one-term treatment, covering the traditional algebra topics that have found greatest application in science and engineering as well as in mathematics: group theory, emphasizing finite groups; ring theory, including ideals, unique factorization in polynomial and Euclidean rings; field theory, including properties and applications of finite fields. 18.700 and 18.703 together form a standard algebra sequence.
G. Lusztig

18.704 Seminar in Algebra and Number Theory

Prereq.: One subject in linear algebra and some experience with proofs
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9

Seminar for mathematics majors. Students present and discuss the subject matter, taken from current journals or books. Topics may vary from year to year.
Information: D. A. Vogan.

18.705 Commutative Algebra

Prereq.: 18.701–18.702 or 18.700–18.703
G (Fall)
3-0-9 H-LEVEL Grad Credit

Basic topics in commutative algebra: localization, primary decomposition, integral dependence, filtrations, flatness, completions, and dimension theory.
G. Lusztig

18.706 Noncommutative Algebra

Prereq.: 18.705
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Wedderburn theory, Artinian algebras, tensor products, cohomology, central simple algebras, Jacobson density theorem, double centralizer theorem, Noether-Skolem theorem, Brauer groups, Galois cohomology, crossed product algebras, division algebras over local fields.
Information: G. Lusztig.

18.715 Topics in Homological Algebra

Prereq.: 18.705 or 18.905
Acad Year 1996-97: G (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics vary from year to year. Topic for 1996–97: Topological cyclic homology.
L. Hesselholt

18.725 Algebraic Geometry

Prereq.: 18.705
Acad Year 1996-97: G (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

Introduces the basic notions and techniques of modern algebraic geometry: schemes, maps, products, representable functors, and sheaf cohomology.
S. Kovács

18.727 Topics in Algebraic Geometry

Prereq.: 18.725
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics vary from year to year. Topic for 1996–97: Higher dimensional complex geometry. Birational geometry of threefolds, Mori's theory, basic theorems of the Minimal Model Program, analogy with the classification of surfaces.
S. Kovács

18.735 Topics in Algebra

Prereq.: 18.702 or 18.703
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics vary from year to year.
Information: D. A. Vogan.

18.737 Quantum Groups

Prereq.: 18.705
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Main objective is the construction of semisimple groups and their generalization, the quantum groups, via the theory of quivers. No preliminaries in Lie groups or Lie algebras required. Good background in abstract algebra useful.
Information: G. Lusztig.

18.739 Theory of Invariants

Prereq.: 18.705
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

Hilbert's finiteness theorem for reductive groups. Properties of the orbits and the orbit space. Classical invariants theory. Hilbert-Mumford-Richardson theorem. Rosenlicht's theorem on the existence of invariants. Matsushima criterion. Richardson's theorem on the principal stabilizer. Chevalley-Luna-Richardson theorem. Linear actions with a nontrivial stabilizer. Nice representations. Methods of the orbit classification. Applications to classical problems of linear algebra. Other topics.
Information: D. A. Vogan.

18.745 Introduction to Lie Algebras

Prereq.: 18.701 or 18.703
G (Fall)
3-0-9 H-LEVEL Grad Credit

Emphasizes theory of Lie algebras and algebraic aspects of Lie theory. Structure of finite-dimensional Lie algebras; Engel and Lie theorems, Cartan subalgebras, Cartan criterion. Structure and classification of semi-simple Lie algebras. Lie algebra cohomology; Weyl and Levi theorems. Finite-dimensional representations of semi-simple Lie algebras, Weyl character formula. Verma modules.
G. Lusztig

18.747 Infinite-dimensional Lie Algebras

Prereq.: 18.745
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

Topics vary from year to year. Representation theory of affine algebras and superalgebras and of superconformal algebras. Modular invariance and fusion rules. Vertex operator algebras.
Information: D. A. Vogan.

18.755 Introduction to Lie Groups

Prereq.: 18.100, 18.700
G (Fall)
3-0-9 H-LEVEL Grad Credit

A general introduction to manifolds and Lie groups. The role of Lie groups in mathematics and physics. The exponential mapping. Correspondence with Lie algebras. Homogeneous spaces and transformation groups. Adjoint representation. Compact Lie groups. Structure theory and elementary representation theory.
P. Pandzič

18.756 Analysis on Lie Groups

Prereq.: Elementary knowledge of Lie groups and manifold theory
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

The wave equation in Euclidean space with geometric and physical interpretation of the solution. Hadamard's theory of second order hyperbolic equations with emphasis on Huygens' principle and conformal transformations. Solution in spaces of constant curvature (Riemannian and Lorentzian) obtained by means of Radon transform and orbital integrals. Hadamard's problem in symmetric spaces, also for multi-temporal wave equations.
S. Helgason

18.757 Representations of Lie Groups

Prereq.: 18.755
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

An introduction to representation theory of locally compact groups, with emphasis on compact groups and abelian groups. Peter-Weyl theorem and Cartan-Weyl highest weight theory for compact Lie groups.
Information: D. A. Vogan.

18.758 Representations of Lie Groups

Prereq.: 18.757
G (Fall)
3-0-9 H-LEVEL Grad Credit

Introduction to D-module approach to representation theory of semi-simple Lie groups.
P. Pandzič

18.769 Topics in Lie Theory

Prereq.: Permission of instructor
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Topics vary from year to year. Topic for 1996–97: Tensor categories.
A. Kirillov

18.775 Algebraic Number Theory

Prereq.: 18.702
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Fall)
3-0-9 H-LEVEL Grad Credit

18.776 Algebraic Number Theory

Prereq.: 18.775
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit

18.775: The p-adic numbers. Number fields, rings of integers, valuations. Ramification, different and discriminant. Finiteness of ideal class groups. Zeta-function; units and Dirichlet theorem on regulators. Quadratic reciprocity law, cyclotomic fields and decomposition laws. Computation of class numbers of quadratic fields. 18.776: Division algebras and Brauer group. Local and global class field theory, including the cohomological approach and Lubin-Tate theory. Weil group. Tate's duality.
Information: A. A. Beilinson.

18.781 Theory of Numbers

Prereq.: 18.701 or 18.703
U (Spring)
3-0-9

Primes, congruences, quadratic reciprocity, and arithmetic functions. Distribution of primes, Euler's zeta function and its values at even integers. Irrationality of e and pi. P-adic numbers. Diophantine equations, rational approximations, and continued fractions. Kronecker's theorem. The geometry of numbers. Quadratic forms and quadratic number fields.
A. Goncharov

18.785 Analytic Number Theory

Prereq.: 18.115
Acad Year 1996-97: G (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit

A historical approach to analytic number theory. Riemann hypothesis, Goldbach's conjecture, the k-tuple conjecture, Cramer's conjecture, Waring's problem, Lindelof's hypothesis, the class number problem, Siegel zeros, Vinogradov's hypothesis, Artin's conjecture, the Linnik-Selberg conjecture, their influence on the development of analytic number theory.
A. Zaharescu

18.786 Topics in Number Theory

Prereq.: Permission of instructor
Acad Year 1996-97: G (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. Topic for 1996–97: L-functions and motives.
A. Goncharov

18.795 Multilinear Algebra

Prereq.: 18.700 or 18.701 or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Intensive introduction to the basic concepts of multilinear algebra that are required for the further study of combinatorics, topology, algebraic topology, and Lie theory. Tensor algebras, exterior algebra, Clifford algebra, representations of the symmetric and general linear group, finer theory of Young symmetrizers, basic notions of Hopf algebra, introduction to supersymmetric algebra.
Information: G.-C. Rota.

Topology and Geometry

18.901 Introduction to Topology

Prereq.: 18.100
U (Fall, Spring)
3-0-9 (H except XVIII)

Introduces topology, covering topics fundamental to modern analysis and geometry. Topological spaces, connectedness, compactness, continuous functions, separation axioms, function spaces. Metrization theorems, the Tychonoff theorem.
Fall Term: *J. R. Munkres*
Spring Term: *F. P. Peterson*

18.904 Seminar in Topology

Prereq.: 18.901
U (Spring)
3-0-9

Seminar for mathematics majors. Students present and discuss the subject matter, taken from current journals or books. Topics may vary from year to year. Topics for 1996–97: Fundamental group and covering spaces.
J. R. Munkres

18.905 Algebraic Topology

Prereq.: 18.702 or 18.705; 18.901
G (Fall)
3-0-9 H-LEVEL Grad Credit

18.906 Algebraic Topology

Prereq.: 18.905
G (Spring)
3-0-9 H-LEVEL Grad Credit

Simplicial and singular homology, Eilenberg-Steenrod axioms. Cohomology ring, universal coefficient theorem, Künneth theorem, plus additional toipcs to be chosen by the instructor (such as homotopy theory, duality in manifolds, vector bundles).
F. P. Peterson

18.915 Graduate Topology Seminar

Prereq.: 18.906
G (Fall)
3-0-21 H-LEVEL Grad Credit

Study and discussion of important original papers in the various parts of algebraic and differential topology. Open to all students who have had 18.906 or the equivalent, not only prospective topologists.
M. J. Hopkins

18.917 Topics in Algebraic Topology

Prereq.: 18.906
G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. Topics may include: cohomology operations, homotopy theory, K-theory, cobordism theory, stable homotopy theory, localization, mapping spaces.
H. R. Miller

18.950 Differential Geometry

Prereq.: 18.100, *18.901*
U (Spring)
3-0-9

An introduction to differential geometry, with emphasis on curves and surfaces. Frenet formulas, fundamental forms, curvature, Gauss' theorem, geodesics, Riemannian manifolds. 18.901 is required, but may be taken concurrently. 18.101 is strongly recommended but not required.
S. Axelrod

18.965 Geometry of Manifolds

Prereq.: 18.101
G (Fall)
3-0-9 H-LEVEL Grad Credit

18.966 Geometry of Manifolds

Prereq.: 18.965
G (Spring)
3-0-9 H-LEVEL Grad Credit

Differentiable manifolds, vector fields and forms, introduction to Lie groups, the DeRham theorem, Riemannian manifolds. 18.966 continues 18.965. Focuses on global differential geometry, curvature and topology. Heat kernels and index theorems also discussed.
G. Tian

18.969 Topics in Geometry

Prereq.: 18.966
G (Fall)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year. 1996–97: Continuation of 18.966. Topics include moment maps and moment polytopes, symplectic reduction, geometric quantization via polarizations and spin-C structures, and the "quantization commutes with reduction" theorem. Applications of the techniques of this course to representation theory and combinatorics also discussed.
V. W. Guillemin

18.979 Graduate Geometry Seminar
(New)

Prereq.: Permission of instructor
G (Spring)
3-0-9 H-LEVEL Grad Credit
Can be repeated for credit

Content varies from year to year.
Information: R. B. Melrose.

18.999 Mathematical Reading

Prereq.: —
G (Fall, Spring, Summer)
Units arranged
Can be repeated for credit

Reading of advanced mathematical treatises under supervision of a member of the Department. For graduate students desiring advanced work not provided in regular subjects.
D. A. Vogan

18.UR Undergraduate Research

Prereq.: —
U (Fall, Spring)
Units arranged [P/D/F]
Can be repeated for credit

Undergraduate research opportunities in mathematics. Permission required in advance to register for this subject. For further information, consult the Departmental Coordinator.
Information: D. A. Vogan.

18.ThG Graduate Thesis

Prereq.: —
G (Fall, Spring)
Units arranged H-LEVEL Grad Credit
Can be repeated for credit

Program of graduate research, leading to the writing of a Ph.D. thesis; to be arranged by the student and an appropriate MIT faculty member.

Course 20

Program in Applied Biological Sciences

20.921 Selected Topics in Applied Biological Sciences

Prereq.: —
G (Fall, Spring)
Units arranged H-LEVEL Grad Credit
Can be repeated for credit

Detailed discussion of selected topics of current interest. Classwork in various fields not covered by regular subjects.
Staff

20.ThG Graduate Thesis

Prereq.: —
G (Fall, Spring, Summer)
Units arranged H-LEVEL Grad Credit
Can be repeated for credit

Program of graduate research, leading to the writing of an S.M. or Ph.D. thesis; to be arranged by the student and appropriate MIT faculty member.
P. C. Dedon

Course 21

Anthropology (21A)
Foreign Languages and Literatures (21F)
History (21H)
Literature (21L)
Music and Theater Arts (21M)
Program in Writing and Humanistic Studies (21W)

Humanities

For degree requirements, see listing in Chapter VII under the School of Humanities and Social Science.

To register for individual research or thesis in a specific humanities section, see the end of the section's subject listing below.

21.UR Research in Humanities

Prereq.: —
U (Fall, Spring)
Units arranged [P/D/F]
Can be repeated for credit

21.URG Research in Humanities

Prereq.: —
U (Fall, Spring)
Units arranged
Can be repeated for credit

Individual participation in an ongoing research project. For students in the Undergraduate Research Opportunities Program.
Consult P. S. Khoury.

21.ThT Humanities Pre-Thesis Tutorial

Prereq.: As specified for particular field
U (Fall, Spring)
1-0-5
Can be repeated for credit

Definition of and early-stage work on thesis project leading to 21 ThU Undergraduate Thesis in Humanities. Taken during the first term of the student's two-term commitment to the thesis project. Student works closely with an individual faculty tutor. Required for all students in Course XXI, and those doing XXI-E and XXI-S degrees, for whom the thesis is a degree requirement.
P. S. Khoury

21.ThU Undergraduate Thesis in Humanities

Prereq.: 21 ThT
U (Fall, Spring)
Units arranged
Can be repeated for credit

Completion of work on the senior major thesis under supervision of a faculty tutor. Includes oral presentation of thesis progress early in the term, assembling and revising the final text, and meeting at the close with a committee of faculty evaluators to discuss the successes and limitations of the project. Required for most students in Course XXI and those doing XXI-E and XXI-S degrees. (See degree requirements in specific fields.)
P. S. Khoury

Anthropology

Consult Anthropology Headquarters, 20B-131, for the most up-to-date information about requirements and subject offerings.

The anthropology subjects described below are grouped within five areas: Introductory, Social Anthropology, Technology in Cultural Context, Culture History, and Advanced Topics. Students are encouraged to take subjects from each of the first four groups for a fuller overview of the field.

Introductory

21A.100 Introduction to Anthropology

Prereq.: —
U (Fall)
3-0-9 HASS-D, Category 4

What kinds of wisdom do other ways of life offer our own? How do other perspectives on the world challenge our assumptions about life? These questions are addressed through the four fields of anthropology: biological, cultural, and linguistic anthropology, and archaeology. We examine family and kinship, religion, economics, politics, survival of indigenous groups, and Western influences from an anthropological perspective to gain appreciation for cultural and ethnic diversity.
M. Diskin

21A.109 Understanding Culture

Prereq.: —
U (Fall)
3-0-9 HASS-D, Category 4

Students are introduced to anthropological fieldwork and the concept of culture from readings, films, and their own research projects in the Boston area. A "hands-on" approach to understanding cultural differences and what produces them. Students discover the excitement and challenges of systematically observing human interaction and convincing others of the accuracy of their findings.
J. Jackson

21A.110 Seminar in Anthropological Method and Theory

Prereq.: Major or minor in Anthropology, or permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Seminar focusing on core issues and approaches in anthropological theory and method. Theoretical frameworks for the analysis and integration of material from other subjects in cultural anthropology.
Consult J. Howe.

21A.112 Tutorial for Majors and Minors in Anthropology

Prereq.: Major or minor in Anthropology
U (Fall, Spring)
3-0-9 HASS

Reading and discussion subject. Each student meets regularly with tutor to discuss readings. Grounding in fundamentals of anthropology and integration of other coursework in field.
Consult J. Howe.

Social Anthropology

21A.211 Magic, Witchcraft, and the Spirit World

Prereq.: —
U (Fall)
3-0-9 HASS

Spiritual, magical, and "occult" aspects of human behavior in anthropological and historical perspective: divination and other forms of magic, ritual curing, trance, spirit possession, sorcery, and accusations of witchcraft. Material drawn from traditional non-western societies, medieval and early modern Europe, and colonial and contemporary North America.
J. Howe

21A.212 Myth, Ritual, and Symbolism

Prereq.: —
U (Spring)
3-0-6 HASS

How people make sense of their worlds symbolically through myth, ritual, metaphor, and cosmology. The structure of symbols, the natural and social elements they draw on, their social use, and the messages they convey. Students learn to record and analyze myth and ritual.
Consult J. Howe.

21A.214 Communities in Crisis

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-6 HASS

What happens when a community is severely stressed? Investigates crises in several western and nonwestern communities, and the attempts made to resolve them by political, religious, or other means.
M. Diskin

21A.215 Medical Anthropology

Prereq.: —
U (Fall)
3-0-9 HASS

Examination of how medicine is practiced cross-culturally, with particular emphasis on western biomedicine. Analysis of medical practice as a cultural system, focusing on the human, as opposed to the biological, side of things. Also examines how we and people in other cultures think of disease, health, body, and mind.
J. Jackson

21A.216 Monotheistic Religions in Cultural Context
(New)

Prereq.: —
U (Fall)
3-0-9 HASS

How and why did the major monotheistic religions (Judaism, Christianity, Islam) arise where and when they did? What were the historical and cultural incentives for their developments; how did they become institutionalized and spread? How did each one deal with the establishment of its canonical texts and doctrine, with heresies, and with reform movements? Readings from the primary religious texts, histories, theories of religion, and ethnographies.
A. Steinberg

21A.220 The Conquest of America

Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 5

The five-hundred-year encounter between native peoples of the Americas and European power and culture. Exploration and conquest. European ideology and fantasies about "savages." Colonialism, resistance, and adaptation. Missionizing and culture contact. Cases include struggles of Maya, Iroquois, and native New Englanders. Students learn to use primary documents.
J. Howe

21A.223 Rural Communities: Dilemmas of Development

Prereq.: —
U (Spring)
3-0-6 HASS

Contemporary agrarian communities and the problems they face, with emphasis on Mexico. Peasants, plantation workers, and other rural proletarians. Examines present-day and traditional farming technologies, gender and family structures, politics, values, social movements, rural-urban migration.
M. Diskin

21A.224J Introduction to Latin American Studies

(Same subject as 21F.884J, 17.541J)
Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 4

See description under subject 21F.884J.
M. Diskin, E. Garrels

21A.225 Rural Conflicts and Rebellion
(New)

Prereq.: —
U (Fall)
3-0-9 HASS

Examines rural conflicts or the rural component of national conflicts in the modern and pre-modern periods. Studies different phenomena such as "primitive rebels," cargo cults and messianic movements, "everyday forms of peasant resistance," and agrarian revolution. Examples from southeast Asia, Mexico, and Europe.
M. Diskin

21A.230J The Contemporary Family

(Same subject as SP.456J)
Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 4

The role of the family in human evolution, and as a symbol in our own social and political lives. Topics include: sex, marriage, and parenting; the labor market; class, race, and ethnicity; and the family's probable future.
J. Jackson

21A.231J Gender, Sexuality, and Society

(Same subject as SP.455J)
Prereq.: —
U (Spring)
3-0-9 HASS

An introduction to the anthropological study of human sexuality, gender constructs, and the sociocultural systems these are embedded in. Examines current critiques of Western philosophical and psychological traditions, and cross-cultural variability and universals of gender and sexuality.
J. Jackson

Technology and Cultural Context

21A.334 Modern Times

Prereq.: —
U (Fall)
3-0-6 HASS

Anthropologists, famous for excursions among faraway peoples, increasingly study one of the most bizarre societies of all — our own. A cross-cultural perspective taking into account both "primitive" societies and other industrialized ones helps us to understand our own body rituals, ethnic divisions, myths, living arrangements, rites of education, sense of time, and scientific cosmologies.
Consult J. Howe.

21A.340J Technology and Culture

(Same subject as STS.075J)
Prereq.: —
U (Spring)
3-0-9 HASS

Examines the relationship between technology and the social life of humans from hunter-gatherers to nuclear weapons scientists. Looks at the effect of technological change on so-called "primitive" societies, the relationship between colonialism, capitalism, and technology, and the transformation of modern American culture by television, computers, and weapons. Readings include books and articles by anthropologists, historians, and cultural critics, as well as one science fiction novel.
H. Gusterson

21A.344 Drugs and Culture

Prereq.: —
U (Fall)
3-0-9 HASS

Examines relationship between drugs and society in cross-cultural perspective. Examines "traditional" societies' use of mind-altering, addictive, and habit-forming substances, the development of a global trade in sugar, opium, and cocaine with the rise of capitalism, and the use and abuse of alcohol, LSD, MDMA, and Prozac in the US. Concludes by looking at addiction as a cultural concept.
H. Gusterson

Culture History

21A.450 First Americans

Prereq.: —
U (Fall)
3-0-6 HASS

Native cultures of North America from the first ancient hunters to the present. Adaptation to hunting and agriculture. Religion and spirituality. Farmers of the Southwest; horse peoples of the great plains; League of the Iroquois; peoples of New England. White conquest and native resistance. Native Americans today.
Consult J. Howe.

21A.453 Culture History of the Middle East
(Revised Content and Units)

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Focus on the Middle East as a culture area in which there has been a very long and well-known history and a great deal of change and cross-cultural interaction. Examines the rise of cities and empires and their collapse due to environmental and political causes; the rise of major world religions; advances in military technology; religious wars; rise of nation states; mercantile activity; the politics of oil; ethnic differences and their solutions.
Consult J. Howe.

21A.454 Egypt's Past
(Revised Content)

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-6 HASS

A culture-historical overview of the Nile Valley from the earliest times to the present. The management of the Nile Valley: agriculture, irrigation, socio-political organizations, and the role of religion. Relations with other parts of Africa: trade, invasion, conquest. The Middle Ages and the Mediterranean contacts. Dealing with European imperialsim, the Suez Canal, recent conflicts in historical perspective.
Consult J. Howe.

21A.457 Mexico and Central America from Early Times to the Present

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

In this region, flourishing indigenous civilizations gave way to European colonialism, and then to the independent countries of Mexico, Guatemala, Honduras, El Salvador, and Nicaragua. Considers the cultures of this region from a variety of anthropological, historical, and political perspectives over a long time span, revealing both their differences and their shared heritage.
M. Diskin

Topical

21A.560 The City in History

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-6 HASS

That unique human construct, the city, is the focus. After discussing different approaches to the study of the city, students look at examples from the Near East, China, and the Greco-Roman world to see how they evolved, differed, and decayed. Physical and social plans, forces that shaped them, and the present and future of cities are among the topics discussed.
A. Steinberg

21A.561 The Decline of Empires

Prereq.: —
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-6 HASS

After examination of basic institutions and processes of empires from modern sociological literature and recent examples, we derive some generalities about how and why empires disintegrate. Considers frontiers, military power, bureaucracy, ruling elites, religions, population growth, raw materials and markets, and urbanization. Generalities tested against examples chosen from ancient and medieval times including Persia, Greece, Rome, Byzantium, and China.
A. Steinberg

Graduate Subjects

For Program in History and Social Study of Science and Technology

21A.670J Proseminar: Social Theory and Analysis

(Same subject as STS.502J)
Prereq.: —
G (Spring)
3-0-9

Major theorists and theoretical schools since the late nineteenth century. Marx, Weber, Durkheim, Bourdieu, Levi-Strauss, Geertz, Foucault, Gramsci, others. Key terms, concepts, debates.
J. Jackson

21A.671J Introduction to Cultural Criticism

(Subject meets with STS.507J, STS.059)
Prereq.: Permission of instructor
G (Spring)
2-0-7

See description under subject STS.507J.
H. Gusterson

Special Topics

21A.896, 21A.897 Special Topics in Anthropology

Prereq.: Any two subjects in Anthropology
U (Fall, Spring)
Units arranged
Can be repeated for credit

Topics in anthropology not included in other subjects. Students electing this subject must secure the approval of the Head of the Anthropology Program. HASS credit for Special Topics subjects awarded only by individual petitions to the Committee on Curricula. Normal maximum is 6 units; to count toward HASS Requirement, 9 units are required. Exceptional 9-unit projects occasionally approved.
Consult J. Howe.

21A.998, 21A.999 Advanced Topics in Anthropology

Prereq.: —
G (Fall, Spring)
Units arranged
Can be repeated for credit

Special studies or projects at an advanced level with a member of the Anthropology faculty.
Consult J. Howe.

For individual research in Anthropology, register for 21A.UR or 21A.URG. For Anthropology pre-thesis tutorial, register for 21A.ThT. For undergraduate thesis, register for 21A.ThU. Descriptions of these subjects can be found in the beginning of this section under 21.UR, 21.URG, 21.ThT, and 21.ThU on page 487.

Foreign Languages and Literatures

Consult Foreign Languages and Literatures Headquarters, 14N-305, for the most up-to-date information about requirements and subject offerings.

The subjects listed below include language, literature, and cultural studies subjects given in Chinese, French, German, Japanese, Spanish, and Studies in International Literatures and Cultures. A variety of literature subjects given in the original language as well as some given in English offer HASS Distribution credit.

***HASS-D Language Option:* Because the Institute regards competence in foreign language as a fundamental value, students may substitute *one* language subject at level III or IV (i.e., 21F.103, 21F.104, 21F.303, 21F.304, 21F.403, 21F.404, 21F.503, 21F.504, 21F.703, or 21F.704) for one HASS-D subject. Of the two remaining HASS-D subjects, one must be taken from categories 4 or 5 and the other from one of the remaining categories. Students selecting this language option may not choose a second distribution subject taught in the same foreign language or literature.**

All foreign language subjects I-IV are open to graduate students for credit.

For subjects in English as a Second Language, see 21F.212–21F.240.

Chinese

The indication of prerequisites for specific Chinese offerings does not apply to students who have already accomplished the equivalent work. For further placement advice, consult with a field advisor in Chinese.

21F.101 Chinese I

Prereq.: —
U (Fall)
4-0-8 HASS

Introduction to spoken and written modern Chinese (Mandarin). Pronunciation, sentence structure, grammar, conversation, reading and writing. Lab work required. Enrollment limited to 20 students.
Y. Tai

21F.102 Chinese II

Prereq.: Chinese I
U (Spring)
4-0-8 HASS

Enhancement of four basic language skills. Extension of grammar and vocabulary. Lab work required.
Y. Tai

21F.103 Chinese III

Prereq.: Chinese II
U (Fall)
4-0-8 HASS-D Language Option

Development of communication skills through active use of the Chinese language. Emphasis on expansion of vocabulary, reading and writing, conversation, and assigned oral presentation. Lab work required.
Y. Liu

21F.104 Chinese IV

Prereq.: Chinese III
U (Spring)
4-0-8 HASS-D Language Option

Emphasis on oral and written communication. Attention paid to assigned simple writings, more challenging oral presentations on topics of everyday situations. Lab work required.
Y. Liu

21F.105 Advanced Chinese I

Prereq.: Chinese IV
U (Fall)
4-0-8 HASS

Consolidation and expansion of skills in reading and writing. Discussion in Mandarin of literary and non-literary materials including newspaper articles, short narratives, lyrical and expository essays. Emphasis on cultural and social issues. Compositions and lab work required.
Y. Liu

21F.106 Advanced Chinese II

Prereq.: Chinese V
U (Spring)
4-0-8 HASS

Continuation of 21F 105. Further development of language skills in speaking and writing. Materials are selected from public media including reports in SCOLA, TV documentaries, and articles in professional journals on social, political, and economic changes in China. Both oral and written reports are required.
Y. Liu

For Literature and Culture subjects on China offered in English, see 21F.840, 21F.842.

English as a Second Language

21F.211 English II: English as a Second Language

(Subject meets with 21F.212)
Prereq.: Placement test or permission of instructor
G (Fall)
3-0-6

21F.212 English II: English as a Second Language

(Subject meets with 21F.211)
Prereq.: Placement test or permission of instructor
U (Fall)
3-0-6 HASS

Continued development of skills in oral comprehension, speaking, reading, and writing. Activities, which include language laboratory work, reinforce understanding and lead to an increased ability to communicate.
M. Christie

21F.213 English III: English as a Second Language

(Subject meets with 21F.214)
Prereq.: Placement test or permission of instructor
U (Fall, Spring)
3-0-6 HASS

21F.214 English III: English as a Second Language

(Subject meets with 21F.213)
Prereq.: Placement test or permission of instructor
G (Fall, Spring)
3-0-6

Improves and refines accuracy, fluency, and style in both spoken and written English through use of American newspapers, radio, literary texts, videotapes, and movies. Also leads to better understanding of American cultures.
J. Dunphy

21F.215 Advanced Speaking and Critical Listening Skills: English as a Second Language

(Subject meets with 21F.216)
Prereq.: Placement test or permission of instructor
G (Fall)
3-3-3

21F.216 Advanced Listening and Speaking Skills: English as a Second Language

(Subject meets with 21F.215)
Prereq.: Placement test or permission of instructor
U (Fall)
3-3-3 HASS

For high intermediate/advanced students who wish to build confidence and skills in spoken English. Focuses on the appropriate oral presentation of material in a variety of professional contexts: group discussions, classroom explanations and interactions, as well as thesis/research proposals. Valuable for those who intend to teach or lecture in English. Language laboratory assignments.
J. Dunphy

21F.217 Workshop in Strategies for Effective Teaching: English as a Second Language
(New)

(Subject meets with 21F.218)
Prereq.: —
G (IAP)
1-0-2

21F.218 Workshop in Strategies for Effective Teaching: English as a Second Language
(New)

(Subject meets with 21F.217)
Prereq.: —
U (IAP)
1-0-2

A mini-module for international teaching assistants. Covers special problems in teaching when English is a second language and the US a second culture. Videotaping of practice sessions for feedback. Individualized programs to meet different needs. Graduate TAs have priority.
J. Dunphy

21F.219 Workshop in Written Expression: English as a Second Language
(New)

(Subject meets with 21F.220)
Prereq.: —
G (Fall)
3-0-3

21F.220 Workshop in Written Expression: English as a Second Language
(New)

(Subject meets with 21F.219)
Prereq.: Placement test or permission of instructor
U (Fall)
3-0-3

A seven-week writing module for ESL students who wish to review and practice accurate grammar, effective sentence and paragraph structure, punctuation and word choice. Short weekly writing assignments with extensive editing required. Class meets for 3 hours per week during the first half of the term.
M. Christie

21F.222 Expository Writing II for Undergraduates: English as a Second Language
(Revised Units)

Prereq.: Placement test or permission of instructor
U (Fall, Spring)
3-0-9 HASS, Phase One WRIT

Formulating, organizing, and presenting ideas clearly in writing. Reviews basic principles of rhetoric. Focuses on development of a topic, thesis, choice of appropriate vocabulary, and sentence structure to achieve purpose. Develops idiomatic prose style. Gives attention to grammar and vocabulary usage. Special focus on strengthening skills of bilingual students. Successful completion satisfies Phase I of the Writing Requirement.
M. Christie

21F.225 Advanced Workshop in Writing for Science and Engineering: English as a Second Language
(Revised Units)

(Subject meets with 21F.226)
Prereq.: Placement test
G (Fall, Spring)
3-0-9

21F.226 Advanced Workshop in Writing for Science and Engineering: English as a Second Language
(Revised Units)

(Subject meets with 21F.225)
Prereq.: Placement test
U (Fall, Spring)
3-0-9 HASS, Phase Two WRIT

Analysis and practice of various forms of scientific and technical writing, from memos to journal articles. Strategies for conveying technical information to a specialist audience. Comparable to 21W.780 but methods designed to deal with special problems of those whose first language is not English. Successful completion satisfies Phase II of Writing Requirement for students registered in 21F.226.
J. Dunphy

21F.227 Advanced Workshop in Writing for Social Sciences and Architecture: English as a Second Language
(Revised Units)

(Subject meets with 21F.228)
Prereq.: Placement test
G (Spring)
3-0-9

21F.228 Advanced Workshop in Writing for Social Sciences and Architecture: English as a Second Language
(Revised Units)

(Subject meets with 21F.227)
Prereq.: Placement test
U (Spring)
3-0-9 HASS, Phase Two WRIT

Advanced subject focusing on techniques, format, and prose style used in academic and professional life. Emphasis on writing as required in fields such as economics, political science, and architecture. Short assignments including business letters, memos, and proposals build toward a written term project. Methods are designed to deal with the special problems of those whose first language is not English. Successful completion satisfies Phase II of the writing requirement for students registered in 21F.228.
M. Christie

Studies in Language

21F.236J Linguistic Theory and Second Language Acquisition

(Same subject as 24.948J)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: G (Spring)
3-0-6

See description under subject 24.948J.
W. O'Neil, S. Flynn

21F.237J The Study of Language

(Same subject as 24.900J)
Prereq.: —
U (Fall)
3-0-9 HASS

See description under subject 24.900J.
S. Flynn, Staff

21F.240J Language and its Structure I: Phonology

(Same subject as 24.901J)
Prereq.: 24.900J/21F 237J
U (Spring)
3-0-9 HASS

See description under subject 24.901J.
W. O'Neil

French

The indication of prerequisites for specific French offerings does not apply to students who have already accomplished the equivalent work. For further placement advice, consult with one of the field advisors in French.

Fundamental Language Subjects

21F.301 French I

Prereq.: —
U (Fall, IAP, Spring)
4-0-8 HASS

Introduction to French language and culture. Emphasis on the acquisition of vocabulary and grammatical concepts through active communication. Immediate exposure to authentic French via video sources and printed materials; for developing cultural awareness as well as linguistic proficiency. Coordinated language lab program.
S. Levet

21F.302 French II

Prereq.: French I
U (Fall, Spring)
4-0-8 HASS

Further development of linguistic proficiency through active communication. Expansion of vocabulary and completion of the basics of French grammar. Continued exposure to culturally authentic audio and video materials in the classroom and the language lab. Study of short texts. Increased practice in writing.
S. Levet

21F.303 French III

Prereq.: French II
U (Fall, Spring)
4-0-8 HASS-D Language Option

Review and expanded study of selected aspects of French grammar. Analysis of films and/or texts from a cross-cultural perspective. Use of interactive multimedia materials for developing comprehension of authentic spoken French and for the exploration of French cultural attitudes and behaviors. Weekly practice in composition. Daily exercises in oral communication and vocabulary enrichment.
G. Furstenberg

21F.304 French IV

Prereq.: French III
U (Fall, Spring)
4-0-8 HASS-D Language Option

Final subject in the French language sequence before taking intermediate subjects in French literature and culture. Further development of linguistic skills, for improving the overall quality of writing and oral fluency. The cultural content of the course is provided by a variety of contemporary materials, ranging from comic books, to short stories to films to interactive CD-ROMs.
S. Waryn

Subjects in Language, Literature, and Culture

These subjects (21F.308, 310, 311, 320) are designed for students who have completed French IV or its equivalent. They serve as a transition between language study and more advanced subjects in literature and cultures. Although each subject has a different emphasis, all provide students with additional practice in reading, speaking, and writing.

Students may take several subjects from these offerings. Native speakers of French who have studied French literature at a high school level must seek the instructor's approval for admission to any of these subjects.

21F.308 Advanced French Language Study

Prereq.: French IV or equivalent
U (Spring)
3-0-9 HASS

For those who have completed French IV or the equivalent, but who wish to continue with language study before taking upper-level subjects in literature or culture. Development of reading, writing, and phonetics through the use of a variety of documents, stories, and poems.
S. Levet

21F.310 French Conversation: Intensive Practice

Prereq.: French IV or equivalent
U (Fall)
3-0-9 HASS

Systematic training in oral expression: communication skills, fluency, and idiomatic French. Audio and video tapes to improve conversational techniques and other forms of oral expression (debates, speeches, reports, interviews). Discussion materials: newspapers, magazines, recent films, and varied audio and interactive video programs dealing with issues in contemporary France. Focus on cultural phenomena specific to French society. Special projects (video and other) by students. Limited to 16.
S. Waryn

21F.311 Introduction to French Culture

Prereq.: French IV or equivalent
U (Fall)
3-0-9 HASS-D, Category 1

Studies major social, political, and aesthetic modes which have shaped French civilization. Coordinates the study of literature, film, and art with the historical evolution of France.
M. Roberts

21F.320 Introduction to French Literature

Prereq.: French IV or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

A basic study of major French literary genres — poetry, drama, and fiction — and an introduction to methods of literary analysis. Authors include Voltaire, Balzac, Baudelaire, Apollinaire, Ionesco, Duras. Special attention devoted to the improvement of French language skills.
M. Roberts

Advanced Subjects in Literature and Culture

Students are required to take at least one intermediate subject before enrolling in advanced subjects. Otherwise they must obtain permission of the instructor.

21F.336 Introduction to the French Short Story

Prereq.: One intermediate French subject or equivalent
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Short stories by major French authors. Special attention paid to the theme of the fantastic and the supernatural. Works by Perrault, Barbey d'Aurevilly, Villers de l'Isle-Adam, Maupassant, Nelly Kaplan, and Michel Tournier.
M. Roberts

21F.338 The French Novel in the Nineteenth Century

Prereq.: One intermediate French subject or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

The golden age of the French novel. Emphasizes Romanticism, Realism, and Naturalism in Balzac, Stendhal, Sand, Flaubert, and Zola. Themes include the interaction of love, money, and politics in the newly developed bourgeois society of nineteenth-century France. Devotes attention to narrative techniques, representations of reality, and the influence of history and science.
Consult I. de Courtivron.

21F.340 The French Novel in the Twentieth Century

Prereq.: One intermediate French subject or equivalent
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Reading and discussion of major twentieth-century French novels. Emphasis on literary techniques as well as historical and cultural contexts. Works by writers such as Genet, Gide, Yourcenar, Proust, Colette, and Camus.
I. de Courtivron

21F.342 Topics in French Film

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
4-0-8 HASS
Can be repeated for credit

Close study of a topic that relates to the art and history of the French cinema and that focuses on a specific director, movement, theme, critical or theoretical issue, analytic approach, etc. Films shown with English subtitles. For 1995–96 the topic is Marcel Carné and Jean Renoir: two major directors, two cinematic visions. Conducted in English.
E. B. Turk

21F.344 From Renaissance to Revolution: The French Humanist Tradition in Literature

Prereq.: One intermediate French subject or equivalent
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Readings in major writers of the Renaissance (Rabelais, Montaigne, Ronsard), the Neo-Classic Period (Corneille, Racine, Moliere, La Fontaine), and the Enlightenment (Rousseau, Prévost, Voltaire, Beaumarchais). Places texts in cultural and intellectural contexts, with emphasis on how the Renaissance concept of bestowing special value on human individuality evolved over a period of three centuries.
E. B. Turk

21F.399 Intensive French Language and Culture: Preparing to Work in France

Prereq.: French IV or equivalent
U (IAP)
4-0-8 HASS

Prepares students to express themselves fluently and to function in a French work environment in the field of their choice. Main components are: a general review of grammar and communication skills; a series of lectures and presentations on French science and technology; advanced independent study of French language using the latest interactive resources, with an emphasis on science and technology; and an introduction to historical and contemporary aspects of French cultural life. Priority given to seniors and graduates.
S. Waryn

For literature subjects on France offered in English, see 21F.850 through 21F.852.

German

The indication of prerequisites for specific German offerings does not apply to students who have already accomplished the equivalent work. For further placement advice, consult one of the field advisors in German.

Fundamental Language Subjects

21F.401 German I

Prereq.: —
U (Fall, IAP, Spring)
4-0-8 HASS

Basic principles of the German language. Fundamentals of pronunciation, intonation, and grammar. Acquisition of basic vocabulary. Laboratory exercises to further communicative competence.
M. Totten, E. Crocker

21F.402 German II

Prereq.: German I
U (Fall, Spring)
4-0-8 HASS

Continued practice in pronunciation and intonation. Vocabulary building, review and extension of basic grammar. Practice in writing short essays. Reading of short literary texts. Introduces the history and culture of German-speaking countries.
E. Crocker, M. Totten

21F.403 German III

Prereq.: German II
U (Fall, Spring)
4-0-8 HASS-D Language Option

Reading of drama, prose, and poetry by such major twentieth-century authors as Dürrenmatt, Böll, Borchert, and others. Discussions and compositions based on these works, media selections, and audio/videotapes on contemporary issues in the German-speaking world link the learning of language and that of culture. Review of German grammar and development of vocabulary-building strategies to improve self-expression. Recommended for students with two years of high school German.
K. Fendt

21F.404 German IV

Prereq.: German III
U (Fall, Spring)
4-0-8 HASS-D Language Option

Further deepening of an understanding of German language and culture. Interpretation of literary texts (Brothers Grimm, Frisch, Brecht), discussion of cultural topics, development of oral communicative competence in practical everyday situations.
E. Crocker, M. Totten

Intermediate and Advanced Subjects in Language, Literature, and Culture

21F.410 Speaking and Writing: German in Technology and Business
(Revised Content)

Prereq.: German IV or equivalent
U (Spring)
4-0-8 HASS

Systematic training in speaking and writing skills to improve fluency and style with emphasis on communicative strategies. Discussion and analysis of newspaper and magazine articles, audio and visual materials, and modern expository prose. Students select a topic of their choice and present the final projects to the class.
B. Widdig

21F.412 Introduction to German Literature

Prereq.: German IV or equivalent
U (Fall)
3-0-9 HASS-D, Category 1

Readings from German prose fiction, poetry, and drama. Authors include Goethe, Brecht, T. Mann, Keller, Kafka, Rilke, Christa Wolf. Literary language as specialized communication; its conventions and presuppositions; relation of author to audience; imitation of reality vs experimentation with reality; purpose in literature: aesthetic, analytic, parodistic, and political goals. Conducted entirely in German, emphasizing reading, speaking, and writing skills.
B. Widdig

21F.414 German Culture and Society: 1750–1945

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

German Enlightenment, impact of the French Revolution on Germany, the failure of liberalism, the discrepancy between economic and political development, and the increasing polarization of society as manifested in the various forms of cultural expression, impact of World War I, rise of National Socialism. Readings include Lessing, Kant, Schiller, Marx, Nietzsche, and Freud. Music by Mozart, Schumann, Wagner, Schönberg. Paintings by Friedrich, Kirchner, Kokoschka. Lecture in English, separate discussion sections in German and English, readings in German or English.
B. Widdig

21F.416 Twentieth-Century German Literature

Prereq.: German IV or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Literature of the German-speaking countries viewed against the backdrop of history (World War I, inflation and depression, National Socialism, the anti-Nazi resistance and exile, World War II, the division and unification of Germany) and cultural trends (Expressionism, Dadaism, Nazi-culture, post-war literature, student-movement of the 1960s, new subjectivity). Authors include Th. and H. Mann, Brecht, Frisch, Böll, and C. Wolf.
B. Widdig

21F.418 German Poetry and Short Fiction

Prereq.: German IV or equivalent
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Poetry and short fiction from the nineteenth and twentieth centuries. Representative works read and discussed, emphasizing metaphoric and rhythmic use of language, narrative strategy, aesthetic structure, social concern, and historical context. Authors include: Kleist, E. T. A. Hoffmann, Büchner, Rilke, Goethe, von Günderrode, Eichendorff, Bachmann, and Grass.
B. Widdig

21F.499 Germany Today: Intensive German Language and Culture

Prereq.: German IV or equivalent
U (IAP)
4-0-8 HASS

Helps students perfect their communication skills and prepares them for working and living in German-speaking countries. Topics studied include: current political debates; Germany in its European context; the scientific and business communities; the influence of the media; business German; the contemporary artistic and cultural scene.
Consult M. Totten.

For Literature and Culture subjects on Germany offered in English, see 21F.814, 21F.856, 21F.858, and 21F.860.

Japanese

The indication of prerequisites for specific Japanese offerings does not apply to students who have already accomplished the equivalent work. For further placement advice, consult with one of the field advisors in Japanese.

Fundamental Language Subjects

21F.501 Beginning Japanese I

Prereq.: —
U (Fall)
4-0-8 HASS

Introduction to modern standard Japanese. Emphasis on developing proficiency in speaking and listening, using basic grammar and vocabulary. Basic skills in reading and writing are also taught. Lab work required.
M. Ikeda

21F.502 Beginning Japanese II

Prereq.: 21F.501
U (Spring)
4-0-8 HASS

Enhancement of the four basic skills. Extension of basic grammar. Vocabulary and *kanji* (Chinese characters) building. Lab work required.
M. Ikeda

21F.503 Intermediate Japanese I

Prereq.: 21F.502
U (Fall)
4-0-8 HASS-D Language Option

Development of the four basic skills. Continued vocabulary and *kanji* building. Lab work required.
Y. Nagaya

21F.504 Intermediate Japanese II

Prereq.: 21F.503
U (Spring)
4-0-8 HASS-D Language Option

Review and expansion of basic grammar. Emphasis on application of basic grammar and vocabulary in various situations. Lab work required.
Y. Nagaya

21F.505 Advanced Japanese I

(21F.510)
Prereq.: 21F.504
U (Fall)
4-0-8 HASS

Systematic development of reading, writing, and oral communication skills. Introduction to advanced grammar. Deepening of the understanding of Japanese culture and society through reading and discussion. Lab work required.
T. Aikawa

21F.506 Advanced Japanese II

(21F.512)
Prereq.: 21F.510
U (Spring)
3-0-9 HASS

Continuation of 21F.510. Further development of reading, writing, and oral communication skills through reading and video. Extension of advanced grammar and further build-up of advanced vocabulary. Variety of cultural elements studied through readings, video, and discussion. Lab work required.
T. Aikawa

21F.507 Advanced Readings and Communication in Japanese I
(New)

Prereq.: 21F.506 or permission of instructor
U (Fall)
4-0-8 HASS

Students develop Japanese language skills necessary for professional as well as social settings. Uses selected materials from newspapers, videos, Internet, and other sources. A common core of course materials focusing on major topics in contemporary Japan is provided and discussed. In addition, each student selects and studies material in his/her own field using the electronic instruction environment of MIT's JP NET with the instructor's guidance. All reading and discussions are in Japanese.
T. Graham

21F.508 Advanced Readings and Communication in Japanese II
(New)

Prereq.: 21F.507 or permission of instructor
U (Spring)
4-0-8 HASS

A continuation of 21F.507. Coursework similar in structure to 21F.507, but with increased emphasis on independent projects.
T. Graham

Advanced Subjects

21F.514 Linguistic Theory and Japanese Language

(Subject meets with 24.946)
Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-6 HASS

Detailed examination of the grammar of Japanese, whose structure is significantly different from English, with special emphasis on problems of interest in the study of linguistic universals. Data from a broad group of languages will also be studied for comparison with Japanese. Meets with graduate subject 24.946, but assignments differ. Assumes familiarity with linguistic theory.
S. Miyagawa

For culture subjects on Japan offered in English, see 21F.864 and 21F.866.

Russian

For Literature and Culture subjects on Russia offered in English, see 21F.872J and 21F.873J.

Spanish

The indication of prerequisites for specific Spanish offerings does not apply to students who have already accomplished the equivalent work. For further placement advice, consult with a field advisor in Spanish.

Fundamental Language Subjects

21F.701 Spanish I

Prereq.: —
U (Fall, IAP, Spring)
4-0-8 HASS

Introduction to understanding, speaking, reading, and writing Spanish. Maximal use of fundamentals of grammar in active communication. Audio- and video-based language laboratory program coordinated with and supplementary to class work.
M. Ribas Groeger

21F.702 Spanish II

Prereq.: Spanish I
U (Fall, Spring)
4-0-8 HASS

Increased practice in listening comprehension, reading, and group interaction.
M. Ribas Groeger

21F.703 Spanish III

Prereq.: Spanish II
U (Fall, Spring)
4-0-8 HASS-D Language Option

Aims at consolidation and expansion of skills in aural comprehension, speaking, reading, and writing. Uses short stories and other readings, Hispanic television programs, and interactive video to study issues of current interest in Hispanic culture.
D. Morgenstern

21F.704 Spanish IV

Prereq.: Spanish III
U (Fall, Spring)
4-0-8 HASS-D Language Option

Continued study of the language, literature, and culture of Spanish-speaking countries. Materials are from both Spain and Latin America and include films, short stories, novels, plays, poetry, and journalistic reports in various media.
M. González-Aguilar

21F.705 Oral Communication in Spanish

Prereq.: Spanish II
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-6 HASS

Gives students the necessary language skills to perform successfully in Spanish in a variety of social situations. Focus on oral communication. Uses popular media for listening practice. Student projects involve reading, oral presentations, and classroom interaction. Emphasizes communication skills needed by students in engineering and management for work in Latin America or Spain.
D. Morgenstern

Intermediate Subjects in Language, Literature, and Culture

These subjects (21F.710–21F.715) are designed for students who have completed Spanish IV or its equivalent. They serve as a transition between language study and more advanced subjects in literature and culture. Although each subject has a different emphasis, all provide students with additional practice in reading, speaking, and writing.

It is required that all students take one of the intermediate-level subjects before enrolling in 21F.716 and above. Students may take several subjects from these offerings. Native speakers of Spanish who have studied Hispanic literature at a high school level must seek the instructor's approval for admission to any of these subjects.

21F.712 Spanish Conversation and Composition

Prereq.: Spanish IV or equivalent
U (Fall)
3-0-9 HASS

Systematic training in spoken and written skills to improve fluency and style. Oral reports by participants on individual topics. Discussions with native speakers, analyses of selected literary texts, periodicals, and Spanish-language media.
D. Morgenstern

21F.713 Advanced Reading and Writing in Spanish
(Revised Content)

(21F.710)
Prereq.: Spanish IV or equivalent
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Students read and discuss works by authors from diverse quarters of Hispanic culture, consider basic problems of interpretation, improve their ability to read, discuss, and write about literary texts, and review advanced Spanish grammar. Materials for class discussion and composition include Hispanic novels, novellas, short stories, plays, and poems.
N. Wey-Gómez

21F.714 Spanish for Bilingual Students

Prereq.: Fluency in a Spanish dialect
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Designed for students of Hispanic background brought up in the US. Expands oral and written grammar study and increases contact with standard Spanish; studies recent fiction and poetry as well as specific historical, social, economic, and political aspects of Mexican-American, Puerto Rican, and Cuban cultures. Many of the nonliterary readings are in English; class discussions in Spanish.
D. Morgenstern

21F.715 Introduction to Spanish Culture

Prereq.: Spanish IV or equivalent
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Studies the major social, political, and aesthetic modes which have shaped Spanish civilization. Coordinates the study of literature, film, art, and architecture with the historical evolution of Spain. Readings and discussion focus on such topics as: the coexistence of Christians, Moors, and Jews, Imperial Spain, The First and Second Republics, and the contemporary period as background for the emergence of distinctively Spanish literary and artistic movements.
M. Resnick

Advanced Subjects in Literature and Culture

Students are required to have taken at least one intermediate subject before enrolling in advanced subjects, or obtain permission of the instructor.

21F.716 Introduction to Contemporary Hispanic Literature

Prereq.: One intermediate subject in Spanish or equivalent
U (Fall)
3-0-9 HASS-D, Category 1

Studies important twentieth-century texts from both Spain and Latin America that represent the principal fictional genres — poetry, theatre, short story, and the novel. Includes works by Hernández, Bombal, Lorca, Neruda, Vallejo, Machado, Unamuno, García Márquez, Ferré, Riera, and Aub.
M. Resnick

21F.718 Art and the Intelligentsia in Post-Colonial Hispanic America
(Revised Content)

Prereq.: One intermediate subject in Spanish or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Looks at the evolving polemic, from Simon Bolivar and the early nineteenth-century Wars of Independence to the intelligentsia in Hispanic America and what is its social function. When have the roles of artist, intellectual, and political activist coincided? When have they diverged? How have these roles been defined or complicated by social class, race, ethnicity, and gender? Spanish-language novels, poetry, short stories, essays, testimonials, and films, including works by Bolívar, Martí, Darío, Azuela, Guillén, Arguedas, Menchú, Garro, Cortázar, Paz, Gambaro, Cuban filmmakers, Chicana poets, and contemporary performance artists.
E. Garrels

21F.729 Making the Other Speak: Narratives From the Spanish Conquest of the New World

Prereq.: One intermediate subject in Spanish, or equivalent
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

How might New World peoples be thought to "speak" in key stories of Spain's colonization of America? How do individual and collective, Old and New World views shape these stories? Selections include: Columbus on the Discovery; Cortes on his conquest of Mexico; Sahagún's Indian informants on Mexico's fall; Las Casas on the unlawfulness of Spain's expansionism; Cabeza de Vaca on shipwreck and survival; Cieza, Garcilaso, and various Andean chroniclers on the conquest of Peru; Ursua on Aguirre's search for El Dorado. Includes some cinematic versions. Students are asked to reflect on the relationship among storytelling, ideology, and historical truth.
N. Wey-Gómez

21F.730 Twentieth-Century Hispanic American Literature

Prereq.: One intermediate subject in Spanish or equivalent
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Concentrates on the classics of this century, with a few surprises: Quiroga's and Borges' short stories, poetry by Vallejo and Neruda, Teresa de la Parra's *Las memorias de Mama Blanca*, Rulfo's *Pedro Páramo*, García Márquez's *Cien años de soledad*, and more.
E. Garrels

21F.736 The Short Story in Spain and Hispanic America

Prereq.: One intermediate subject in Spanish or equivalent
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Studies the evolution of the short story in Spain and Hispanic America from the sixteenth century to the present. Considers the short story as a genre with unique possibilities for expression. Some semesters students write their own short stories in Spanish. Authors include Borges, Cortázar, Quiroga, Cervantes, María de Zayas, Pardo Bazán, and numerous contemporary women writers.
E. Garrels

21F.738 Literature and Social Conflict: Perspectives on Modern Spain

Prereq.: One intermediate subject in Spanish or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Considers how major literary texts illuminate principal issues in the evolution of modern Spanish society. Emphasizes the treatment of such major questions as the exile of liberals in 1820, the concept of progress, the place of religion, urbanization, rural conservatism and changing sex roles, and the Spanish Civil War. Authors studied include Pérez Galdós, Pardo Bazán, Unamuno, Ortega y Gasset, Salinas, Lorca, La Pasionaria, and Falcón.
M. Resnick

21F.740 The New Spain: 1977–Present

Prereq.: One intermediate subject in Spanish or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Deals with the vast changes in Spanish social, political, and cultural life that have taken place since the death of Franco. New freedom from censorship; the re-emergence of strong movements for regional autonomy: the Basque region and Catalonia; the new cinema including Almodóvar and Saura; educational reforms instituted by the socialist government, as well as the fiction of Carmé Riera and Terenci Moix, are examined. Special emphasis placed on the emergence of mass media as a vehicle for expression in Spain. Consideration given to the changes wrought by Spain's acceptance into the European Community. Material includes magazines, newspapers, films, fiction and Amando de Miguel's *Los Españoles.*
M. Resnick

21F.741 Theater and Society in the Spanish-Speaking World
(Revised Content)

Prereq.: One intermediate subject in Spanish, or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Hispanic theater and its performance from Golden Age masterworks to twentieth-century experimental and political drama in Spain, Latin America, and the US. What has been the place of drama in various Hispanic societies? Includes major works such as Lope de Vega's *Fuenteovejuna,* Calderón de la Barca's *La vida es sueño,* Valle-Inclán's *Luces de bohemia*, Buero Vallejo's *El tragaluz*, Triana's *La noche de los asesinos,* Benedetti's *Pedro y el capitán,* Gambaro's *Los siameses,* and García Márquez's *Diatriba de amor contra un hombre sentado.* Also includes film productions. Conducted in Spanish.
N. Wey-Gomez

21F.742 Cervantes and His Age

Prereq.: One intermediate subject in Spanish or equivalent
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Critics have long recognized Spain as the birthplace of the novel and have seen in *Don Quijote de la Mancha* the prototype for this genre. Concentrates on *Don Quijote* but also considers the author Cervantes as an outstanding example of the humanist in sixteenth-century Spain and Europe. Attention to Cervantes' humor and irony as well as his ideas on religion, justice, love, language, and artistic creation.
N. Wey-Gómez

21F.748 History of the Spanish Language

Prereq.: Permission of instructor
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Starts with the modern language and proceeds to successively earlier stages. Includes general concepts of language change; specific phonological, morphological, and syntactic changes in the history of Spanish; the place of Spanish among Romance tongues; modern dialects; reading of representative texts of earlier periods. Discussion and readings in English and Spanish. Spanish III or equivalent normally provides sufficient preparation.
J. W. Harris

For Literature and Culture subjects taught in English on Spain and Latin America, see 21F.810, 21F.812, 21F.820J, 21F.880, 21F.884J.

Studies in International Literatures and Cultures

Studies in International Literatures and Cultures make various modes of intercultural discourse available in English. Those subjects that deal with works from more than one nation give students the opportunity to do work in comparative studies. A significant number of subjects also allow students to study works from a single foreign country.

Cross-Cultural Subjects in Translation

21F.810 Introduction to European and Latin American Fiction

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Studies great works of European and Latin American fiction. Attention to a variety of forms including the picaresque, epistolary, realist, naturalist, and magical realist fiction. Emphasizes ways in which the unique history of each country shaped the imaginative responses of its writers. Authors read include Cervantes, Laclos, Goethe, Mann, Dostoevsky, Flaubert, Zola, Unamuno, Wolf, García Márquez, and Allende.
M. Resnick

21F.812 Christopher Columbus: Science and Politics in the Age of Discovery

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Studies the philosophical foundations of racial prejudice, colonialism, and slavery in the Age of Discovery. Focuses on the relationship between scientific systems of description and classification and political theory in Early Modern Europe. Topics include: the conception of the cosmos prior to Newton's mathematical refutation of Aristotle's geocentric universe; the impact of these ideas in early portrayals of Indians and their "place" in a new imperial order; the idealized and demonic stereotypes of Indians resulting from early colonial contact in More's *Utopia,* Shakespeare's *The Tempest,* etc. Class conducted in English.
N. Wey-Gomez

21F.814 Modernism and Its Discontents

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Investigates the various reactions of writers, artists, philosophers, and filmmakers to the process of social and cultural modernization during the early twentieth century. Topics: the city as text, the fascination with technology and the machine, myth and modernity, avant-garde art movements, reactionary modernism, redefinitions of sexuality. In 1997–98, subject emphasizes German modernism. Readings by Marx, Freud, Benjamin, Döblin, Hesse, Brecht, Jünger; films by Lang, Murnau, Pabst; artistic production of German expressionism, Neue Sachlichkeit, Bauhaus. Taught in English.
B. Widdig

21F.816 Alternative Cinema: Male Same-Sex Desire in International Film
(New)

Prereq.: —
U (Spring)
2-2-8 HASS

Interpretation and analysis of works by international filmmakers who focus on male homosexual desire. Primary attention given to ways in which screen representations of same-sex desire affect narrative form, cinematic style, and human vision. Films studied in cultural and political contexts. Filmmakers include: Almodovar, Kenneth Anger, Gregg Araki, Denys Arcand, Bertolucci, Antonia Byrd, Fassbinder, Jean Genet, Todd Haynes, Derek Jarman, Isaac Julien, Bruce La Bruce, Takehiro Murata, Pasolini, Marlon Riggs, Frank Ripploh, Gus Van Sant, André Téchiné, Andy Warhol. Non-English-language films in subtitled versions.
E. B. Turk

21F.820J New World Literature

(Same subject as 21L.444J)
Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 1

Studies in comparative patterns of development in the diverse American traditions of literature, race, gender, and cultural identity. Works from the Americas, as well as by European writers responding to America.
N. Wey-Gomez, M. Fuller

21F.822J International Women's Voices

(Same subject as SP.431J)
Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 1

Introduces students to a variety of fictional works by contemporary women writers. The subject's international perspective emphasizes the extent to which each author's work reflects her distinct cultural heritage and to what extent, if any, we can identify a female voice that transcends national boundaries. A variety of interpretive perspectives, including sociohistorical, psychoanalytic, and feminist criticism will be used to examine the texts. Authors read include: Mariama Bâ, Isabel Allende, Anita Desai, Maxine Hong Kingston, Toni Morrison, Doris Lessing, Alifa Riyaat, Yang Jiang, Nawal Al-Saadawi, and Sawako Ariyoshi.
M. Resnick

21F.823 Women's Voices: An International Perspective
(New)

Prereq.: —
G (Spring)
3-0-9

Introduces students to fictional works by contemporary women writers. The subject's international perspective emphasizes the extent to which each author's work reflects her distinct cultural heritage and to what extent, if any, we can identify a female voice that transcends national boundaries. Interpretive perspectives, including sociohistorical, psychoanalytic, and feminist criticism. Authors include Mariama Ba, Isabel Allende, Hong Kingston, Toni Morrison, Alifa Riyaat, Nawal Al-Saadawi, Yang Jiang, Anita Desai and Sawako Ariyoshi. Graduate students are expected to pursue the subject in greater depth through reading and individual projects.
M. Resnick

21F.828J Sex Roles in Fiction: Europe and Latin America

(Same subject as SP.432J)
Prereq.: —
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Examines the representation of sexual roles in fiction. Studies works by European and Latin American authors in their cultural and historical contexts. Themes emphasized include bourgeois women, women rebels, and redefinition of sex roles. Comparative analysis of works by Laclos, Fontane, Molière, Sor Juana Inés de la Cruz, Zola, Lorca, Wolf, Wittig, Machado de Assis, Colette, and Puig. Materials used include films by: Godard, Buñuel, Saura, M. v. Trotta.
M. Resnick

Culture-Specific Subjects in Translation

21F.840 Introduction to Chinese Classic Fiction

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Traces the evolution of Chinese fiction from its roots in the oral tradition through major novels of the eighteenth century. This genre includes historical, supernatural, detective, and love stories. Attention paid to the art of the early storytellers; Confucian, Taoist, and Buddhist themes; the interpolation of poetry in narratives; the Literati writers; and other aspects of culture reflected in the readings. Works read include *Three Kingdoms*, *Monkey King*, *The Dream of the Red Chamber*, and others.
Y. Tai

21F.842 Chinese Drama Through the Ages

Prereq.: —
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

An introduction to Chinese drama through readings and videos. Students examine the cultural heritage of the Chinese theatre from the stylized traditional mode of the Yuan Dynasty through the realistic plays of the twentieth century. The social and historical role of the theatre in shaping Chinese ethical concerns is studied. Discussions focus on dramaturgy, production techniques, and styles. Attention paid to the similarities and differences between the Chinese and Western theatres, and the interchange between the two.
Y. Tai

21F.850J French Literature in Translation

(Same subject as 21L.490J)
Prereq.: —
U (Spring)
3-0-9 HASS

Reading and analysis of landmark works of French literature, from the neo-classical period through the twentieth century, in English translation. Attention to intellectual and cultural contexts. Typically, writers include Racine, Molière, Voltaire, Beaumarchais, Balzac, Flaubert, Baudelaire, Proust, Genet, Ionesco, Beckett, Duras, and Yourcenar.
E. B. Turk

21F 851 The Avant-Garde in France

Prereq.: French IV
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Focuses on avant-garde movements and their relationship to dominant institutions and values in twentieth-century France, including Surrealism, Situationalism, and other counter-cultures (the nouvelle vague, the nouveau roman, post-structuralism). Topics include: sexual politics of the avant-garde aesthetics; dissident voices within avant-garde groups; avant-garde aesthetics and mythologies in contemporary mass culture; theories of the avant-garde and debates about its alleged obsolescence. Conducted in English.
M. Roberts

21F.852 French Film Classics

Prereq.: —
U (Fall)
4-0-8 HASS

History and aesthetics of French cinema from the advent of sound to the present day. Treats films in the context of technical processes, the art of narration, directorial style, role of the scriptwriter, the development of schools and movements, the impact of political events and ideologies, and the relation between French and other national cinemas. Directors studied include Clair, Vigo, Carné, Renoir, Clouzot, Ophuls, Godard, Truffaut, Malle, and Akerman. The unifying theme in selection and analysis of films is sex and society. Films shown with English subtitles.
E. B. Turk

21F.856 The German Cinema

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
4-0-8 HASS

Overview of German film since its beginnings. Weekly screenings. Lectures and discussions deal with technical and aesthetic as well as socio-historical aspects. Students keep weekly journals based on thorough analysis of films as well as readings on social and historical background. Directors include Lang, Murnau, Pabst, Schlöndorff, Wenders, Herzog, Fassbinder, Staudte, M. v. Trotta. Conducted in English. Films shown with English subtitles.
B. Widdig

21F.858 Modern German Novels in Translation

Prereq.: —
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Twentieth-century fiction from Germany, Austria, and Switzerland. Emphasizes major themes (bourgeois conventions and rebellion against them, role of the artist, individual and collective guilt, the metropolis, World War II and its aftermath), development of novel form, narrative structure, social and historical context. Authors include Thomas Mann, Kafka, Hesse, Grass, Christa Wolf. Showing of a film version of at least one novel.
B. Widdig

21F.860 Postwar Germany and Its Historical Burden

Prereq.: —
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Examines through literary and sociological texts the historical, political, and cultural forces that define German culture and society today. Topics: value changes in postwar society, coping with the legacy of the past, the role of writers and intellectuals, foreign cultures in Germany, political participation and protest, differences between East and West after unification. Texts by Dahrendorf, Enzensberger, Grass, Koeppen, Mitscherlich, Oren, Wolf, among others, in addition to films by Fassbinder, Sanders-Brahms, von Trotta. Lecture in English, discussion section in German or in English, readings in German or English.
B. Widdig

21F.864 Introduction to Japanese Culture

Prereq.: —
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Study of the major aesthetic, social, and political elements which have shaped modern Japanese culture and society. Readings on contemporary Japan and historical evolution of the culture coordinated with study of literary texts, film, and art.
S. Miyagawa

21F.866 Japan in Real Time
(New)

Prereq.: —
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Looks extensively at topics on modern Japan, including issues in modern Japanese life, popular culture, fine arts, and film. Material drawn from the Internet as well as books and articles. Material on the Internet is updated frequently, bringing immediacy to the study of modern Japan. Students engage in a project using some form of electronic media. Technical support provided if necessary. Lectures and reading in English. Students with knowledge of the Japanese language have the option of doing their project in Japanese.
S. Miyagawa

21F.872J Russian Novel of the Nineteenth Century

(Same subject as 21L.480J)
Prereq.: —
Acad Year 1996-97: U (Spring)
Acad Year 1997-98: **Not offered**
3-0-9 HASS

Studies the greatest Russian prose writers of the nineteenth century: Pushkin, Lermontov, Gogol, Tolstoy, Dostoevsky. Attention given to the rise of the Russian novel within the European context. Students with a knowledge of Russian encouraged to read portions of texts in the original.
Staff

21F.873J Twentieth-Century Russian Literature

(Same subject as 21L.484J)
Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Spring)
3-0-9 HASS

Considers great Russian poetry, novels, short stories of the twentieth century. A variety of fictional responses to the complex political landscape including the avant-garde, socialist realism, literature of dissent and glasnost. Attention given to the consequences of censorship and the limitations on all aspects of individual freedom — religious persecution, gender discrimination, and state terror. Authors include: Blok, Akhmatova, Bely, Zamiatin, Gladkov, Pasternak, Bulgakov, Brodsky, Tolstaya. Students with a knowledge of Russian are encouraged to read portions of these texts in the original.
S. Ketchian

21F.880 Masterpieces of Hispanic Culture

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

Subject studies major works of Hispanic literature, film, and art, including the *Poem of the Cid* and Cervantes's *Don Quijote*. Films by Buñuel, as well as paintings by Velazquez, among others, allow students to trace development of Hispanic culture through focus on fanaticism, honor, and the grotesque, as well as on humor as a way to cope creatively with the world, or to escape from it.
E. Garrels

21F.882 Contemporary US Hispanic Literature and Film: Lives in Translation
(New)

Prereq.: —
Acad Year 1996-97: U (Fall)
Acad Year 1997-98: **Not offered**
3-3-6 HASS

Examines the experience and dilemmas of Cubans, Mexicans, Puerto Ricans and other established and immigrant US Hispanic/Latino groups in works by recent writers and filmmakers; marginality, transculturation, and acculturation in works such as Julia Alvarez's *How the Garcia Girls Lost Their Accent*, Gloria Anzaldua's *Borderlands*, Sandra Cisneros's *Woman Hollering Creek*, Jesus Colon's *A Puerto Rican in New York*, Oscar Hijuelos's *The Mambo Kings Play Songs of Love*, and Richard Rodriguez's *Hunger of Memory*. Includes TV series "I Love Lucy," and film *Mambo Kings*. Conducted in English.
N. Wey-Gomez

21F.884J Introduction to Latin American Studies

(Same subject as 17.541J, 21A.224J)
Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 4

Introduction to contemporary reality of multicultural, multi-ethnic peoples of Latin America. Organized around six topics: indigenous identity and struggle, nineteenth-century liberalism and current crisis of the liberal nation-state, Afro-Americans in Brazil and Cuba, democratization and worker's movements in contemporary Brazil, the new urbanization and women's activism (case study — Mexico City), and the Latino-Americanization of the US. Major emphasis on the period from 1970 to present but certain units explore historical antecedents as far back as late eighteenth century.
M. Diskin, E. Garrels

Special Topics

21F.910 Special Topics in Foreign Languages and Literatures

Prereq.: —
U (Fall)
Units arranged
Can be repeated for credit

21F.911 Special Topics in Foreign Languages and Literatures

Prereq.: —
U (IAP, Spring)
Units arranged
Can be repeated for credit

Advanced work in foreign languages and literatures for students wishing to pursue topics or projects not provided for by regular subject offerings. Before registering, student must plan course of study with appropriate instructor in the Section and secure the approval of the Section Head. Normal maximum is 6 units; to count toward HASS Requirement, 9 units are required. Exceptional 9-unit projects occasionally approved.
Consult Foreign Languages and Literatures Headquarters.

For individual research in Foreign Languages and Literatures, register for 21F.UR or 21F.URG. For Foreign Languages and Literatures pre-thesis tutorial, register for 21F.ThT. For undergraduate thesis, register for 21F.ThU. Descriptions of these subjects can be found in the beginning of this section under 21.UR, 21.URG, 21.ThT, and 21.ThU on page 487.

History

Consult History Headquarters, E51-285, for the most up-to-date information about requirements and subject offerings.

American History

Survey Subjects

21H.101 American History to 1865

Prereq.: —
U (Fall)
3-0-9 HASS

A basic history of American social, economic, and political development from the colonial period through the Civil War. Examines the differences between Indians and European settlers; the colonial heritages of Spanish and British America; the American Revolution and its impact; the establishment and growth of the new nation; the Civil War, its background, character, and impact. Readings are from modern scholarship as well as writings of the period, including those of Winthrop, Paine, Madison, H. B. Stowe, and Lincoln.
J. Saillant

21H.102 The Emergence of Modern America, 1865 to the Present

Prereq.: —
U (Fall)
3-0-9 HASS-D, Category 5

Examines four central issues in the development of modern America: the ways in which different groups sought to alter society; the rise of a strong central government and its effect on the nation; the impact of the nation's role as a superpower on domestic life; and changes in the lives of Americans from 1865 to the present. Using primary documents as well as secondary interpretations, subject explores issues of politics, economics, race, and gender from Reconstruction to the 1990s.
H. Richardson

21H.103 Family, Work, and Leisure in America, 1600 to the Present

Prereq.: —
U (Spring)
3-0-9 HASS-D, Category 5

An interdisciplinary exploration of changes in family life, work, and leisure among a diversity of Americans in four historical contexts — the pre-industrial North, the antebellum South, the early twentieth century, and our own time. Topics include gender roles, transformations in the organization and meaning of work, the relationship between private and public life, and changing ideals and experiences of leisure.
C. Appy

21H.104J Riots, Strikes, and Conspiracies in American History

(Same subject as 11.015J)
Prereq.: —
U (Fall)
3-0-9 HASS-D, Category 5

Readings and discussions focusing on a series of short-term events that shed light on American culture and social organization. The events studied in 1995 were the anti-abolitionist "riot" at Alton, Illinois, in 1837, the lockout and strike at Homestead, Pennsylvania, in 1892, the uprising at Columbia University in 1968, and the takeover of Attica penitentiary in 1971. Emphasis on finding ways to make sense of these complicated, highly traumatic events, and on using them to understand larger processes of change in American history.
P. Maier, R. M. Fogelson

21H.111 Colonial America

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

North American history to 1763 with particular attention to the development of society and politics in the British colonies. Topics include the British, French, and Spanish empires; insurrections, witchcraft, and slavery; economic, social, and religious change; war, politics, and political ideology on the eve of the American Revolution. Readings are drawn from the most recent historical scholarship as well as documents of the time.
P. Maier

21H.112 The American Revolution

Prereq.: —
Acad Year 1996-97: **Not offered**
Acad Year 1997-98: U (Fall)
3-0-9 HASS

English and American backgrounds of the Revolution; issues and arguments in the Anglo-American conflict; colonial resistance and the beginnings of republicanism; the Revolutionary War; constitution writing for the states and nation; effects of the American Revolution. Concerned primarily with the revolutionary origins of American government. Readings emphasize documents from the period — pamphlets, correspondence, the minutes or resolutions of resistance organizations, constitutional documents and debates.
P. Maier