

History of the Built Environment

Minor

The undergraduate minor in the History of the Built Environment is designed to give students an awareness of the history of the built environment through a series of courses in history, architectural history, and cultural landscape. It is offered to all majors. The college's purpose in offering minors is twofold: to provide a secondary focus to a student's degree and to bring these additional courses together into a coherent pattern.

There is no major program; students interested in pursuing this course of study at the major level should consider the BA in Architecture program (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/architecture>).

Declaring the Minor

A letter grade of C- or higher in ENV DES 1 is required to declare the minor. To declare, students must submit the CED Request to Add Minor Form (<https://ced.berkeley.edu/students/undergraduate-advising/forms-documents>), available on the CED website. When completing the final requirements for the minor, students must submit the CED Minor Completion Form (<https://ced.berkeley.edu/students/undergraduate-advising/forms-documents>).

Other Majors and Minors Offered by the Department of Architecture

Architecture (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/architecture>) (Major and Minor)
 Environmental Design and Urbanism in Developing Countries (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/environmental-design-urbanism-developing-countries>) (Minor only)
 Social and Cultural Factors in Design (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/social-cultural-factors-environmental-design>) (Minor only)
 Sustainable Design (<http://guide.berkeley.edu/archive/2017-18/undergraduate/degree-programs/sustainable-design>) (Minor only)

Students who have a strong interest in an area of study outside their major often decide to complete a minor program. When completing their final requirements for the minor, students must submit the CED Minor Completion Form (<https://ced.berkeley.edu/students/undergraduate-advising/forms-documents>), available on the CED website.

General Guidelines

1. A letter grade of C- or higher in ENV DES 1 is required to declare the minor. To declare, students must submit the CED Request to Add Minor Form (<https://ced.berkeley.edu/students/undergraduate-advising/forms-documents>), available on the CED website.
2. Each course used to fulfill minor requirements must be completed with a letter grade of C- or above.
3. Students must earn a 2.0 GPA in the upper division requirements for the minor.
4. Any course used in fulfillment of minor requirements may also be used to fulfill major and upper division CED non-major requirements.

5. Courses used to fulfill a breadth requirement may also be used to satisfy minor requirements.
6. Students may apply the non-CED version of a CED cross-listed course towards the minor.
7. Students may use up to two courses taken abroad to fulfill upper division minor requirements, with faculty approval of the individual courses.

Requirements

Lower Division

ENV DES 1	Introduction to Environmental Design (A letter grade of C- or higher is required to declare the minor.)	3
-----------	---	---

Upper Division (Five Courses)

ARCH 170A	An Historical Survey of Architecture and Urbanism	4
ARCH 170B	An Historical Survey of Architecture and Urbanism	4

Select two of the following:

ARCH 179	Special Topics in the History of Architecture (various offerings each semester)	
LD ARCH 170	History and Literature of Landscape Architecture	
LD ARCH C171	The American Designed Landscape Since 1850	
CY PLAN 200	History of City Planning (Instructor approval required)	

Select one upper division, non-CED course with a focus on history and environmental design ¹ 4

¹ Approval of faculty adviser required. Please send proposed courses with descriptions to the staff adviser for review.

History of the Built Environment

ARCH 11A Introduction to Visual Representation and Drawing 4 Units

Terms offered: Fall 2018, Summer 2018 8 Week Session, Fall 2017
 Introductory studio course: theories of representation and the use of several visual means, including freehand drawing and digital media, to analyze and convey ideas regarding the environment. Topics include contour, scale, perspective, color, tone, texture, and design.
 Introduction to Visual Representation and Drawing: [Read More \[+\]](#)

Rules & Requirements

Prerequisites: Env Des 1 with C- or better

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 6 hours of studio per week

Summer: 8 weeks - 3.5 hours of lecture and 11 hours of studio per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Formerly known as: Environmental Design 11A

Introduction to Visual Representation and Drawing: [Read Less \[-\]](#)

ARCH 11B Introduction to Design 5 Units

Terms offered: Summer 2018 8 Week Session, Spring 2018, Summer 2017 8 Week Session

Introduction to design concepts and conventions of graphic representation and model building as related to the study of architecture, landscape architecture, urban design, and city planning. Students draw in plan, section, elevation, axonometric, and perspective and are introduced to digital media. Design projects address concepts of order, site analysis, scale, structure, rhythm, detail, culture, and landscape.

Introduction to Design: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: 11A with C- or better

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 2 hours of laboratory, and 6 hours of studio per week

Summer: 8 weeks - 6 hours of lecture, 3.5 hours of laboratory, and 11 hours of studio per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Formerly known as: Environmental Design 11B

Introduction to Design: Read Less [\[-\]](#)

ARCH 24 Freshman Seminars 1 Unit

Terms offered: Spring 2018, Spring 2017, Spring 2016

The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.

Freshman Seminars: Read More [\[+\]](#)

Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman Seminars: Read Less [\[-\]](#)

ARCH 39A Freshman/Sophomore Seminar 2 - 4 Units

Terms offered: Fall 2012, Fall 2003, Fall 2002

Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester.

Freshman/Sophomore Seminar: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Summer: 8 weeks - 4-8 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam not required.

Freshman/Sophomore Seminar: Read Less [\[-\]](#)

ARCH 84 Sophomore Seminar 1 or 2 Units

Terms offered: Fall 2012, Spring 2012, Fall 2011

Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.

Sophomore Seminar: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: At discretion of instructor

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring:

5 weeks - 3-6 hours of seminar per week

10 weeks - 1.5-3 hours of seminar per week

15 weeks - 1-2 hours of seminar per week

Summer:

6 weeks - 2.5-5 hours of seminar per week

8 weeks - 1.5-3.5 hours of seminar and 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Sophomore Seminar: Read Less [\[-\]](#)

ARCH 98 Special Group Study 1 - 4 Units

Terms offered: Spring 2018, Spring 2017, Fall 2016

This is a special topics course intended to fulfill the individual interests of students, and provide a vehicle for professors to instruct students based on new and innovative developments in the field of architecture.

Special Group Study: Read More [+]

Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the section on Academic Policies-Course Number Guide in the Berkeley Bulletin.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Special Group Study: Read Less [-]

ARCH 98BC Berkeley Connect 1 Unit

Terms offered: Fall 2018, Spring 2018, Fall 2017

Berkeley Connect is a mentoring program, offered through various academic departments, that helps students build intellectual community. Over the course of a semester, enrolled students participate in regular small-group discussions facilitated by a graduate student mentor (following a faculty-directed curriculum), meet with their graduate student mentor for one-on-one academic advising, attend lectures and panel discussions featuring department faculty and alumni, and go on field trips to campus resources. Students are not required to be declared majors in order to participate.

Berkeley Connect: Read More [+]

Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the section on Academic Policies-Course Number Guide in the Berkeley Bulletin.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Berkeley Connect: Read Less [-]

ARCH 100A Fundamentals of Architectural Design 6 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

Introductory courses in the design of buildings. Problems emphasize conceptual strategies of form and space, site relationships and social, technological and environmental determinants. 100A focuses on the conceptual design process.

Fundamentals of Architectural Design: Read More [+]

Rules & Requirements

Prerequisites: Arch 11A & 11B With a C- or better. Must be taken in sequence

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture, 2 hours of laboratory, and 6 hours of studio per week

Summer: 8 weeks - 4 hours of lecture, 3 hours of laboratory, and 12 hours of studio per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Fundamentals of Architectural Design: Read Less [-]

ARCH 100B Fundamentals of Architectural Design 6 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Introductory courses in the design of buildings. Problems emphasize conceptual strategies of form and space, site relationships and social, technological and environmental determinants. 100B stresses tectonics, materials, and energy considerations. Studio work is supplemented by lectures, discussions, readings and field trips.

Fundamentals of Architectural Design: Read More [+]

Rules & Requirements

Prerequisites: Arch 100A with a C- or better. Must be taken in sequence

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture, 2 hours of laboratory, and 6 hours of studio per week

Summer: 8 weeks - 4 hours of lecture, 3 hours of laboratory, and 12 hours of studio per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Fundamentals of Architectural Design: Read Less [-]

ARCH 100C Architectural Design III 5 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

This is a studio course in architectural design. Students work on individual and group design projects that build on topics from Architecture 100B with additional integration of conditions pertinent to architectural production that may include architectural precedents, context, landscape and urban issues, envelope, performance, structure, and tectonics in the design of buildings.

Architectural Design III: Read More [+]

Rules & Requirements

Prerequisites: Arch 100B with a C- or better

Hours & Format

Fall and/or spring: 15 weeks - 8 hours of studio per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Architectural Design III: Read Less [-]

ARCH 100D Architectural Design IV 5 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Students work on individual and/or group design projects that build on topics from previous studios with additional integration of conditions pertinent to architectural production that may include architectural precedents, context, landscape and urban issues, envelope, structure, and tectonics in the design of buildings. It may also include relevant and pertinent social, cultural, and technological issues facing architecture and design.

Architectural Design IV: Read More [+]

Rules & Requirements

Prerequisites: Arch 100B with a C- or better

Hours & Format

Fall and/or spring: 15 weeks - 8 hours of studio per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Architectural Design IV: Read Less [-]

ARCH 102A Capstone Project Preparation Seminar 3 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

This course is a course in architectural research methods with an emphasis on collaborative work. Students will work on individual facets of a collective topic of critical importance to the contemporary discipline of architecture within areas of faculty expertise. These include: architectural history and theory, structures, materials and methods of construction, building performance, energy and environment, and social factors and human behavior in architecture and the environment. The goal of Capstone Preparation is to develop a coherent research proposal that will be used as a topic for the Capstone Project course taken the following semester.

Capstone Project Preparation Seminar: Read More [+]

Objectives Outcomes

Course Objectives: Ability to communicate research findings through oral, written and graphic modes of presentation to a variety of audiences. Comprehension of the ethics and professional responsibilities of research and how they relate to the discipline of architecture.

Develop a research proposal of scholarly significance, identifying and effectively communicating the information sources, skill sets, and research process required to pursue the project.

Formulate clear and precise questions, interpret information using abstract ideas, consider culturally diverse points of view, and reach well-reasoned conclusions.

Gather, record, evaluate and apply information relevant to a research problem.

Identify and critically assess the knowledge base and body of literature relevant to a specific research project.

Understand the role of applied research in environmental design and its impact on human conditions, behavior and impact on the environment.

Work with others to coordinate individual research ventures addressing a larger collective topic, and to learn to work in a supervised collaborative team.

Rules & Requirements

Prerequisites: Architecture 100A, Architecture 100B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Capstone Project Preparation Seminar: Read Less [-]

ARCH 102B Architecture Capstone Project 5 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Through individual and collective efforts, students will address topics selected in the previous semester under the guidance of faculty mentors. Topics in the field which may serve as a basis for capstone projects include: the history and theory of architecture; structures; the materials and methods of construction; building performance; energy and the environment; and social factors and human behavior. This course is aimed at students who wish to strengthen their understanding of the research methods used by the discipline of architecture and related disciplines (e.g., engineering or history), and is not solely design oriented. Architecture Capstone Project: Read More [+]

Objectives Outcomes

Course Objectives: Communicate complex research questions, ideas and findings clearly, both orally and in writing, to a broad community. Demonstrate a critical understanding of how resources, including literature and data, are used in critical study and how these resources can be assessed for their validity and reliability. Demonstrate analytic skills. Understand the nature of research questions in the field, and how to choose appropriate architectural research methods given time, cost and skill constraints. Demonstrate critical thinking. Analyze, compare and critique information gathered. Organize a coherent argument. Derive objective conclusions based on the information and inquiry. Learn how to work in a supervised, collaborative research team, drawing on the diverse skills and knowledge of peers and faculty mentors. Understand the ethics and professional responsibilities of research and how this relates to the discipline of architecture.

Rules & Requirements

Prerequisites: Architecture 102A

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of seminar and 4 hours of studio per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Architecture Capstone Project: Read Less [-]

ARCH 105 Deep Green Design 4 Units

Terms offered: Spring 2014, Fall 2013

This course explores the issues and practices of green architectural design through critical readings of seminal and current texts, lectures, films, field trips and projects that use both design and analysis as means of inquiry. The course examines varied approaches to sustainable design including using nature and wilderness as models, biophilia, biomimicry, material sources and reuse, accounting systems such as LEED, Zero Net Carbon and the 2030 Challenge, and the Living Building Challenge. Deep Green Design: Read More [+]

Rules & Requirements

Prerequisites: Completion of a minimum of one design studio, two studios preferred

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Ubbelohde

Deep Green Design: Read Less [-]

ARCH 107 Introduction to the Practice of Architecture 3 Units

Terms offered: Prior to 2007

Introduction to the business of architecture including client, developer and contractor relations, design proposals, competitions, and other marketing approaches as well as ethical issues of professional practice. Introduction to the Practice of Architecture: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 120

Introduction to the Practice of Architecture: Read Less [-]

ARCH 108 Architectural Internship 5 Units

Terms offered: Summer 2016 10 Week Session, Summer 2015 10 Week Session, Summer 2014 10 Week Session

An intensive and structured exposure to the professional practice, using the resources of practicing architects' offices as the "laboratory." The seminar discussion focus on understanding how design happens, how projects are managed and how buildings are constructed.

Architectural Internship: Read More [+]

Rules & Requirements

Prerequisites: 100B or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 10.5 hours of internship per week

Summer: 8 weeks - 4 hours of lecture and 21 hours of tutorial per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Comerio

Formerly known as: 128

Architectural Internship: Read Less [-]

ARCH 109 Special Topics in Architectural Design 1 - 4 Units

Terms offered: Spring 2018, Spring 2017, Fall 2016

Selected topics in the theories and concepts of architectural design. For current offerings, see department website.

Special Topics in Architectural Design: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of seminar per week

Summer: 8 weeks - 2-7.5 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics in Architectural Design: Read Less [-]

ARCH 110AC The Social and Cultural Processes in Architecture & Urban Design 4 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

Architecture 110AC focuses on the significance of the physical environment in human life as citizens and as future design professionals.

This course is an introduction to the field of human-environment studies.

Its objectives include:

1. Working knowledge of the concepts in person-environment relations,
2. Understanding how these concepts vary by subculture, primarily Anglo-, Hispanic-, and Chinese-American,*
3. Learning to use the methodological skills needed to conduct architectural programming and evaluation research,
4. Thinking critically about the values embedded in design and the consequences for people, their behavior, and feelings.

The Social and Cultural Processes in Architecture & Urban Design: Read More [+]

Rules & Requirements

Credit Restrictions: Students will receive no credit for Architecture 110AC after completing Architecture 110.

Requirements this course satisfies: Satisfies the American Cultures requirement

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Cranz

The Social and Cultural Processes in Architecture & Urban Design: Read Less [-]

ARCH 111 Housing: An International Survey 3 Units

Terms offered: Spring 2014, Spring 2013, Spring 2012

Introduction to international housing from the Architectural and City Planning perspective. Housing issues (social, cultural, and policy) ranging from micro-scale (house) to macro-scale (city) presented with a comparison of housing situations in developed and developing countries.

Housing: An International Survey: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Housing: An International Survey: Read Less [-]

ARCH 119 Special Topics in the Social and Cultural Basis of Design 1 - 4 Units

Terms offered: Fall 2014, Spring 2014, Fall 2013

Selected topics in the social and cultural basis of design. For current offerings, see departmental website.

Special Topics in the Social and Cultural Basis of Design: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of seminar per week

Summer: 8 weeks - 2-8 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics in the Social and Cultural Basis of Design: Read Less [\[-\]](#)

ARCH 122 Principles of Computer Aided Architectural Design 4 Units

Terms offered: Fall 2009

This course introduces students to Architecture's New Media; why and how computers are being used in architecture, and what are their current and expected impacts on the discipline and practice of architecture. Topics include presentation and re-presentation (including sketching, drafting, modeling, animating, and rendering); generating design solutions (including generative systems, expert systems, genetic algorithms, and neural networks); evaluation and prediction (using examples from structures, energy, acoustics, and human factors); and the future uses of computers in architectural design (including such topics as construction automation, smart buildings, and virtual environments). The laboratories introduce students to REVIT, a state-of-the-art architectural software, including drafting, modeling, rendering, and for building information modeling. This course is co-listed with 222.

Principles of Computer Aided Architectural Design: Read More [\[+\]](#)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1.5 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 132

Principles of Computer Aided Architectural Design: Read Less [\[-\]](#)

ARCH 123 2-D Computer Technology 2 Units

Terms offered: Summer 2012 8 Week Session, Summer 2011 10 Week Session, Summer 2011 8 Week Session

The course provides students with practical hands-on experience in using professional architectural drafting software (e.g., Autocad). The course covers the process of creating, manipulating, and communicating through digital drawings.

2-D Computer Technology: Read More [\[+\]](#)

Hours & Format

Summer:

6 weeks - 5 hours of laboratory per week

8 weeks - 3.5 hours of laboratory per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 133A

2-D Computer Technology: Read Less [\[-\]](#)

ARCH 124A 3-D Computer Technology 2 Units

Terms offered: Summer 2018 8 Week Session, Summer 2017 8 Week Session, Summer 2016 8 Week Session

The course provides students with practical hands-on experience in using professional architectural modeling software (e.g., 3DStudioMax, Maya, Rhino, etc.). The course covers the process of creating, manipulating, and communicating through digital architectural models.

3-D Computer Technology: Read More [\[+\]](#)

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of laboratory per week

Summer:

6 weeks - 5 hours of laboratory per week

8 weeks - 3.5 hours of laboratory per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 133B

3-D Computer Technology: Read Less [\[-\]](#)

ARCH 124B 3-D Computer Technology 2 Units

Terms offered: Summer 2017 8 Week Session, Summer 2016 10 Week Session, Summer 2016 8 Week Session

The course provides students with practical hands-on experience in using professional architectural modeling software (e.g., 3DStudioMax, Maya, Rhino, etc.). The course covers the process of creating, manipulating, and communicating through digital architectural models.

3-D Computer Technology: Read More [\[+\]](#)

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of laboratory per week

Summer:

6 weeks - 5 hours of laboratory per week

8 weeks - 3.5 hours of laboratory per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 133B

3-D Computer Technology: Read Less [\[-\]](#)

ARCH 127 Workshop in Designing Virtual Places 4 Units

Terms offered: Spring 2010

This course introduces students to designing web-accessible, Multi User, Virtual Environments (MUVES), inhabited through avatars. Such worlds are used in video games and web-based applications, and are assuming their role as alternative 'places' to physical spaces, where people shop, learn, are entertained, and socialize. Virtual worlds are designed according to the same principles that guide the design of physical spaces, with allowances made for the absence of gravity and other laws of nature. The course combines concepts from architecture, film studies, and video game design. It uses a game engine software and a modeling software to build, test, and deploy virtual worlds.

Workshop in Designing Virtual Places: Read More [\[+\]](#)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar and 1.5 hours of laboratory per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Workshop in Designing Virtual Places: Read Less [\[-\]](#)

ARCH 129 Special Topics in Digital Design Theories and Methods 1 - 4 Units

Terms offered: Summer 2018 8 Week Session, Spring 2018, Summer 2017 8 Week Session

Topics cover advanced and research-related issues in digital design and New Media, related to architecture. For current offerings, see department website.

Special Topics in Digital Design Theories and Methods: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Summer: 8 weeks - 2-8 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics in Digital Design Theories and Methods: Read Less [\[-\]](#)

ARCH 130 Introduction to Architectural Design Theory and Criticism 4 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

This class introduces students to the history and practice of design theory from the late 19th century to the present, with emphasis on developments of the last four decades. Readings and lectures explore specific constellations of theory and practice in relation to changing social and historical conditions. The course follows the rise of modernist design thinking, with particular emphasis on the growing influence of technical rationality across multiple fields in the post World War II period. Systematic approaches based in cybernetics and operations research (amongst others) are examined in the context of wider attempts to develop a science of design. Challenges to modernist design thinking, through advocacy planning and community-based design, the influence of social movements and countercultures, and parallel developments in postmodernism within and beyond architecture, provide the critical background for consideration of recent approaches to design theory, including those informed by developments in digital media and technology, environmental and ecological concerns, questions surrounding the globalization of architectural production, and the development of new materials.

Introduction to Architectural Design Theory and Criticism: [Read More](#) [+]

Rules & Requirements

Prerequisites: Open to upper division undergraduates

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Crysler

Formerly known as: 130A

Introduction to Architectural Design Theory and Criticism: [Read Less](#) [-]

ARCH 133 Architectures of Globalization: Contested Spaces of Global Culture 3 Units

Terms offered: Fall 2010, Fall 2009

This seminar examines the relationship between architecture and the processes associated with globalization. The social and spatial changes connected to the global economic restructuring of the last four decades are explored in relation to distinctive national conditions and their connection to historical forces such as colonization and imperialism. Theoretical arguments about international urban political economy, uneven development, deindustrialization, and the growth of tourism and service industries, are grounded in specific urban and architectural contexts. Case studies explore issues such as urban entrepreneurialism and the branding of cities and nationstates; heritage practices and the postcolonial politics of place; border cities, and the urbanism of transnational production; cities, terrorism, and the global architecture of security; critical regionalism, localism, and other responses to debates on place and placelessness. Readings and class discussions examine course themes in a comparative framework and consider their implications for architectural design, education, and professional practice. Architectures of Globalization: Contested Spaces of Global Culture: [Read More](#) [+]

Rules & Requirements

Prerequisites: This course is open to all graduate students and upper division undergraduates

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Crysler

Architectures of Globalization: Contested Spaces of Global Culture: [Read Less](#) [-]

ARCH 136 The Literature of Space 3 Units

Terms offered: Spring 2012, Spring 2011, Spring 2010

The concept of space as it is applied to the fields of architecture, geography and urbanism can be understood as a barometer of the condition that we call "modernity." This course explores connections between the larger cultural frameworks of the past century, and the idea of space as it has been perceived, conceived and lived during this period. Readings include essays from the disciplines of philosophy, geography, architecture, landscape, and urbanism, and short works of fiction that illustrate and elucidate the spatial concepts. The readings are grouped according to themes that form the foundation for weekly seminar discussions. Chronological and thematic readings reveal the force of history upon the conceptualization of space, and its contradictions.

The Literature of Space: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Stoner

The Literature of Space: Read Less [-]

ARCH 139 Special Topics in Architectural Design Theory and Criticism 1 - 4 Units

Terms offered: Fall 2017, Spring 2017, Fall 2016

Topics cover contemporary and historical issues in architectural design theory and criticism. For current offerings, see department website.

Special Topics in Architectural Design Theory and Criticism: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Summer: 8 weeks - 2-8 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics in Architectural Design Theory and Criticism: Read Less [-]

ARCH 140 Energy and Environment 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

This course provides undergraduates and graduates with an introduction to issues of physical building performance including building thermodynamics, daylighting, and solar control. The course presents the fundamentals of building science while recognizing the evolving nature of building technologies, energy efficiency, ecology, and responsible design. The course begins with a detailed explication of the thermal properties of materials, heat transfer through building assemblies, balance point temperature, solar geometry, and shading analysis. Students apply these principles later in the course to a design project. The latter part of the course also provides a survey of broader building science topics including mechanical system design, microclimate, and current developments in energy-efficient design.

Energy and Environment: Read More [+]

Rules & Requirements

Prerequisites: Physics or equivalent, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Brager, Schiavon

Energy and Environment: Read Less [-]

ARCH 142 Sustainability Colloquium 1 or 2 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

Presentations on a variety of topics related to sustainability, offering perspectives from leading practitioners: architectural designers, city planners, consultants, engineers, and researchers. Students can enroll for one unit (required attendance plus reading) or two units (with additional writing assignments).

Sustainability Colloquium: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Brager

Sustainability Colloquium: Read Less [-]

ARCH 144 Introduction to Acoustics 1 Unit

Terms offered: Fall 2018, Fall 2017, Fall 2016

This course focuses on what architects need to know about acoustics. The first part deals with the fundamentals of acoustics including how sound levels are described and measured, and human response to sound. The course then covers building acoustics, mechanical equipment noise and vibration control, office acoustics, design of sound amplification systems, and environmental acoustics.

Introduction to Acoustics: Read More [a+]

Hours & Format

Fall and/or spring: 5 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Salter

Introduction to Acoustics: Read Less [-]

ARCH 149 Special Topics in Energy and Environment 1 - 4 Units

Terms offered: Summer 2018 8 Week Session, Spring 2018, Fall 2017

Special topics include climatic design, heating, ventilating, air-conditioning systems, lighting, and acoustics. For current offerings, see department website.

Special Topics in Energy and Environment: Read More [a+]

Rules & Requirements

Prerequisites: 140 and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Summer: 8 weeks - 2-8 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics in Energy and Environment: Read Less [-]

ARCH 150 Introduction to Structures 4 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

Study of forces, materials, and structural significance in the design of buildings. Emphasis on understanding the structural behavior of real building systems.

Introduction to Structures: Read More [a+]

Rules & Requirements

Prerequisites: Physics 8A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Black

Introduction to Structures: Read Less [-]

ARCH 154 Design and Computer Analysis of Structure 3 Units

Terms offered: Spring 2018, Spring 2017, Spring 2015

Design and analysis of whole structural building systems with the aid of finite element analytical methods. Advanced structural concepts explored in a laboratory environment.

Design and Computer Analysis of Structure: Read More [a+]

Rules & Requirements

Prerequisites: 150

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Black

Design and Computer Analysis of Structure: Read Less [-]

ARCH 155 Structure, Construction, and Space 3 Units

Terms offered: Fall 2009

In profound buildings, the structural system, construction materials, and architectural form work together to create an integrated work of art. Current practice segregates these three areas by assigning separate and rigid roles to 1) an engineer, 2) a contractor, and 3) an architect. The goal of this class is to blur these traditional boundaries and erase the intellectual cleft through hands-on experience. Students are given weekly assignments which focus on one or more of the three areas. They may be asked to analyze a structure, to construct something from actual materials, or research a case study and present it to the class. Each assignment is geared to help students integrate construction and structural issues into their architectural design, so that they can maintain control of the entire design process.

Structure, Construction, and Space: [Read More](#) [+]

Rules & Requirements

Prerequisites: 150

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Black

Structure, Construction, and Space: [Read Less](#) [-]

ARCH 159 Special Topics in Building Structures 1 - 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

Special topics such as experimental structures and architectural preservation. For current offerings, see department website.

Special Topics in Building Structures: [Read More](#) [+]

Rules & Requirements

Prerequisites: 150 and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Summer: 8 weeks - 2-8 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics in Building Structures: [Read Less](#) [-]

ARCH 160 Introduction to Construction 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

This introduction to the materials and processes of construction takes architecture from design to realization. The course will cover four material groups commonly used in two areas of the building assembly (structure and envelope): wood, concrete, steel, and glass. You will understand choices available and how materials are conventionally used. By observing construction, you'll see how our decisions affect the size of materials, connections, and where they are assembled. Architects must understand not only conventions, but also the potential in materials, so we will also study unusual and new developments.

Introduction to Construction: [Read More](#) [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Black

Introduction to Construction: [Read Less](#) [-]

ARCH 169 Special Topics in Construction Materials 1 - 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

For current offerings, see department website.

Special Topics in Construction Materials: [Read More](#) [+]

Rules & Requirements

Prerequisites: 160 and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Summer: 8 weeks - 2-8 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 169X

Special Topics in Construction Materials: [Read Less](#) [-]

ARCH 170A An Historical Survey of Architecture and Urbanism 4 Units

Terms offered: Fall 2018, Fall 2017, Fall 2016

The first part of this sequence studies the ancient and medieval periods; the second part studies the period since 1400; the aim is to look at architecture and urbanism in their social and historical context.

An Historical Survey of Architecture and Urbanism: [Read More](#) [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

An Historical Survey of Architecture and Urbanism: [Read Less](#) [-]

ARCH 170B An Historical Survey of Architecture and Urbanism 4 Units

Terms offered: Spring 2018, Spring 2017, Spring 2016

The first part of this sequence studies the ancient and medieval periods; the second part studies the period since 1400; the aim is to look at architecture and urbanism in their social and historical context.

An Historical Survey of Architecture and Urbanism: [Read More](#) [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

An Historical Survey of Architecture and Urbanism: [Read Less](#) [-]

ARCH 173 Case Studies in Modern Architecture 3 Units

Terms offered: Fall 2010, Fall 2009

This course examines developments in design, theory, graphic representation, construction technology, and interior programming through case studies of individual buildings. Our survey technique will be highly focused rather than panoptic. Each lecture will delve deeply into one or two buildings to examine program, spatial organization, graphic representation, critical building details, construction technology, and the relationship of the case study building with regard to other contemporary structures and the architect's overall body of work. From this nucleus, we will spiral outward to consider how the case study is embedded within a constellation of social and economic factors crucial to its design and physical realization. This survey of "modernism's built discourses" provides multiple perspectives on the variety of architectural propositions advanced to express the nature of modernity as a way of life.

Case Studies in Modern Architecture: [Read More](#) [+]

Rules & Requirements

Prerequisites: 170A-170B and consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 173A

Case Studies in Modern Architecture: [Read Less](#) [-]

ARCH C174 Architecture in Depression and War 4 Units

Terms offered: Spring 2010

The Great Depression and World War II are arguably the two most influential events for the development of the built environment in the 20th century. Not only did they alter the socio-economic and political landscape on which architecture and urban planning depend, but they also led to technological innovations and vital debates about the built environment. This course examines the 1930's and 1940's topically, studying the work of the New Deal, corporate responses to the Depression and war, the important connections between architecture and advertising, the role of the Museum of Modern Art in the promotion of Modernism, the concept of the ideal house, and key tests, theories, and projects from the period.

Architecture in Depression and War: Read More [\[+\]](#)

Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 3-4 hours of lecture and 0-1 hours of discussion per week

Summer: 6 weeks - 7.5 hours of lecture and 0-2.5 hours of discussion per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Shanken

Also listed as: AMERSTD C111A

Architecture in Depression and War: Read Less [\[-\]](#)

ARCH 175 Introduction to Architectural Theory 1945-Present 3 Units

Terms offered: Prior to 2007

This seminar provides an introduction to architectural theory since 1945, with emphasis on developments over the last three decades. Class readings and discussions explore the post-World War II crisis within modernism, postmodernism within and beyond architectural culture, and more recent developments around issues such as rapid urbanization, sustainability, the politics of cultural identity, and globalization. Transformations in architectural theory are examined in relation to historical forces such as the economy, the growth and transformation of cities, and the changing relationship between design professions and disciplines. The influences of digital media, new materials and production techniques on architectural education and practice are explored and the implications for architectural theory assessed. Key issues are anchored in case studies of buildings, urban spaces, and the institutions and agents of architectural culture.

Introduction to Architectural Theory 1945-Present: Read More [\[+\]](#)

Rules & Requirements

Prerequisites: Open to upper division undergraduates and graduate students

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Cryslar

Introduction to Architectural Theory 1945-Present: Read Less [\[-\]](#)

ARCH 176 American Architecture 3 Units

Terms offered: Prior to 2007

The first half of this course surveys American architecture from Colonial times to contemporary trends. Stylistic and spatial analysis is linked with the socioeconomic, political, and environmental influences on architecture, issues on originality, American exceptionalism, the influence from abroad, regionalism, and the role of technology. The second half delves more deeply into the history of specific building types--house, church, museum, library--grafting the earlier themes onto a history of modern institutions as they took shape in the United States.

American Architecture: Read More [\[+\]](#)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Shanken

American Architecture: Read Less [\[-\]](#)

ARCH 178 Visionary Architecture 3 Units

Terms offered: Prior to 2007

This course explores architectural visions as historical windows, examining them from a number of angles. Using a variety of case studies drawn from different media (architectural theory, film, advertisements, architectural projects, and so on) and periods (turn of the century, the Modern Movement, Depression, World War II, 1960's, etc.) it provides a sampling of possibilities and models for the final student project, an in-depth, original research paper. Several themes thread their way through the course, including the role of the "unbuilt" in architectural practice; the uses of the future in the construction of national and personal identities, cultural narratives, and modern mythologies; and the importance of the future as cliché, and the role of play in cultural production.

Visionary Architecture: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Shanken

Visionary Architecture: Read Less [-]

ARCH 179 Special Topics in the History of Architecture 1 - 4 Units

Terms offered: Fall 2018, Spring 2018, Fall 2017

Special topics in Architectural History. For current section offerings, see departmental announcement.

Special Topics in the History of Architecture: Read More [+]

Rules & Requirements

Prerequisites: 170A-170B and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week

Summer:

6 weeks - 2.5-10 hours of lecture per week

8 weeks - 1.5-7.5 hours of lecture per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics in the History of Architecture: Read Less [-]

ARCH 198 Special Group Study 1 - 4 Units

Terms offered: Fall 2018, Spring 2018, Spring 2017

Studies developed to meet needs.

Special Group Study: Read More [+]

Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the section on Academic Policies-Course Number Guide in the Berkeley Bulletin.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Summer: 8 weeks - 1.5-7.5 hours of directed group study per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Special Group Study: Read Less [-]

ARCH 198BC Berkeley Connect 1 Unit

Terms offered: Fall 2018, Spring 2018, Fall 2017

Berkeley Connect is a mentoring program, offered through various academic departments, that helps students build intellectual community. Over the course of a semester, enrolled students participate in regular small-group discussions facilitated by a graduate student mentor (following a faculty-directed curriculum), meet with their graduate student mentor for one-on-one academic advising, attend lectures and panel discussions featuring department faculty and alumni, and go on field trips to campus resources. Students are not required to be declared majors in order to participate.

Berkeley Connect: Read More [+]

Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the section on Academic Policies-Course Number Guide in the Berkeley Bulletin.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Berkeley Connect: Read Less [-]

ARCH 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Summer 2016 Second 6 Week Session, Spring 2016, Fall 2015

Enrollment is restricted by regulations in the General Catalog. Studies developed to meet individual needs.

Supervised Independent Study and Research: [Read More](#) [+]

Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the section on Academic Policies-Course Number Guide in the Berkeley Bulletin.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer:

6 weeks - 2.5-10 hours of independent study per week

8 weeks - 2-7.5 hours of independent study per week

Additional Details

Subject/Course Level: Architecture/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study and Research: [Read Less](#) [-]