

ARCH-ARCHITECTURE

ARCH 1155 Design I- Design Fundamentals 5 Credit Hours

Prerequisite: Co-requisites: ARCH 1163 or permission of director. Development of foundational design and representational skills, and graphic conventions including sketching and digital methods. The course introduces processes of Creating-Making through methods engaged in critical thinking and experiential knowing. Methods of composition are introduced and explored: design elements and principles, proportion and scale, ordering systems, and organizational strategies. Introduction to issues of craft and material engagement. (F)

ARCH 1163 Methods I - Materiality of Place 3 Credit Hours

Prerequisite: Co-requisites: ARCH 1155 or permission of director. Introduction to principles of representation in freehand, hand-constructed, and computer-generated form through a variety of media, formats, and techniques, including projective geometry, orthographic and axonometric drawings, perspectives, sketches, and more. A wide breadth of architectural vocabulary will be explored and related to the design studio activities. (F)

ARCH 1255 Design II - Craft and Making 5 Credit Hours

Prerequisite: ARCH 1163 and ARCH 1155, Corequisite: ARCH 1263; or permission of director. A continuation in the development of fundamental design skills through introductions to the material, formal, and spatial properties of architecture. Fabrication safety, craft, and techniques will be introduced and developed through the making of full-scale constructions. Continued ideas involving Creating-Making are explored through exercises in the formal, spatial, and material qualities of human environments. (Sp)

ARCH 1263 Methods II - Pattern of Architecture 3 Credit Hours

Prerequisite: ARCH 1163 and ARCH 1155, Corequisite: ARCH 1255; or permission of director. An introduction to organizational strategies across a range of architectural scales. Ordering principles are investigated from micro through macro, from the materiality and tectonics of details, to urban patterns. Architectural assemblies and building technology will introduce structural systems and material characteristics. Massing and typology studies will introduce relationships of building to site and environment. (Sp)

ARCH 1713 Architectural Journeys in Europe and the Americas 3 Credit Hours

Introduction to the built environment using residence, public buildings, and communities as vehicles. Overview of architectural history is interwoven with an introduction to architectural form, space, order, and the elements of architecture. Stories of European and American cities serve as a vehicle to explore both architectural styles and to apply ways of thinking about space and how humans live together. (Sp) [IV-AF].

ARCH 1723 Architectural Explorations in Asia, Africa, and Australia 3 Credit Hours

Introduction to the built environment using residence, public buildings, and communities as vehicles. Overview of architectural history is interwoven with an introduction to architectural form, space, order, and the elements of architecture. Stories of East Asian, South Asian, and Southeast Asian cities serve as a vehicle to explore architectural styles, space, and how humans live together. (F) [IV-WDC].

ARCH 2243 History of the Built Environment I 3 Credit Hours

Prerequisite: majors only or permission of director. Co-requisite: ARCH 2363, ARCH 2356; for Interior Design majors: completion of A HI 2213 and A HI 2223. A theoretical investigation of the cultural, political, and aesthetic values of diverse Western and non-Western cultures and how these affect the built environment from pre-history through the Renaissance. This course continues the development of critical writing skills and further develops analytic skills that act to inform design decisions related to studio projects. (F) [IV-WC].

ARCH 2343 History of the Built Environment II 3 Credit Hours

Prerequisites: ARCH 2363, ARCH 2356, ARCH 2243. Co-requisites: ARCH 2463, ARCH 2456, ARCH 4193; or permission of director. An investigation of the cultural, political, and aesthetic values of diverse Western and non-Western cultures and how these have affected the built environment from the Renaissance through the 19th century. This course continues the development of critical writing skills and further develops analytic skills that act to inform design decisions related to studio projects. (Sp) [IV-WC].

ARCH 2356 Design III - Crafting Place 6 Credit Hours

Prerequisites: ARCH 1263, ARCH 1255 with a grade of C or better. Corequisites: ARCH 2363, ARCH 2243; or permission of director. Development of formal and spatial architectural components that demonstrate engagement with design principles, precedent analysis, human factors, and environmental and cultural influences on design. Expression of ideas through the application of virtual techniques of representation and visual communication are required. (F)

ARCH 2363 Materials and Form 3 Credit Hours

(Crosslisted with CNS 2363) Prerequisite: Majors only. An introduction to the nature of building materials with regard to form, strength, durability, workability, structure, connections, surfaces, and edges. Analysis of architectural expression through the use of building materials including the effects of: light, air movement, humidity, and their relationships to both one another and formal and spatial expressions. (F)

ARCH 2456 Design IV - Materials and Making 6 Credit Hours

Prerequisite: ARCH 2363, ARCH 2356, ARCH 2243 with a grade of C or better. Corequisites: ARCH 2463, ARCH 2343, and ARCH 4193; Majors only; or permission of director. Introduces projects of moderate complexities demonstrating intermediate design principles within the context of the urban environment demonstrating an understanding of material. Students begin to engage the effects of site and environmental conditions upon material, formal, and spatial design decisions. (Sp)

ARCH 2463 Methods IV- Sustainable and Resilient Systems I 3 Credit Hours

Prerequisite: ARCH 2363, ARCH 2356, and ARCH 2243 with a grade of C or better. Co-requisites: ARCH 2456, ARCH 2343, ARCH 4193; or permission of director. Introduction to psychrometrics, heat transmission, mechanical heating and cooling, natural ventilation, passive solar conditioning, plumbing, and fire protection in buildings. (Sp)

ARCH 2970 Special Topics/Seminar 1-3 Credit Hours

1 to 3 hours. Prerequisite: May be repeated; Maximum credit nine hours. Special topics course for content not currently offered in regularly scheduled courses. May include library and/or laboratory research, and field projects. (Irreg.)

ARCH 3013 Architecture for Non-Majors 3 Credit Hours

Prerequisite: junior standing. An introduction of basic principles of architecture for the non-architect. Understanding of the qualities and characteristics of a well-designed architectural environment. Not open to architecture majors. (F, Sp) [IV-AF].

ARCH 3143 Architecture of the Gods: Monumentality from East to West 3 Credit Hours

Prerequisite: Junior Standing. This course examines how ambitious individuals and societies have used monumental architecture to project power and immortalize legacies across cultures and time. Students will analyze architectural expressions from antiquity to present day, studying how builders from Rome, Persia, and other civilizations defined power and identity through the built environment, transcending cultural boundaries. (F, Sp)

ARCH 3440 Mentored Research Experience 3 Credit Hours

0 to 3 hours. Prerequisites: ENGL 1113 or equivalent, and permission of instructor. May be repeated; maximum credit 12 hours. For the inquisitive student to apply the scholarly processes of the discipline to a research or creative project under the mentorship of a faculty member. Student and instructor should complete an Undergraduate Research & Creative Projects (URCP) Mentoring Agreement and file it with the URCP office. Not for honors credit. (F, Sp, Su)

ARCH 3556 Design V - Architectural Making I 6 Credit Hours

Prerequisite: ARCH 2463, ARCH 2456, ARCH 2343, and ARCH 4193 with a grade of C or better. Co-requisites: ARCH 4563, ARCH 4233, ARCH 4453; or permission of director. Introduces principles and techniques of site design within a building context of place, order, form, and structure. It also introduces climatic data analysis software as a means for teaching evidence based design and sustainable design principles. Studio-based lectures and assignments will challenge students to analyze, adapt to, and transform the site within a building design context. (F)

ARCH 3656 Design VI - Architectural Making II 6 Credit Hours

Prerequisites: ARCH 4563, ARCH 3556, ARCH 4233, ARCH 4453 with a grade of C or better. Co-requisites: ARCH 4663, ARCH 4543; or permission of director. Students develop the ability to design in the context of existing urban environments. Students are challenged to take into account the layered histories of cities as well as the complexities of dealing with site and street design for urban contexts. Course features guest lectures from experts on urban design and planning; and special topics pertaining to individual studio programs. (Sp)

ARCH 3960 Honors Reading 1-3 Credit Hours

1 to 3 hours. Prerequisite: admission to Honors Program. May be repeated; maximum credit six hours. Consists of topics designated by the instructor in keeping with the student's major program. The topics will cover materials not usually presented in the regular courses. (F, Sp, Su)

ARCH 3970 Honors Seminar 1-3 Credit Hours

1 to 3 hours. Prerequisite: admission to Honors Program. May be repeated; maximum credit six hours. The projects covered will vary. The content will deal with concepts not usually presented in regular coursework.

ARCH 3980 Honors Research 1-3 Credit Hours

1 to 3 hours. Prerequisite: admission to Honors Program. Provides an opportunity for the gifted Honors candidate to work at a special project in the student's field. (F, Sp)

ARCH 3990 Independent Study 1-3 Credit Hours

1 to 3 hours. Prerequisite: permission of instructor and junior standing. May be repeated once with change of content. Independent study may be arranged to study a subject not available through regular course offerings. (F, Sp, Su)

ARCH 4000 Foreign Study 0 Credit Hours

Prerequisite: permission of instructor. The student will experience an alternative culture or setting that enhances awareness and sensitivity. While this course normally involves foreign studies, it may include design/build, community service, volunteer activities, or other experiences relevant to Creating-Making. The duration of this experience shall be no less than eight weeks, and must be approved by a faculty coordinator. (F, Sp, Su)

ARCH 4053 Methods X- Tool of Practice 3 Credit Hours

(Slashlisted with ARCH 5053) Prerequisites: ARCH 4923, ARCH 4956 with a grade of C or better. Co-requisites: ARCH 4056 or permission of director. Explores issues in contemporary architectural practice including the role of the client, contracts, practice and project management, leadership skills, legal responsibilities, and ethics. Emphasis is placed upon issues of cultural and environmental sustainability, political activism, and the changing role of the architecture profession. The course contains program specific research and support related to studio projects. No student may earn credit for both 4053 and 5053. (Sp)

ARCH 4056 Design X- Options Studio II 6 Credit Hours

Prerequisite: ARCH 4723, ARCH 4756, and ARCH 4333 with a grade of C or better. This course examines analytical and methodological aspects of the design process through individual architectural projects. Students develop design proposals through means of intensive modeling and representation, both in analog and digital media. Fundamental issues of form, order, site, program along with schematic structure and constructability concepts are developed as part of the final project. (Sp)

ARCH 4160 Internship 0 Credit Hours

(Slashlisted with ARCH 5160) Prerequisite: ARCH 4723, ARCH 4756; or permission of director. This internship requirement corresponds with the National Council of Architectural Registration Boards Internship Development Program (IDP) and provides students with experience in an architecture office or in a related field. Students must follow the Division's Internship Program Guidelines in order to verify the appropriate experience is gained and documented. No student may earn credit for both 4160 and 5160. (F, Sp, Su)

ARCH 4161 Co-Op: Cooperative Education Experience 1 Credit Hour

(Slashlisted with ARCH 5161) Prerequisite: ARCH 4723 and ARCH 4756; or permission of director. The purpose of the Cooperative Education Program is to provide students with an actual office practice experience prior to graduation. The student is ideally exposed to a broad range of areas, such as construction documents, marketing, office practice, business management, client reviews, construction administration and a host of other daily activities that may be possible while working in Host Firms. No student may earn credit for both 4161 and 5161. (F, Sp, Su)

ARCH 4183 Survey of Middle Eastern Architecture 3 Credit Hours

(Slashlisted with ARCH 5183) Prerequisite: Junior standing or permission of instructor. Survey of Middle Eastern architecture and the impact architects and architecture from this time and region had upon the advancement of environmental/urban design throughout the rest of history. No student may earn credit for both 4183 and 5183. (Irreg.) [IV-WDC].

ARCH 4193 Architectural Structures I 3 Credit Hours

(Slashlisted with ARCH 5193; Crosslisted with CNS 4193) Prerequisite: Architecture major and completion of MATH 1523 and PHYS 1114; or Construction Science major and completion of PHYS 2414 and MATH 1523; or permission of division director. An introduction to basic physics, forces within structural systems, material strength, and associated structural engineering principles. Develops both intuitive and empirical knowledge of forces within structural systems that serve as a foundation for future courses within the Structures sequence. No student may earn credit for both 4193 and 5193. (Sp)

ARCH 4233 Architectural Structures II 3 Credit Hours

(Slashlisted with ARCH 5233; Crosslisted with CNS 4233) Prerequisite: ARCH 4193 or CNS 4193; majors only. Focus is on wood, concrete, and steel as structural materials. Material properties, common manufactured systems, common material sections, and common connection types will be explored with students demonstrating the ability to develop technical details related to various structural systems. No student may earn credit for both 4233 and 5233. (F)

ARCH 4283 Persian Architecture 3 Credit Hours

(Slashlisted with ARCH 5283) Prerequisite: junior standing. The goal of the course is to guide students into an understanding of the important contributions that Persian Architecture has made to the built environment. This course provides a comprehensive history of ancient Iranian architecture and urbanism, from the first societies to the present. No student may earn credit for both 4283 and 5283. (Sp)

ARCH 4333 Advanced Structures 3 Credit Hours

(Slashlisted with ARCH 5333) Prerequisite: ARCH 4193 and ARCH 4233; or permission of director. Introduces design of structural members using reinforced concrete. It covers the structural concrete, loads, analyses of tension and compression members, bending design for beams, axial load design for columns, structural systems, and design of reinforced concrete buildings. Concrete structures as taught for architects emphasizes principles of design rather than formulaic calculations. It emphasizes learning through project based collaborations. No student may earn credit for both 4333 and 5333. (F)

ARCH 4353 LEED Seminar 3 Credit Hours

Prerequisite: senior standing. Gives a comprehensive understanding of leadership in energy and environmental design (LEED) and the certification process. Students acquire first-hand experience in the process of "greening up" a campus. Prepares students with the knowledge necessary to sit for and pass the LEED certification exam. (F, Sp)

ARCH 4433 Rendering 3 Credit Hours

Prerequisite: senior standing. Helps students develop a more advanced understanding of graphic presentation principles and the use of pen and pencil, marker, and water color in developing presentation floor plans, sections, elevations and 3-D renderings. (Sp) [IV-AF].

ARCH 4453 Modern and Contemporary Architecture 3 Credit Hours

(Slashlisted with ARCH 5453) Prerequisite: Junior level standing; or permission of director. The course focus is on the relationship between architectural theories and projects during culture and the modern era. It considers how particular historical contexts shaped theories of design as well as how architects responded to the change. The course examines the relationship between the constructed environment and notions of modernity, developments in technology, building traditions, and politics. No student may earn credit for both 4453 and 5453. (F) [IV-AF].

ARCH 4493 Architecture of Democracy 3 Credit Hours

(Slashlisted with ARCH 5493; Crosslisted with P SC 4493) Prerequisite: P SC 1113 or permission of instructor. This course explores how space, place and values come together in public spaces, by reviewing the evolution of architecture as it relates to human governance; introducing methods for assessing and designing physical space as an expression of human values; examines the social meaning and behavioral impact of spaces; studies the expression of democratic values in public spaces. No student may earn credit for both 4493 and 5493. (Irreg.)

ARCH 4513 Creativity Through Sketching 3 Credit Hours

(Slashlisted with ARCH 5513) Prerequisite: ENGL 1213 or EXPO 1213. This course teaches students how to express themselves creatively through sketching. Students receive instruction and assignments tailored to help them learn basic sketching techniques with the aim of developing their own expressive means of communicating through sketching. No student may earn credit for both 4513 and 5513. (F) [IV-AF].

ARCH 4543 Architectural Theory and Criticism 3 Credit Hours

(Slashlisted with ARCH 5543) Prerequisite: Junior level standing; or permission of director. The development of research and academic writing in an urban and architectural context. Development of critical and analytical writing skills through the use of original research and/or analysis term papers. Topics may range from periods, politics, technology, economics, religion, gender, and culture. Open to non-architecture majors to encourage interdisciplinary research/writing. No student may earn credit for both 4543 and 5543. (Sp)

ARCH 4563 Methods V- Sustainable and Resilient Systems II 3 Credit Hours

Prerequisite: ARCH 2463, ARCH 2456, ARCH 2343, ARCH 4193 with a grade of C or better. Co-requisite: ARCH 3556, ARCH 4453, ARCH 4233; or permission of director. Introduction to plumbing, lighting, acoustics, and other auxiliary systems that impact the Creating-Making of the built environment. These systems are discussed in relation to issues of sustainability and human comfort. Codes and standards that effect building design will be introduced and discussed. (F)

ARCH 4663 Methods VI- Urban Design Methodologies 3 Credit Hours

(Slashlisted with ARCH 5663). Prerequisites: ARCH 4563, ARCH 3556, ARCH 4233, ARCH 4453 with a grade of C or better. Co-requisites: ARCH 3656, ARCH 4543 or permission of program director. Provides an introduction to urban design, an overview of its history, and a cross section of contemporary strategies to effect desired urban design conditions. The course content may support design work developed in studios of the architecture curriculum. Students may not earn credit for both 4663 and 5663. (Sp)

ARCH 4713 Real Estate Fundamentals 3 Credit Hours

(Slashlisted with ARCH 5713) Prerequisite: Junior Standing. This course is the first part of a two-course series providing an introductory survey of real estate development in terms of terminology, data, and the players, parties, and processes involved from both theoretical and practical perspectives. This course, Real Estate I, is intended to provide students with a fundamental understanding of real property's role in the creation of cities. No student may earn credit for both 4713 and 5713. (F)

ARCH 4723 Methods VII - Advanced Systems 3 Credit Hours

(Slashlisted with ARCH 5723) Prerequisites: ARCH 4543, ARCH 4663, ARCH 3656 with a grade of C or better. Co-requisites: ARCH 4756; or permission of director. Introduction to advanced issues of structure, building systems, sustainability, and integrated building management systems. Course material will develop advanced understanding of the theories and practices of these complex systems and their effects on the built environment. No student may earn credit for both 4723 and 5723. (F)

ARCH 4743 Legal Framework for Design 3 Credit Hours
(Slashlisted with ARCH 5743) Prerequisite: Junior standing or permission of instructor. The course covers the study of legal principles relevant to real estate and real-estate projects, and the business entities through which to conduct that business. No student may earn credit for both 4743 and 5743. (F)

ARCH 4756 Design VII - Systems and Context 6 Credit Hours
Prerequisites: ARCH 4543, ARCH 4663, ARCH 3656 with a grade of C or better. Co-requisites: ARCH 4723; or permission of director. This capstone course emphasizes the relationship of schematic design to contract documents through a broad exploration of structural, mechanical, electrical, plumbing, and other buildings systems. It builds on the fundamental issues of place, order, form, structure, site and programming. It is also dedicated to developing interdisciplinary and collaborative skills through team-based projects and other small group exercises. (F) [V].

ARCH 4783 Architectural Acoustics 3 Credit Hours
(Slashlisted with ARCH 5783) Prerequisite: 3rd, 4th or 5th year student in the College of Architecture. Focuses primarily on the nature of architectural acoustics based on material choices, surface arrangement, and the overall shaping of space to promote natural acoustics. There will also be some discussion concerning natural lighting and how design decisions for lighting and acoustics can work in unison. Students may not earn credit for both 4783 and 5783. (Irreg.)

ARCH 4813 Real Estate Development 3 Credit Hours
(Slashlisted with ARCH 5813) Prerequisite: Junior Standing. The course is the second part of a two-course series providing an introductory survey of real estate development in terms of terminology, data, and the players, parties, and processes involved from both theoretical and practical perspectives. This course, Real Estate II, is intended to provide students with an understanding of the development process from beginning to end. No student may earn credit for both 4813 and 5813. (Sp)

ARCH 4923 Methods IX- Entrepreneurial Architect and Leadership 3 Credit Hours
(Slashlisted with ARCH 5923) Prerequisites: ARCH 4723, ARCH 4756, ARCH 4333 with a grade of C or better. Co-requisites: ARCH 4956; or permission of director. Explores finance and leadership issues that currently confront the development, design, and construction industries. Expertise and decision-making capabilities will be explored. No student may earn credit for both 4923 and 5923. (F)

ARCH G4940 Field Work 1-4 Credit Hours
1 to 4 hours. Prerequisite: senior standing and permission of instructor. Field study related to the student's area of interest in a position approved by the instructor. One hour credit per 120 hours of field work or equivalent. Documentation and evaluation is required. (F, Sp, Su)

ARCH 4956 Design IX- Options Studio I 6 Credit Hours
Prerequisite: ARCH 4723, ARCH 4756, ARCH 4333 with a grade of C or better. This course addresses advanced aspects of architectural design. It focuses on the development of analytical and methodological aspects of the design process, including but not limited to problem formulation, design representation and decision-making. Projects investigate a number of issues ranging from socio-economic, demographic, spatial justice, equity and environmental challenges, among others. (F)

ARCH 4960 Directed Readings 1-4 Credit Hours
1 to 4 hours. Prerequisite: senior standing and permission of instructor. May be repeated with change of subject; maximum credit 12 hours. Designed for upper-division students who need opportunity to study a specific problem in greater depth than formal course content permits. (F, Sp, Su)

ARCH G4970 General Departmental Seminar 1-6 Credit Hours
1 to 6 hours. Prerequisite: senior or graduate standing, or permission of instructor. May be repeated with change of content. Special topics in architecture. (F, Sp, Su)

ARCH 4990 Independent Study 1-3 Credit Hours
1 to 3 hours. Prerequisite: four courses in general area to be studied; permission of instructor and department. May be repeated; maximum credit six hours. Contracted independent study for topic not currently offered in regularly scheduled courses. (F, Sp)

ARCH 5053 Methods X - Tools of Practice 3 Credit Hours
(Slashlisted with ARCH 4053) Prerequisites: Program admission or permission of graduate liaison. Explores issues in contemporary architectural practice including the role of the client, contracts, practice and project management, leadership skills, legal responsibilities, and ethics. Emphasis is placed upon issues of cultural and environmental sustainability, political activism, and the changing role of the architecture profession. The course contains program specific research and support related to studio projects. No student may earn credit for both 4053 and 5053. (Sp)

ARCH 5143 Architectural History 3 Credit Hours
Prerequisite: Program admission or permission of graduate liaison. A theoretical investigation of the cultural, political, and aesthetic values of diverse Western and non-Western cultures and how these affect the built environment. This course continues the development of critical writing skills and further develops analytic skills that act to inform design decisions related to studio projects. (F)

ARCH 5160 Internship 0 Credit Hours
(Slashlisted with ARCH 4160) Prerequisite: Program admission or permission of graduate liaison. This internship requirement corresponds with the National Council of Architectural Registration Boards Internship Development Program (IDP) and provides students with experience in an architecture office or in a related field. Students must follow the Division's Internship Program Guidelines in order to verify the appropriate experience is gained and documented. No student may earn credit for both 4160 and 5160. (F, Sp, Su)

ARCH 5161 Co-Op: Cooperative Education Experience 1 Credit Hour
(Slashlisted with ARCH 4161) Prerequisite: Graduate standing. The purpose of this Cooperative Education Program is to provide students with an actual office practice experience prior to graduation. The student is ideally exposed to a broad range of areas, such as construction documents, marketing, office practice, business management, client reviews, construction administration, and a host of other daily activities that may be possible while working in host firms. No student may earn credit for both 4161 and 5161.

ARCH 5183 Survey of Middle Eastern Architecture 3 Credit Hours
(Slashlisted with 4183) Prerequisite: Graduate standing or permission of instructor. Survey of Middle Eastern architecture and the impact architects and architecture from this time and region had upon the advancement of environmental/urban design throughout the rest of history. No student may earn credit for both 4183 and 5183. (Irreg.)

ARCH 5193 Architectural Structures I 3 Credit Hours
(Slashlisted with ARCH 4193) Prerequisite: graduate standing and majors only; or permission of graduate liaison. An introduction to basic physics, forces within structural systems, material strength, and associated structural engineering principles. Develops both intuitive and empirical knowledge of forces within structural systems that serve as a foundation for future courses within the Structures sequence. No student may earn credit for both 4193 and 5193. (Sp)

- ARCH 5233 Architectural Structures II 3 Credit Hours**
(Slashlisted with ARCH 4233) Prerequisite: Program admission or permission of graduate liaison. Focus is on wood, concrete, and steel as structural materials. Material properties, common manufactured systems, common material sections, and common connection types will be explored with students demonstrating the ability to develop technical details related to various structural systems. No student may earn credit for both 4233 and 5233. (F)
- ARCH 5283 Persian Architecture 3 Credit Hours**
(Slashlisted with ARCH 4283) Prerequisite: graduate standing. The goal of the course is to guide students into an understanding of the important contributions that Persian Architecture has made to the built environment. This course provides a comprehensive history of ancient Iranian architecture and urbanism, from the first societies to the present. No student may earn credit for both 4283 and 5283. (Sp)
- ARCH 5333 Advanced Structures 3 Credit Hours**
(Slashlisted with ARCH 4333) Prerequisite: Program admission or permission of graduate liaison. Introduces design of structural members using reinforced concrete. It covers the structural concrete, loads, analyses of tension and compression members, bending design for beams, axial load design for columns, structural systems, and design of reinforced concrete buildings. Concrete structures as taught for architects emphasizes principles of design rather than formulaic calculations. It emphasizes learning through project based collaborations. No student may earn credit for both 4333 and 5333. (F)
- ARCH 5363 Methods III- Materials and Form 3 Credit Hours**
Prerequisite: Program admission or permission of graduate liaison. Introduction to the nature of building materials with regard to form, strength, durability, workability, structure, connections, surfaces, and edges. Analysis of architectural expression through the use of building materials including the effects of: light, air movement, humidity, and their relationships to both one another and formal and spatial expressions. (F)
- ARCH 5453 Modern and Contemporary Architecture 3 Credit Hours**
(Slashlisted with ARCH 4453) Prerequisite: Program admission or permission of graduate liaison. The course focus is on the relationship between architectural theories and projects during culture and the modern era. It considers how particular historical contexts shaped theories of design as well as how architects responded to the change. The course examines the relationship between the constructed environment and notions of modernity, developments in technology, building traditions, and politics. No student may earn credit for both 4453 and 5453. (F)
- ARCH 5463 Advanced Sustainable and Resilient Systems 3 Credit Hours**
Prerequisite: Graduate standing, ARCH 5363 and ARCH 5516 with a grade of C or better. Introduction to plumbing, lighting, acoustics, and other auxiliary systems that impact the Creating-Making of the built environment. These systems are discussed in relation to issues of sustainability and human comfort. Codes and standards that effect building design will be introduced and discussed. (Sp)
- ARCH 5493 Architecture of Democracy 3 Credit Hours**
(Slashlisted with ARCH 4493; Crosslisted with P SC 5493) Prerequisite: Graduate standing or permission of instructor. This course explores how space, place and values come together in public spaces by reviewing the evolution of architecture as it relates to human governance; introducing methods for assessing and designing physical space as an expression of human values; examining the social meaning and behavioral impact of spaces; and studying the expression of democratic values in public spaces. No student may earn credit for both 4493 and 5493. (Irreg.)
- ARCH 5513 Creativity Through Sketching 3 Credit Hours**
(Slashlisted with ARCH 4513) Prerequisite: Graduate standing or instructor permission. This course teaches students how to express themselves creatively through sketching. Students receive instruction and assignments tailored to help them learn basic sketching techniques with the aim of developing their own expressive means of communicating through sketching. No student may earn credit for both 4513 and 5513. (F)
- ARCH 5516 Graduate Architectural Design I 6 Credit Hours**
Prerequisite: Program admission or permission of the graduate liaison. Introduces projects of moderate complexities demonstrating intermediate design principles within the context of the built environment. Application of both physical and virtual communication skills as professional techniques of representation and communication are required. (F)
- ARCH 5526 Graduate Architectural Design II 6 Credit Hours**
Prerequisite: Program admission or permission of graduate liaison. Continuation of ARCH 5126 with an introduction to passive and active forms of lighting, acoustics, conveyance systems, and electrical systems. An emphasis will be placed on the relation between these auxiliary building systems and Creating-Making. Issues of sustainability including environmental impacts, resource utilization, ethical resource efficiencies and performance-based design will be related to concepts of Creating-Making. Codes and standards that effect the built environment will be explored. (Sp)
- ARCH 5536 Graduate Architectural Design III 6 Credit Hours**
Prerequisite: Program admission or permission of graduate liaison. Emphasis is on the relationship of schematic design to contract documents in order to understand structural, mechanical, electrical, plumbing, and other systems within buildings. Students demonstrate an understanding of drafting conventions, the production of traditional contract documents, Building Information Modeling, and the communication of additional solutions necessary for construction. The course develops interdisciplinary and collaborative skills through team projects. (F) [V].
- ARCH 5543 Architectural Theory and Criticism 3 Credit Hours**
(Slashlisted with ARCH 4543) Prerequisite: Program admission or permission of graduate liaison. The development of research and academic writing in an urban and architectural context. Development of critical and analytical writing skills through the use of original research and/or analysis term papers. Topics may range from periods, politics, technology, economics, religion, gender, and culture. Open to non-architecture majors to encourage interdisciplinary research/writing. No student may earn credit for both 4543 and 5543. (Sp)
- ARCH 5546 Graduate Architectural Design IV 6 Credit Hours**
Prerequisite: Program admission or permission of graduate liaison. Emphasis is on the development of a complete project from schematic design through design development and construction detailing. Students will develop a building of limited programmatic complexity through more complete technical development. The application of Building Information Modeling software will be required. This course addresses and builds upon the collaborative and analytic knowledge developed in ARCH 5423. (Sp)

ARCH 5663 Methods VI- Urban Design Methodologies 3 Credit Hours
(Slashlisted with ARCH 4663) Pre-requisites: Program admission or permission of graduate liaison. Provides an introduction to urban design, an overview of its history and a cross section of contemporary strategies to effect desired urban design conditions. The course content may support design work developed in studios of the architecture curriculum. No student may earn credit for both 4663 and 5663. (Sp)

ARCH 5713 Real Estate Fundamentals 3 Credit Hours
(Slashlisted with ARCH 4713) Prerequisite: Graduate standing or permission of instructor. This course is the first of a two-course series providing an introductory survey of real estate development in terms of terminology, data, and the players, parties, and processes involved from both theoretical and practical perspectives. The course is intended to provide students with a fundamental understanding of real property's role in the creation of cities. No student may earn credit for both 4713 and 5713. (F)

ARCH 5723 Methods VII-Advanced Systems 3 Credit Hours
(Slashlisted with ARCH 4723) Prerequisite: Program admission or permission of graduate liaison. This course introduces students to advanced issues of structure, building systems, sustainability, and integrated building management systems. Course material will develop advanced understanding of the theories and practices of these complex systems and their effects on the built environment. No student may earn credit for both 4723 and 5723. (F)

ARCH 5743 Legal Framework for Design 3 Credit Hours
(Slashlisted with ARCH 4743) Prerequisite: Graduate standing or permission of instructor. The course covers the study of legal principles relevant to real estate, real estate projects, and the business entities through which to conduct that business. No student may earn credit for both 4743 and 5743. (F)

ARCH 5763 Landscape Architecture for Architects 3 Credit Hours
Prerequisite: graduate standing or permission of instructor. Analysis and organization of the site together with the use of plant materials in landscape design. (Sp)

ARCH 5783 Architectural Acoustics 3 Credit Hours
(Slashlisted with ARCH 4783) Prerequisite: Graduate standing and permission of instructor. Focuses primarily on the nature of architectural acoustics based on material choices, surface arrangement, and the overall shaping of space to promote natural acoustics. There will also be some discussion concerning natural lighting and how design decisions for lighting and acoustics can work in unison. Students may not earn credit for both 4783 and 5783. (Irreg.)

ARCH 5812 Human Centric Design: Equity and Comfort 2 Credit Hours
Prerequisite: Graduate standing and majors only. An introduction to environmental justice, including stakeholders and community engagement. A survey of how human comfort metrics intersect with site and climate. Introduces systemic issues associated with equity in the built environment and indigenous approaches. (F, Sp, Su)

ARCH 5813 Real Estate Development 3 Credit Hours
(Slashlisted with ARCH 4813) Prerequisite: Graduate standing or permission of the instructor. The course provides an introductory survey of real estate development in terms of terminology, data, and the players, parties, and processes involved from both theoretical and practical perspectives. This course is intended to provide students with an understanding of the development process from beginning to end. No student may earn credit for both 4813 and 5813. (Sp)

ARCH 5822 Foundations of Building Physics and Analysis 2 Credit Hours

Prerequisite: Graduate standing and majors only. An introduction to topics in building physics including indoor and outdoor climate, passive technologies, daylighting, water issues, psychrometrics, and heat transfer. Explores the scientific method and application with building performance analysis, simple software-based calculations used to evaluate designs and construction against codes and standards. Explores connections between site and sustainable building metrics, Zero Tool, and AIA Framework for Design Excellence. (F, Sp, Su)

ARCH 5832 Introduction to Building Performance Analysis 2 Credit Hours

Prerequisite: Graduate standing; ARCH 5812, ARCH 5822; majors only. An introduction to metrics for evaluating building performance and tools for evaluation. Explores performance targets such as the Architecture 2030 Challenge. Examines pre- and post-occupancy performance analysis tools, equipment, and methods. Introduces software such as Cove Tools, Autodesk Insight, and Sefaira. (F, Sp)

ARCH 5842 Introduction to Research Methods for Analysis 2 Credit Hours

Prerequisite: Graduate standing; ARCH 5812, ARCH 5822; majors only. An introduction to design research methods. Examines the application of quantitative and qualitative research methods to research questions in architecture and urban design from pre-design to post-occupancy evaluation. Explores the practice of evidence-based design. (F, Sp)

ARCH 5852 Sustainable Design and BIM Workflows 2 Credit Hours

Prerequisite: Graduate standing; ARCH 5812, ARCH 5822; majors only. An introduction to Building Information Modeling (BIM) sustainable design workflows. Explores how designers, engineers, and contractors collaborate through BIM to reach sustainable design goals. Examines how BIM can be used to drive sustainable design and decision-making in theory and practice. (F, Sp)

ARCH 5862 Sustainable Urban Design 2 Credit Hours

Prerequisite: Graduate standing; ARCH 5812, ARCH 5822; majors only. An introduction to sustainable urban design principles and practices. Explores Geographic Information System (GIS) tools and EPA databases such as the TRI Explorer as they relate to sustainable urbanism, real estate, and equity. Introduces the Ecodistrict Accredited Professional program. (F, Sp)

ARCH 5863 Methods VIII-Building Performance Analytics 3 Credit Hours

Prerequisite: Graduate standing in Architecture, ARCH 5723, and ARCH 5536; corequisite, ARCH 5546; or permission of graduate liaison. Advanced level course investigating contemporary theories and practices of sustainable and resilient design. Case studies are used to examine the connections between theories and practices particularly with regard to circular economies, and life cycle costs. (Sp)

ARCH 5872 LEED GA Exam 2 Credit Hours

Prerequisite: Graduate standing; ARCH 5812, ARCH 5822; majors only. An introduction to the US Green Building Council Leadership in Energy and Environmental Design (LEED) program. Examines how buildings can be designed and operated to reduce energy consumption, protect resources and promote health through the LEED program. Prepares students for taking the LEED Green Associate Exam. (F, Sp)

- ARCH 5882 WELL AP Exam 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5812, ARCH 5822; majors only. An introduction to the theory and practices associated with WELL Building Standard. Explores the research on human health and the design of the built environment that forms the foundation for the WELL building program. Prepares students for taking the WELL Accredited Professional exam. (F, Sp)
- ARCH 5892 LCCA and the Circular Economy 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5842; majors only. Introduction to Life Cycle Cost Accounting (LCCA) and the Circular Economy. Explores the economic history, basic theory, and practices associated with LCCA. Examines connections between performative building design evaluations and sustainability's three "E's": Environment, Equity, and Economic factors. Considers the role of the architect in a global context and their interdisciplinary impact on sustainability. (F, Sp)
- ARCH 5902 Building Operations Management 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5812, ARCH 5822; majors only. This course will explore the Rocky Mountain Institute (RMI) "NZE Leasing Best Practice Guide" and ULI's "Blueprint for Green Real Estate" including the steps of how to write and negotiate an NZE lease with elements that include energy budgets, building dashboards, recommissioning, green building financing models, and BIM-enabled digital twins. (F, Sp)
- ARCH 5912 Sustainable Design Case Studies 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5842; majors only. Explores the realities of building impacts on the environment through sustainable design case studies. Introduces the case study method of analysis using the AIA Framework for Design Excellence. Introduces tools and methods for undertaking case study analysis of built works. (F, Sp)
- ARCH 5923 Methods IX - Entrepreneurial Architect and Leadership 3 Credit Hours**
(Slashlisted with ARCH 4923) Prerequisites: Program admission or permission of graduate liaison. Explores finance and leadership issues that currently confront the development, design, and construction industries. Expertise and decision-making capabilities will be explored. No student may earn credit for both 4923 and 5923. (F)
- ARCH 5932 Sustainable Design Literature Reviews 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5912; majors only. Introduces literature reviews in the context of architectural research questions. Explores design research methods and process through a review of existing literature on a topic. Develops an understanding of how to identify gaps in existing knowledge. (F, Sp)
- ARCH 5942 Case Study Research 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5932; majors only. Explores examples of sustainable building design and construction through case study analysis following the American Institute of Architects case study format. Provides an opportunity for individual research project development. Includes consideration of sustainable design standards such as LEED and/or WELL. (F, Sp)
- ARCH 5952 Comprehensive Exam 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5882 and ARCH 5892; majors only. This course prepares students to take the Comprehensive Examination, given at the end of the course, demonstrating: 1) their experience in secondary research in their area of program concentration; 2) their knowledge of the areas and subareas of the discipline and their position relative to these areas; and (3) their pedagogical knowledge, techniques and literature. (F, Sp, Su)
- ARCH 5960 Directed Readings 1-4 Credit Hours**
1 to 4 hours. Prerequisite: fifth year or graduate standing in architecture and permission of instructor. May be repeated with change of subject; maximum credit nine hours. Studies in major field as approved by instructor. (F, Sp, Su)
- ARCH 5962 Case Study Development and Presentation 2 Credit Hours**
Prerequisite: Graduate standing; ARCH 5942; majors only. Building on ARCH 5942, case studies are developed through peer reviews and presentations. Publication venues are investigated. (F, Sp)
- ARCH 5970 General Departmental Seminar 1-4 Credit Hours**
1 to 4 hours. Prerequisite: graduate standing or permission of instructor. May be repeated; maximum credit 12 hours. Advanced professional topics in architecture, construction science, urban design or environmental design. Lectures, team and individual assignments. (F)
- ARCH 5980 Research for Master's Thesis 2-9 Credit Hours**
Prerequisite: Graduate standing. Variable enrollment, two to nine hours; Laboratory (F, Sp, Su)
- ARCH 5990 Special Studies in Architecture 1-6 Credit Hours**
1 to 6 hours. Prerequisite: fifth year or graduate standing and permission of instructor. May be repeated; maximum credit nine hours. Subject as assigned by instructor will be explored in depth. Documentation and presentation varies with nature of problem. Laboratory (Sp, Su)
- ARCH 6056 Design X- Comprehensive Architecture II 6 Credit Hours**
Prerequisite: Graduate standing and ARCH 6956, or permission of graduate liaison. This course is a continuation of ARCH 6956. Analytical and methodological aspects of the design process introduced in the Fall are reinforced in the context of individual architectural projects. Schematic design alternatives developed at the end of ARCH 6956 will be developed. Fundamental issues of form, order, site, program, and building systems integration are developed for the final project. (Sp)
- ARCH 6156 Graduate Studio I 6 Credit Hours**
Prerequisite: Permission of graduate liaison. The class introduces fundamental design and visual communication skills through the use of material, formal, and spatial properties of architecture. Fabrication safety, craft, and techniques will be introduced and developed through the making. Ideas involving creating-making are explored through exercises in the formal, spatial and material qualities of human environments. (Su)
- ARCH 6590 Professional Project Research 1-4 Credit Hours**
1 to 4 hours. Prerequisite: permission of instructor. Research and development on subjects related to the professional project in architectural studies, architectural technology, historic preservation, urban design or other approved topics. (F, Sp, Su)
- ARCH 6643 Urban Design Theory 3 Credit Hours**
(Crosslisted with L A 6643 and RCPL 6643) Prerequisite: graduate standing. A survey of theory relevant to the urban design process, including social and behavioral concepts, visual and aesthetic theory, spatial and geographic factors of urban form. (Sp)
- ARCH 6680 Urban Design Studio 1-6 Credit Hours**
1 to 6 hours. Prerequisite: graduate standing. May be repeated with different content; maximum credit six hours. The course involves advanced architectural design projects with an emphasis in architectural studies, architectural technology, historic preservation, urban design, or other approved topics. Laboratory. (F, Sp)

ARCH 6690 Professional Project 1-6 Credit Hours

1 to 6 hours. Prerequisite: 5595 or 6680. May be repeated; maximum credit six hours. A terminal professional project demonstrating comprehensive understanding and integrative capabilities in architectural studies, architectural technology, historic preservation, urban design or other approved topics. Laboratory (F, Sp, Su)

ARCH 6956 Design IX- Comprehensive Architecture I 6 Credit Hours

Prerequisite: Program admission or permission of graduate liaison. This is the first of a two-semester sequence that concludes with ARCH 6056. The course encourages innovative exploration, analysis, speculation, and experimentation in developing schematic proposals. Building design concepts will consider attitudes towards ethical, environmental, site, sustainable, social, financial, material, and historical issues within the built environment and the program's Creating-Making curriculum. (F)

ARCH 6960 Directed Readings 1-3 Credit Hours

1 to 3 hours. Prerequisite: graduate standing or permission of instructor. May be repeated; maximum credit six hours. Directed readings and/or literature review under the direction of a faculty member. (Irreg.)

ARCH 6970 Special Topics/Seminar 1-3 Credit Hours

1 to 3 hours. Prerequisite: graduate standing or permission of instructor. May be repeated; maximum credit 12 hours. Special topics or seminar course for content not currently offered in regularly scheduled courses. May include library and/or research and field projects. (Irreg.)

ARCH 6990 Special Studies in Architecture 1-6 Credit Hours

1 to 6 hours. Prerequisite: graduate standing. May be repeated; maximum credit 12 hours. The candidate will thoroughly explore the particular phase of architecture selected for advanced study by the student and the graduate committee; presentation of the work will be determined by the nature of the contribution. Laboratory (F, Sp, Su)