

ARCHITECTURE (ARCH)

ARCH 1004 - Understanding Community through your Campus (2 credits)

The Virginia Tech campus as both a place and an idea. Explore the physical campus and learn how to recognize its elements. Determine where you are physically, as a community, and as part of an academic tradition. Identification of campus landmarks and navigational exploration. Measure and assess the campus and its spaces and objects, both real and virtual. Place this campus in relation to wider campus ideal and Virginia Tech history. Discussion of custodianship of land by indigenous people and history of black communities in Blacksburg and surrounding areas. Discussion of how and to whom the campus is accessible. Analysis of its buildings, spaces, and branded artifacts in verbal, digital, and drawn representation of the images, forms, and spaces students have observed. Recognition and analysis of both explicit and implicit messages in buildings, objects, and spaces. Come to an understanding of how human-made structures act as stage sets or active frameworks in which we can act out our roles of as members of communities of various kinds and at various scales.

Instructional Contact Hours: (2 Lec, 2 Crd)

ARCH 1015 - Foundation Design Laboratory (6 credits)

Foundation Design Lab is an immersive, interactive learning environment focused on inquiry, experimentation, discovery, and synthesis for students studying architecture, landscape architecture, interior design, and industrial design. The design lab develops self-reliance and self-critique, opens intellectual horizons, and challenges students to continually expand and deepen their aesthetic judgement and critical understanding. Course contact to credit hour structure: Lecture (1H,1C), Lab (6L, 2C), Design Lab/Studio (5L,3C).

Instructional Contact Hours: (1 Lec, 11 Lab, 6 Crd)

ARCH 1016 - Foundation Design Laboratory (6 credits)

Foundation Design Lab is an immersive, interactive learning environment focused on inquiry, experimentation, discovery, and synthesis for students studying architecture, landscape architecture, interior design, and industrial design. The design lab develops self-reliance and self-critique, opens intellectual horizons, and challenges students to continually expand and deepen their aesthetic judgement and critical understanding. Course contact to credit hour structure: Lecture (1H,1C), Lab (6L, 2C), Design Lab/Studio (5L,3C).

Instructional Contact Hours: (1 Lec, 11 Lab, 6 Crd)

ARCH 1024 - Innovative Design Thinking (3 credits)

Engages students in learning environment of the design laboratory, which is interactive inquiry, experimentation, discovery, and synthesis. Develops thinking and making skills in 2D and 3D across multiple scales. Advances abilities to solve problems through exploring strategies with viable consequences. Engages students in a series of iterative drawing, and modeling exercises relevant to architecture and design education. ARCH 1024 is restricted to incoming freshmen.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 1034 - Seeing Design: Transforming Observations (3 credits)

Introduces students to ways of perceiving, and recording the built and natural environment in Southwest Virginia. Introduces students to travel studies as an essential part of their architecture and design education. Transforms students observational skills. Employs photography and sketching as means of documenting findings. Employs screenprinting and digital technologies as a way to transform documentation. Prepares students for an exhibition of their work, including oral presentations. ARCH 1034 is restricted to incoming freshmen.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 1044 - Life in the Built Environment (3 credits)

Development of the human-made environment has shaped our social relations, culture, and identity. Discussion of how the imposition of built form has served both to define a shared culture and as a means of exclusion and injustice. Study of equity and ethics as evidenced and continued in planning, construction, and public space. Learn how the knowledge of these past structures might shape the future of the built environment in the United States in ways that are more equitable, inclusive, and sustainable.

Pathway Concept Area(s): 3 Reasoning in Social Sciences, 7 Identity & Equity in U.S., 11 Intercultural&Global Aware.

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: SPIA 1044

ARCH 1115 - Qualifying Design Laboratory (3 credits)

1115: An immersive, interactive course focused on inquiry, experimentation, discovery, and synthesis. Employs a series of iterative drawing and modeling exercises, at a beginners level, in two and three dimensions across multiple scales. Develops self-reliance and self-critique, which opens intellectual horizons. Challenges expand and deepen aesthetic judgment and critical understanding. Develops fundamental thinking and making skills that advance their abilities to solve problems by exploring strategies toward viable consequences. Restricted to students transferring into the School of Architecture + Design and changing their major to architecture, landscape architecture, interior design, or industrial design. 1116: An immersive, interactive course focused on inquiry, experimentation, discovery, and synthesis. Employs a series of iterative drawing and modeling exercises, at an intermediate level, in two and three dimensions across multiple scales. Develops self-reliance and self-critique, which opens intellectual horizons. Challenges expand and deepen aesthetic judgement and critical understanding. Advances foundational thinking and making skills that develop their abilities to solve problems by exploring strategies toward viable consequences. Restricted to students transferring into the School of Architecture + Design and changing their major to architecture, landscape architecture, interior design, or industrial design.

Instructional Contact Hours: (1 Lec, 6 Lab, 3 Crd)

ARCH 1116 - Qualifying Design Laboratory (3 credits)

An immersive, interactive course focused on inquiry, experimentation, discovery, and synthesis. Employs a series of iterative drawing and modeling exercises, at an intermediate level, in two and three dimensions across multiple scales. Develops self-reliance and self-critique, which opens intellectual horizons. Challenges expand and deepen aesthetic judgement and critical understanding. Advances foundational thinking and making skills that develop their abilities to solve problems by exploring strategies towards viable consequences. Restricted to students transferring into the School of Architecture + Design and changing their major to architecture, landscape architecture, interior design, or industrial design.

Prerequisite(s): ARCH 1115

Instructional Contact Hours: (1 Lec, 6 Lab, 3 Crd)

ARCH 1984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 2015 - Architecture II (7 credits)

Introduction to the theory and practice of architecture. Discipline-specific investigations into how architecture concentrates and conveys natural and cultural influences. Focus on building design as a comprehensive activity balancing numerous concerns including aesthetic, history, materiality, tectonics, and spatial expression. Examination of the relationship between the built and natural environments, including the effects of construction and environmental factors. Qualitative approaches to how architecture contributes to human wellbeing. Identification of relevant areas of interest and modes of inquiry to enrich current work and serve as a basis for self-directed learning. Immersion in the design laboratory ('studio') learning environment. 2015: How architecture concentrates and expresses natural and cultural influences, as well as how it addresses the well-being of individuals and society, through design investigations of varied scales and complexity. Identifying and connecting the fundamentals that comprise the multidimensional wholeness of a work of architecture. Selecting, describing, and analyzing relevant precedents. How architecture and the arts are similar and different, as well as how different fields of knowledge relate to architecture as a cultural and technological production. Discipline-specific modes of communication. 2016: Continued exploration of the dynamic between built and natural environments, including site, environmental forces, and construction impacts; how architecture contributes to human wellbeing. Speculation, development, and communication of architectural proposals. Developing creative source materials by examining a problem from various disciplinary and cultural perspectives. Increasingly complex design work. Hybrid Lecture (2H, 2C), Lab (12L, 4C), Design Lab/Studio (2L, 1C) (2H,14L,7C)

Prerequisite(s): ARCH 1016

Instructional Contact Hours: (2 Lec, 14 Lab, 7 Crd)

ARCH 2016 - Architecture II (7 credits)

Introduction to the theory and practice of architecture. Discipline-specific investigations into how architecture concentrates and conveys natural and cultural influences. Focus on building design as a comprehensive activity balancing numerous concerns including aesthetic, history, materiality, tectonics, and spatial expression. Examination of the relationship between the built and natural environments, including the effects of construction and environmental factors. Qualitative approaches to how architecture contributes to human wellbeing. Identification of relevant areas of interest and modes of inquiry to enrich current work and serve as a basis for self-directed learning. Immersion in the design laboratory ('studio') learning environment. 2015: How architecture concentrates and expresses natural and cultural influences, as well as how it addresses the well-being of individuals and society, through design investigations of varied scales and complexity. Identifying and connecting the fundamentals that comprise the multidimensional wholeness of a work of architecture. Selecting, describing, and analyzing relevant precedents. How architecture and the arts are similar and different, as well as how different fields of knowledge relate to architecture as a cultural and technological production. Discipline-specific modes of communication. 2016: Continued exploration of the dynamic between built and natural environments, including site, environmental forces, and construction impacts; how architecture contributes to human wellbeing. Speculation, development, and communication of architectural proposals. Developing creative source materials by examining a problem from various disciplinary and cultural perspectives. Increasingly complex design work. Hybrid Lecture (2H, 2C), Lab (12L, 4C), Design Lab/Studio (2L, 1C) (2H,14L,7C)

Prerequisite(s): ARCH 2015

Instructional Contact Hours: (2 Lec, 14 Lab, 7 Crd)

ARCH 2034 - Art of Building (2 credits)

Introduction to architecture identifying the fundamental considerations that contribute to the complex totality of a work of architecture. Interrelationships of context, structure, materiality, and technology toward accommodation and advancement of human activities and well-being. Context as preexisting factors and forces of any given site of architecture, not limited to cultural, historical, geographical, and environmental, including topography and climate. Contemporary precedents emphasizing the diversity of cultural practices and values around the globe.

Prerequisite(s): ARCH 1016

Corequisite(s): ARCH 2015

Instructional Contact Hours: (3 Lab, 2 Crd)

ARCH 2044 - Building Materials (2 credits)

Introduction to the attributes of materials with which buildings are built such as masonry, reinforced concrete, steel, stone, timber, glass and insulation; introduction of the impact of soil, vegetation, watersheds and other natural conditions on buildings and their material fabrication.

Prerequisite(s): ARCH 1015

Instructional Contact Hours: (2 Lec, 2 Crd)

ARCH 2114 - Sustainability by Design (3 credits)

Design decision-making in complex contexts. Ethical issues underlying design for sustainability. Evaluation of design in systems, products, places, and modes of living using the Framework for Strategic Sustainable Development (FSSD). Historical and cultural underpinnings of design and sustainability.

Pathway Concept Area(s): 6D Critique & Prac in Design, 10 Ethical Reasoning

Instructional Contact Hours: (3 Lec, 3 Crd)

Course Crosslist: UAP 2114

ARCH 2974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 2984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 3015 - Architecture III (7 credits)

Architectural design principles, technical concepts, applications, and measures of quality. Ongoing development of key professional skills such as modes of inquiry, problem structuring, drawing and modeling, workflows, and critique. Site, program, structural, regulatory, and environmental influences addressed in architectural formulations. Development of independent interests, research pursuits, and modes of working. 3015: Various materials and techniques of building design. The technical language of describing designed structures. Human experience, health & wellness, user needs, and regulatory standards in the built environment at multiple scales. Analysis of programmatic and site variables that influence design decisions and resource and environmental stewardship objectives. How fundamental design concepts (idea, movement, structure) and human occupation (context, program, experience) intersect with technical constructive knowledges (assembly, materials, building systems). Subjective measures of quality in design. 3016: Continued studies in materials and techniques of building design. Building assemblies documented in technical drawing, modeling, and writing. Interweaving of fundamental design concepts, human occupation, and technical constructive knowledges. How subjective and measurable (resource, environmental stewardship) criteria impact design decisions. Hybrid Lecture (2H, 2C), Lab (12L, 4C), Design Lab/Studio (2L, 1C) (2H,14L,7C)

Prerequisite(s): ARCH 2016

Corequisite(s): ARCH 3065

Instructional Contact Hours: (2 Lec, 14 Lab, 7 Crd)

ARCH 3016 - Architecture III (7 credits)

Architectural design principles, technical concepts, applications, and measures of quality. Ongoing development of key professional skills such as modes of inquiry, problem structuring, drawing and modeling, workflows, and critique. Site, program, structural, regulatory, and environmental influences addressed in architectural formulations. Development of independent interests, research pursuits, and modes of working. 3015: Various materials and techniques of building design. The technical language of describing designed structures. Human experience, health & wellness, user needs, and regulatory standards in the built environment at multiple scales. Analysis of programmatic and site variables that influence design decisions and resource and environmental stewardship objectives. How fundamental design concepts (idea, movement, structure) and human occupation (context, program, experience) intersect with technical constructive knowledges (assembly, materials, building systems). Subjective measures of quality in design. 3016: Continued studies in materials and techniques of building design. Building assemblies documented in technical drawing, modeling, and writing. Interweaving of fundamental design concepts, human occupation, and technical constructive knowledges. How subjective and measurable (resource, environmental stewardship) criteria impact design decisions. Hybrid Lecture (2H, 2C), Lab (12L, 4C), Design Lab/Studio (2L, 1C) (2H,14L,7C)

Prerequisite(s): ARCH 3015

Corequisite(s): ARCH 3066

Instructional Contact Hours: (2 Lec, 14 Lab, 7 Crd)

ARCH 3045 - Building Assemblies (2 credits)

The designs of building assemblies, elements, systems and sub-assemblies are studied. Building assemblies as controlled by formal idea, geometry, construction, materials, details, structure, function, enclosure, and finish work are considered.

Prerequisite(s): ARCH 2016

Corequisite(s): ARCH 3015

Instructional Contact Hours: (2 Lec, 2 Crd)

ARCH 3046 - Building Assemblies (2 credits)

The designs of building assemblies, elements, systems, and sub-assemblies are studied. Building assemblies as controlled by formal idea, geometry, construction, materials, details, structure, function, enclosure, and finish work are considered.

Corequisite(s): ARCH 3016, ARCH 3054

Instructional Contact Hours: (2 Lec, 2 Crd)

ARCH 3054 - Building Analysis (2 credits)

Study of exemplary built works of architecture through analysis of design documents, interviews, and inspection of actual construction. Course is completed as a group project resulting in both an oral presentation and a written document.

Prerequisite(s): ARCH 3015

Corequisite(s): ARCH 3016, ARCH 3046

Instructional Contact Hours: (2 Lec, 2 Crd)

ARCH 3065 - Building Materials and Assemblies (3 credits)

Study of what buildings are made of and how buildings are made, in support of architectural design decisions. Attributes of building materials informing their selection and use in buildings. Design and representation of building assemblies, systems, and details, including primary and secondary structural systems, the building envelope, and sub-assemblies, as influenced by formal design ideas, geometry, structure, construction processes, weather resistance, human health and well-being, and environmental impact and sustainability. 3065: Focus on wood, masonry, concrete, and steel construction systems; subsurface conditions and foundations; building codes, life-safety, and accessibility; and basic principles of building envelope systems. 3066: Review of wood, masonry, concrete, and steel construction. Focus on design of building envelope/enclosure wall systems and roofs, including consideration of water resistance, thermal insulation, air infiltration, and vapor control; building cost considerations; and appropriate modes of representation for detailed design decisions.

Prerequisite(s): ARCH 2016

Corequisite(s): ARCH 3015

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 3066 - Building Materials and Assemblies (3 credits)

Study of what buildings are made of and how buildings are made, in support of architectural design decisions. Attributes of building materials informing their selection and use in buildings. Design and representation of building assemblies, systems, and details, including primary and secondary structural systems, the building envelope, and sub-assemblies, as influenced by formal design ideas, geometry, structure, construction processes, weather resistance, human health and well-being, and environmental impact and sustainability. 3065: Focus on wood, masonry, concrete, and steel construction systems; subsurface conditions and foundations; building codes, life-safety, and accessibility; and basic principles of building envelope systems. 3066: Review of wood, masonry, concrete, and steel construction. Focus on design of building envelope/enclosure wall systems and roofs, including consideration of water resistance, thermal insulation, air infiltration, and vapor control; building cost considerations; and appropriate modes of representation for detailed design decisions.

Prerequisite(s): ARCH 3065

Corequisite(s): ARCH 3016, ARCH 3054

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 3115 - Histories of Architecture (3 credits)

Disciplinary study of architecture across time (pre-history to present) and across continents (Eastern, Western, Northern, and Southern hemispheres). Histories, principles, and factors grounding architecture's expression, form, and methods. Architecture as a cultural production reflective of its social, political, artistic, intellectual, technological, and environmental context. Exploration through artifacts, texts, drawings. ARCH 3115: emphasis on artifacts and architecture between 25000 BCE and 1600 CE; ARCH 3116: includes architectural productions from 1600 CE to present.

Prerequisite(s): ARCH 1015

Pathway Concept Area(s): 2 Critical Thinking Humanities, 11 Intercultural&Global Aware.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 3116 - Histories of Architecture (3 credits)

Disciplinary study of architecture across time (pre-history to present) and across continents (Eastern, Western, Northern, and Southern hemispheres). Histories, principles, and factors grounding architecture's expression, form, and methods. Architecture as a cultural production reflective of its social, political, artistic, intellectual, technological, and environmental context. Exploration through artifacts, texts, drawings. ARCH 3115: emphasis on artifacts and architecture between 25000 BCE and 1600 CE; ARCH 3116: includes architectural productions from 1600 CE to present.

Prerequisite(s): ARCH 3115

Pathway Concept Area(s): 2 Critical Thinking Humanities, 11 Intercultural&Global Aware.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 3514 - Design-Related Media (3 credits)

Properties and uses of various media, materials and processes as tools for analysis, documentation and presentation of the designed environment. Basic skills and techniques relating to photography, printmaking, and pottery will be explored. Repeatable with a maximum of 6 credits.

Instructional Contact Hours: (3 Lec, 3 Crd)

Repeatability: up to 6 credit hours

ARCH 3900 - Bridge Experience (0 credits)

Application of academic knowledge and skills to in a work-based experience aligned with post-graduation goals using research-based learning processes. Satisfactory completion of work-based experience often in the form of internship, undergraduate research, co-op, or study abroad; self-evaluation; reflection; and showcase of learning. Pre: Departmental approval of 3900 plan.

Instructional Contact Hours: (0 Crd)

ARCH 3954 - Studio-Study Abroad (6 credits)

The Europe Studio offers students the opportunity to make comparative studies of European cultures, as well as to study the relationship of culture to the physical environment, the organization of cities, and the history and behavior of their inhabitants. Exercises include analysis and documentation of elements of the physical environment, exploration of the interface between buildings and the fabric of the existing city, and examination of the professional community's reactions to urban design solutions.

Instructional Contact Hours: (16 Lec, 6 Crd)

ARCH 3974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 3984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 4004 - Architecture IV - Option Lab (7 credits)

Advanced architecture laboratory with specialized design options, off-campus domestic and study abroad opportunities, technical research, and professional internships. Role of design processes in shaping the built environment in response to multiple factors and across diverse contexts. Immersion in professional or specialized settings to contextualize the student's position in the discipline. Development of student-driven course of action for pursuing ongoing professional interests through engagements with, and contributions to, disciplinary research and discourse. Engagement of new territories of inquiry and representation in design work. Critical professional skills in documentation of technical and discursive dimensions of architectural works. Hybrid Lecture (2H, 2C), Lab (12L, 4C), Design Lab/Studio (2L, 1C) (2H,14L,7C)

Prerequisite(s): ARCH 3016

Instructional Contact Hours: (2 Lec, 14 Lab, 7 Crd)

ARCH 4014 - Architecture IV - Integrative Design (8 credits)

Integration of site, program, constructive systems, and regulatory and environmental frameworks to develop conceptually sound and technically feasible architectural works. Application of design research, including precedent analysis and case studies of existing works. Advanced representation techniques including written, graphic, and physical artifacts. Criticism and dialogue. Individual growth in areas of ongoing interest, research, and modes of study in architectural practice. Repeatable one time, Max. 16 cr. Hybrid Lecture (2H, 2C), Lab (15L, 5C), Design Lab/Studio (2L, 1C) (2H, 17L, 8C)

Prerequisite(s): ARCH 3016 and ARCH 3054

Instructional Contact Hours: (2 Lec, 17 Lab, 8 Crd)

Repeatability: up to 16 credit hours

ARCH 4034 - Building Cities (3 credits)

Analytical studies in the historical evolution of cities, towns and villages. Comparative studies of urban form in relation to their constructive and imaginative means with an emphasis on modern construction processes. Specific case studies in designing and building cities.

Corequisite(s): ARCH 4016

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4044 - Professional Practice in Architecture (3 credits)

Role and responsibilities of the profession on the environment, public health, and social welfare. Professional ethics. Contributions to policymaking and the building enterprise through leadership, advocacy, and civic engagement. Issues of equity, diversity, and inclusion in the profession, the environments where we practice, and the places we design. Roles, responsibilities and viewpoints of the commissioning, design, and construction ensemble. Contracts, compliance, and risk management. Starting, running, and maintaining a profitable architecture practice to achieve design goals. Methods and technologies for delivering projects. Leadership and professional communication skills, including oral, written, and visual presentations, negotiations and conflict resolution, and interpersonal communication in collaborative teams, interviews, and public meetings. Pursuing licensing, specialization, and/or nontraditional career trajectories. Change and future practice forms.

Prerequisite(s): ARCH 3016

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4055 - Environment and Building Systems (3 credits)

A design oriented study of environmental forces, environmental impacts of the built environment, and related building environmental control, life safety and service systems, with concern for the human psycho-physical impacts of building form and systems performance.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4056 - Environment and Building Systems (3 credits)

A design oriented study of environmental forces, environmental impacts of the built environment, and related building environmental control, life safety and service systems, with concern for the human psycho-physical impacts of building form and systems performance.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4075 - Building Structures (3 credits)

Building structures in steel, timber, and reinforced concrete; design of typical components: beams, slabs, columns, beam-columns, connections, and foundations; design of retaining walls; the resistance of buildings to gravity and lateral force action; building stability; floor/roof framing systems; design of simple buildings.

Prerequisite(s): ESM 3704

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4076 - Building Structures (3 credits)

Building structures in steel, timber, and reinforced concrete; design of typical components: beams, slabs, columns, beam-columns, connections, and foundations; design of retaining walls; the resistance of buildings to gravity and lateral force action; building stability; floor/roof framing systems; design of simple buildings.

Prerequisite(s): ESM 3704

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4114 - Ideas, Concepts, and Representations of Architecture (3 credits)

Disciplinary study of ideas, concepts, and representations that have shaped architecture across time (Common Era). Emphasis on ideational constructs and their varied modes of transmission (from textual to oral communications, drawings to images, buildings to models) in relation to the projecting of architecture. Architectural theories and their transmission as cultural productions reflective of societal, ethical, intellectual, environmental, and technological contexts. Presentation and reflection upon architectural discourse itself through written and oral communication.

Prerequisite(s): ARCH 3015 and ARCH 3116

Pathway Concept Area(s): 1A Discourse Advanced, 10 Ethical Reasoning

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4144 - Advanced Building Structures I (3 credits)

Study of long-span building structures. Introduction to geometry, form, and structure of folded and bent surfaces. Study of space grid geometry, close-packing systems, and cellular tensegrity. Approximate design of folded plate structures, single and double curvature shells, single and double layer space frames, suspension roofs, tents, and pneumatic structures.

Prerequisite(s): ARCH 4075 and ARCH 4076

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4154 - Advanced Building Structures II (3 credits)

Study of highrise structures ranging from building slabs and blocks, terraced buildings, and skyscrapers to towers. The complexity of load action including wind, earthquake, and hidden loads. The effect of building height, form, and proportion on force action; considerations of stability and redundancy. Preliminary design of masonry buildings, core structures, suspension buildings, braced skeletons, rigid frames, interstitial systems, staggered truss buildings, tubes and hybrid structures.

Prerequisite(s): ARCH 4075 and ARCH 4076

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4164 - Computer Applications in Design (3 credits)

Computer system fundamentals. Very brief introduction to assembly programming. Programming in a high level language. Construction of a simple text editor. Construction of a simple relational file. Computer graphics fundamentals. Geometric transformations. 3-space geometry and projections.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4204 - Urban Technology and Architecture (3 credits)

Architecture as determinant of urban spaces and urban form; perceptual, morphological, and typological characteristics of urban spaces as expressions of social values, ideals, and technological innovation. Theoretical models of technological, function, environmental, and social determinants of urban configurations are related to their cultural and historic precedents.

Instructional Contact Hours: (3 Lec, 3 Crd)

Repeatability: up to 6 credit hours

ARCH 4214 - Topics in Architecture History and Theory (3 credits)

Topics in the history of architecture and theory, predominantly with reference to the Western World. Special emphasis on methods of analysis and interpretation. Repeatable with a maximum of 9C.

Prerequisite(s): ARCH 3115 and ARCH 3116

Instructional Contact Hours: (3 Lec, 3 Crd)

Repeatability: up to 9 credit hours

ARCH 4304 - Topics in Design Methods (3 credits)

Topics in systematic methods of design and the nature of the design process including application of creative techniques, analogous thinking, analytic methods, computer-aided procedures, and information handling in design. Repeatable with a maximum of 6 credits.

Instructional Contact Hours: (3 Lec, 3 Crd)

Repeatability: up to 6 credit hours

ARCH 4414 - Advanced Environment Building Systems (3 credits)

Advanced studies of environment and building systems, including development in building systems, urban systems, service systems, construction systems, materials and component systems, psycho-physical considerations, systems analysis, and computer technology. May be repeated for a maximum of 9 credit hours in varied options offered.

Prerequisite(s): ARCH 4055 and ARCH 4056

Instructional Contact Hours: (2 Lec, 3 Lab, 3 Crd)

Repeatability: up to 9 credit hours

ARCH 4434 - Architectural Lighting Design (3 credits)

Advanced level lecture course focused on lighting. Impact on, need for and measurement of light for humans and the built and natural environments. Selection of color, light sources, equipment and controls. daylight integration. Lighting design, visualization and calculations through hand and digital methods. Evaluation of lighting system energy efficiency and cost. Presentation of lighting design.

Prerequisite(s): ARCH 4055 and ARCH 4056

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4514 - Thesis Inquiry (3 credits)

Student-led, design thesis project research articulated by an aggregated, reflective record of the first semester design work of ARCH 4515-4516 (Architecture V) through an appropriate array of representational means, such as writing, models, images, and drawings. Schematic, critical compilation of ideational and physical process includes critique, evaluation, and presentation of historical, contextual, professional, ethical, and aesthetic considerations; conceptual and theoretical foundations; development of the project's parameters and its design. Course contact to credit hour structure: Lecture (1H, 1C), Lab (3L, 1C), Design Lab/Studio (1.5L, 1C).

Prerequisite(s): ARCH 4004 and ARCH 4014

Corequisite(s): ARCH 4515

Pathway Concept Area(s): 6A Critique & Practice in Arts, 6D Critique & Prac in Design, 10 Ethical Reasoning

Instructional Contact Hours: (1 Lec, 3 Lab, 2 Lab, 3 Crd)

ARCH 4515 - Architecture V (6 credits)

Advanced design and research to produce an architectural project. Demonstration of a conceptual and professional position through a work of architecture. 4515: Student-led focus on identifying research field; probing professional interests; developing conceptual and project parameters; proposing and evaluating design through varied means of public dialogue, critique, and self-reflection. 4516: Emphasis on resolution of project, formal documentation and presentation of work, communication of conceptual position, and assertion of professional trajectory. Hybrid Lecture (1H,1C), Lab (12L, 4C), Design Lab/Studio (2L, 1C) (1H,14L,6C)

Prerequisite(s): ARCH 4004 and ARCH 4014

Corequisite(s): ARCH 4514

Instructional Contact Hours: (1 Lec, 14 Lab, 6 Crd)

ARCH 4516 - Architecture V (6 credits)

Advanced design and research to produce an architectural project. Demonstration of a conceptual and professional position through a work of architecture. 4515: Student-led focus on identifying research field; probing professional interests; developing conceptual and project parameters; proposing and evaluating design through varied means of public dialogue, critique, and self-reflection. 4516: Emphasis on resolution of project, formal documentation and presentation of work, communication of conceptual position, and assertion of professional trajectory. Hybrid Lecture (1H,1C), Lab (12L, 4C), Design Lab/Studio (2L, 1C) (1H,14L,6C)

Prerequisite(s): ARCH 4514 and ARCH 4515

Corequisite(s): ARCH 4524

Instructional Contact Hours: (1 Lec, 14 Lab, 6 Crd)

ARCH 4524 - Thesis Documentation (3 credits)

Formal documentation of the architectural design thesis, a terminal design project with a conceptual and professional position in the final, fifth year of the professional degree program. Thesis project, process, concept, research, and ethical position presented through drawings, images, and writings. Preparation of portfolio quality document demonstrating architectural ability within discipline and profession. Course contact to credit hour structure: Lecture (1H, 1C), Lab (3L, 1C), Design Lab/Studio (1.5L, 1C).

Prerequisite(s): ARCH 4514 and ARCH 4515

Corequisite(s): ARCH 4516

Pathway Concept Area(s): 6A Critique & Practice in Arts, 6D Critique & Prac in Design, 10 Ethical Reasoning

Instructional Contact Hours: (1 Lec, 5 Lab, 3 Crd)

ARCH 4705 - Qualifying Design Seminar (3 credits)

Exploratory overview of selected theories and issues relevant to the design and use of the environment. 4705: Emphasis on history, human behavior, and environmental context as it relates to architecture. 4706: Presentation and discussion of the nature of principal construction materials in relation to building design. Characteristics of primary structural materials: wood, steel, concrete, masonry; environmental control systems; supporting technologies. Not for credit for majors holding a first professional degree in architecture.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4706 - Qualifying Design Seminar (3 credits)

Exploratory overview of selected theories and issues relevant to the design and use of the environment. 4705: Emphasis on history, human behavior, and environmental context as it relates to architecture. 4706: Presentation and discussion of the nature of principal construction materials in relation to building design. Characteristics of primary structural materials: wood, steel, concrete, masonry; environmental control systems; supporting technologies. Not for credit for majors holding a first professional degree in architecture.

Instructional Contact Hours: (3 Lec, 3 Crd)

ARCH 4715 - Qualifying Design Laboratory (9 credits)

4715: Design laboratory in which student and faculty teams explore the nature of problems and potentials with which architecture is concerned, and experimentally develop methods and process through which existing contexts are transformed into new conditions. 4716: Provides introduction to basic concepts of building structures, materials, and enclosure systems, and appropriate site and climate responses. Not for credit for majors holding a first professional degree in architecture.

Instructional Contact Hours: (3 Lec, 18 Lab, 9 Crd)

ARCH 4716 - Qualifying Design Laboratory (9 credits)

4715: Design laboratory in which student and faculty teams explore the nature of problems and potentials with which architecture is concerned, and experimentally develop methods and process through which existing contexts are transformed into new conditions. 4716: Provides introduction to basic concepts of building structures, materials, and enclosure systems, and appropriate site and climate responses. Not for credit for majors holding a first professional degree in architecture.

Instructional Contact Hours: (3 Lec, 18 Lab, 9 Crd)

ARCH 4904 - Professional Studies (1 credit)

Instructional Contact Hours: (1 Lec, 1 Crd)

ARCH 4944 - Consortium Studies in Arch (0 credits)

International consortium of Schools of Architecture. Undergraduate students are provided an academic environment utilizing the Washington D.C. metropolitan area as an educational laboratory for pursuit of architecture, landscape architecture and urban design and planning. Consortium studies courses are not for credit but reflect enrollment as a full time student. Approval for participation required by student home institution and Virginia Tech. Special fees apply.

Instructional Contact Hours: (0 Crd)

ARCH 4954 - Study Abroad (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 4964 - Field Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 4974 - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 4974H - Independent Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 4984 - Special Study (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 4994 - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course

ARCH 4994H - Undergraduate Research (1-19 credits)

Instructional Contact Hours: Variable credit course