North Carolina State University
Interim Progress Report for Year Five

Instructions and Template

Due by November 30, 2023

Contents

1. INSTRUCTIONS AND TEMPLATE GUIDELINES

Purpose

Continuing accreditation is subject to the submission of interim progress reports at defined intervals after an eight-year or four-year term of continuing accreditation is approved.

This narrative report, supported by documentation, covers three areas:
1. The program's correction of not-met Conditions or Student Performance Criteria from the previous Interim Progress Report.
2. Significant changes to the program or the institution since the last visit.
3. Summary of preparations for adapting to 2020 NAAB Conditions.

Supporting Documentation

1. Evidence must be provided for each Condition and SPC "not met," including detailed descriptions of changes to the curriculum that have been made in response to not-met SPC that were identified in the review of the previous Interim Progress Report. Identify any specific outcomes expected to student performance. Attach new or revised annotated syllabi identifying changes for required courses that address unmet SPC.
2. Provide information regarding changes in leadership or faculty membership. Identify the anticipated contribution to the program for new hires and include either a narrative biography or one-page CV.
3. **Evidence of student work is required for SPCs 'not met' in the most recent VTR.**
    - **Provide three examples of minimum-pass work for each deficiency** and submit student work evidence to NAAB in electronic format. ((Refer to the "Requirements for the Use of Digital Content in Interim Progress Reports" for the required format and file organization.)
    - All student work evidence must be labeled and clearly annotated so that each example cross-references the specific SPC being evaluated and shows compliance with that SPC.
4. Provide additional information that may be of interest to the NAAB team at the next accreditation visit.

Outcomes

IPRs are reviewed by a panel of three: one current NAAB director, one former NAAB director, and one experienced team chair.[1] The panel may make one of three recommendations to the Board regarding the interim report:

1. Accept the interim fifth-year report as having demonstrated satisfactory progress toward addressing deficiencies identified in the most recent VTR;

2. Reject the fifth-year interim report as having not demonstrated sufficient progress toward addressing deficiencies and advance the next accreditation sequence by at least one but not more than three calendar years. In such cases, the chief academic officer of the institution will be notified with copies to the program administrator and a schedule will be determined so that the program has at least six months to prepare an APR.

3. The annual statistical report (See Section 9 of the 2015 Procedures)) is still required in either case.

Deadline and Contacts

IPRs are due on November 30. They shall be submitted as bookmarked PDFs sent to accreditation@naab.org. As described in Section 10 of the 2015 NAAB Procedures for Accreditation "…the program will be assessed a fine of $100.00 per calendar day until the IPR is submitted." If the IPR is not received by January 15, the program will automatically receive Outcome 3 described above. Email questions to accreditation@naab.org.

Instructions

1. **Reports shall be succinct and are limited to 40 pages/20 MBs, including supporting documentation.**
2. Type all responses in the designated text areas.
3. Reports must be submitted as a single PDF following the template format. Pages should be numbered.
4. Supporting documentation should be included in the body of the report.
5. Remove the #4 “Requirements for the Use of Digital Content in Interim Progress Reports” pages before submitting the interim progress report.

2. EXECUTIVE SUMMARY OF 2018 NAAB VISIT

CONDITIONS NOT MET

2018 VTR	Requires Update on Progress in 5-Yr. IPR
II.4.2 Access to NAAB Conditions and Procedures	☐
II.4.4 Public Access to APRs and VTRs	☐

STUDENT PERFORMANCE CRITERIA NOT MET

2018 VTR	Requires Update on Progress in 5-Yr. IPR
B.4 Technical Documentation	☒
B.6 Environmental Systems	☒
B.10 Financial Considerations	☒
C.2 Integrated Evaluations and Decision-making Design Process	☒
C.3 Integrative Design	☒

3. TEMPLATE

Interim Progress Report

North Carolina State University
College of Design, School of Architecture
Bachelor of Architecture (preprofessional degree + 30 semester credits)
Master of Architecture (preprofessional degree + 48 semester credits)
Master of Architecture (non-preprofessional degree + 96 semester credits)
Year of the previous visit: 2018

Please update contact information as necessary since the last APR was submitted.

Chief administrator for the academic unit in which the program is located:

Name: David Hill, FAIA
Title: Head of the School of Architecture
Email Address: dbhill@ncsu.edu
Physical Address: Campus Box 7701, College of Design, 50 Pullen Road, Raleigh, NC 27695

Any questions pertaining to this submission will be directed to the chief administrator for the academic unit in which the program is located.

Chief academic officer for the Institution:

Name: Dr. Warwick Arden
Title: Executive Vice Chancellor and Provost
Email Address: provost@ncsu.edu
Physical Address: Campus Box 7101, NC State University, 20 Watauga Club Dr., Raleigh, NC 27695

Text from the VTR and IPR Year 3 review is in the gray text boxes. Type your response in the designated text boxes.

I. Progress in Addressing Not-Met Conditions and Student Performance Criteria

a. Progress in Addressing Not-Met Conditions

N/A

b. Progress in Addressing Not-Met Student Performance Criteria

B.4 Technical Documentation: Ability to make technically clear drawings, prepare outline specifications, and construct models illustrating and identifying the assembly of materials, systems, and components appropriate for a building design.

2018 Visiting Team Assessment:

B. Arch.: Evidence was found in areas of technically clear drawings and models, identifying the assembly of materials, systems, and components appropriate for a building design in ARC 501, Professional Architecture Studio I, however no evidence was found demonstrating the ability to prepare outline specifications.

M. Arch.: Evidence was found in making technically clear drawings and models identifying the assembly of materials, systems, and components appropriate for a building design in student work prepared ARC 500, Architectural Design: Professional Studio; however, no evidence was found demonstrating the ability to prepare outline specifications.

North Carolina State University, 2021 Response: The course assignments for ARC 500 Architectural Design: Professional Studio (M.Arch.) and ARC 501 Professional Architecture Studio 1 (B.Arch.) have been updated. The assignment requires students to write an outline specification for a component of their design projects in these studios. The instructors and external reviewers evaluate the students' proficiency in writing outline specifications, and they provide feedback to ensure success. See Appendix item A for updated syllabus and item B for outline specifications assignment listed in the ARC 500/501 Integrative Studio Phases, Lectures, Deliverables, and SPCs outline.

North Carolina State University, 2023 Response: ARC 561 The Practice of Architecture student work samples in this report demonstrate students' ability to prepare outline specifications. We have moved this assignment to ARC 561 The Practice of Architecture in order to align it with a lecture and workshop on construction administration. In the assignment, students are asked to prepare an outline specification for two materials that they are proposing for a studio design project. See Appendix item C for the ARC 561 The Practice of Architecture syllabus and the outline specifications assignment.

B.6 Environmental Systems: Ability to demonstrate the principles of environmental systems' design, how design criteria can vary by geographic region, and the tools used for performance assessment. This demonstration must include active and passive heating and cooling, solar geometry, daylighting, natural ventilation, indoor air quality, solar systems, lighting systems, and acoustics.

2018 Visiting Team Assessment:

B. Arch: Evidence of student achievement at the prescribed level was not found in student work presented. Scant evidence of student ability was found regarding principles of environmental design.

M.Arch: Evidence of student achievement at the prescribed level was not found in student work presented.

North Carolina State University, 2021 Response: The School of Architecture created a task force to address this issue and make recommendations on improving students' ability to meet this SPC and other SPCs associated with Integrative Design. The task force and instructors updated the ARC 500/501 syllabus (see Appendix item A) and created a new ARC 500/501 Integrative Studio Phases, Lectures, Deliverables, and SPCs outline (see Appendix item B). The outline maps assignments to individual SPCs, including B.6 Environmental Systems. ARC 500 and ARC501 studios are coordinated in terms of learning objectives, SPCs, schedules, lectures, workshops, and deliverables. Course assignments for ARC 500 Architectural Design: Professional Studio (M.Arch.) and ARC 501 Professional Architecture Studio 1 (B.Arch.) have been updated to ensure that students are capable of designing environmental systems as part of an integrated design project. Faculty and external reviewers provide students with a technical review near the middle of the semester. Students refine their environmental and technical systems for the final review at the semester's end. The assignment requires students to consider various environmental systems—passive and active—to determine the most appropriate systems for their buildings. Students are required to produce natural and mechanical systems diagrams and a 3D digital integration "chunk" model that demonstrates how the components of the environmental systems are integrated with other building systems, such as structure, floorplates, interior partitions, ceilings, and envelopes. The faculty task force, along with a new studio coordinator, Professor Jianxin Hu, and the ARC 500 (M.Arch.) and ARC 501 (B.Arch.) studio instructors created a new lecture and workshop (Instructor Lecture 3: Environmental Systems) to guide students in designing and integrating environmental systems in their design schemes.

North Carolina State University, 2023 Response: We have provided student work from ARC 414/590-014 Environmental Control Systems that illustrates how students are meeting all components of this SPC: active and passive heating and cooling, solar geometry, daylighting, natural ventilation, indoor air quality, solar systems, lighting systems, and acoustics. In addition to this, we have provided student work examples from ARC 500 and ARC 501 Integrative Studios that demonstrate 1.) tools used for performance assessment and 2.) how students apply principles and integrate elements of environmental systems to their design projects—illustrated through drawings, diagrams, and the integrative 3D digital "chunk" model. See Appendix item D for the ARC 414/590-014 Environmental Control Systems syllabus and Appendix items A and B for the ARC 500/501 Integrative Studio syllabus and deliverables. NOTE: The student work PDF files are bookmarked and annotated for ease of navigation.

B.10 Financial Considerations: Understanding of the fundamentals of building costs, which must include project financing methods and feasibility, construction cost estimating, construction scheduling, operational costs, and life-cycle costs.

2018 Visiting Team Assessment:

B. Arch: Evidence of exposure to concepts of construction cost estimating and life-cycle costing was found; however no corollary evidence was found demonstrating students' understanding of project financing methods and feasibility or operational costs.

M.Arch: Evidence of exposure to concepts of construction cost estimating and life-cycle costing was found; however no evidence was found to demonstrate an understanding of the concepts presented, such as project financing methods and feasibility or operational costs.

North Carolina State University, 2021 Response: The course syllabi and assignments for ARC500 Architectural Design: Professional Studio (M.Arch.), ARC 501 Professional Architecture Studio 1 (B.Arch.), and ARC 561 The Practice of Architecture (B.Arch. and M.Arch.) have been updated to effectively address this SPC. In a new ARC 500 and ARC 501 assignment, students are required to prepare a preliminary cost estimate for their design projects, including a summary of hard costs, soft costs, and life-cycle/operational costs (see Appendix item B for ARC 500/501 Integrative Studio Phases, Lectures, Deliverables, and SPCs outline). In ARC 561, course topics, lectures, and workshops have been revised to more thoroughly address financing, feasibility, and life-cycle, operations, and maintenance costs. A new assignment in ARC 561 requires students to determine the financial feasibility of a hypothetical project, with considerations for project financing, budgeting, fees, construction schedule, and project delivery method (see Appendix items C and D for ARC 561 syllabus and new assignment).

North Carolina State University, 2023 Response: Annotated student work from ARC 500 and ARC 501 Integrative Studios is included in this report to demonstrate student understanding of construction and operational costs. Annotated student work from ARC 561 The Practice of Architecture is included in this report to demonstrate students' understanding of project financing costs and feasibility. See Appendix items A and B for ARC 500/501 Integrative Studio syllabus and deliverables. See Appendix item C for ARC 561 The Practice of Architecture syllabus and assignments. NOTE: The student work PDF files are bookmarked and annotated for ease of navigation.

C.2 Integrated Evaluations and Decision-Making Design Process: Ability to demonstrate the skills associated with making integrated decisions across multiple systems and variables in the completion of a design project. This demonstration includes problem identification, setting evaluative criteria, analyzing solutions, and predicting the effectiveness of implementation.

2018 Visiting Team Assessment: B. Arch: Evidence was not found in the work presented. While ARC 501, ARC 502, ARC 561 and ARC 581 have produced case studies, class books, and projects addressing problem identification and set some design parameters, individual student projects generally fail to include evaluative criteria, present a systematic analysis of design solutions, or predict effectiveness of implementation(s). In addition, plumbing, mechanical, electrical, and fire protection systems are not readily identified in many projects. Building systems identified do not logically integrate with other building service systems and the overall building design. Designs did not demonstrate an ability to integrate life safety requirements.

M. Arch: Evidence was not found in work presented. While ARC 500 and ARC 561 have produced case studies, class books, and projects addressing problem identification and set some design parameters, individual projects fail to include evaluative criteria, present a systematic analysis of design solutions, or predict the effectiveness of implementation(s). In addition, plumbing, mechanical, electrical, and fire protection systems are not readily identified in many projects. Building systems identified do not logically integrate with other building service systems and the overall building design. Designs did not demonstrate an ability to integrate life safety requirements.

North Carolina State University, 2021 Response: The School of Architecture created a task force to address this issue and make recommendations on improving students' ability to meet this SPC and other SPCs associated with Integrative Design. The task force and instructors updated the ARC 500/501 syllabi and created a new ARC 500/501 Integrative Studio Phases, Lectures,

Deliverables, and SPCs outline (see Appendix items A and B). The outline maps assignments to individual SPCs, including C.2 Integrated Evaluations and Decision-Making Design Process. ARC 500 and ARC 501 studios are coordinated in terms of learning objectives, SPCs, schedules, lectures, workshops, and deliverables. Course assignments/deliverables for ARC 500 Architectural Design: Professional Studio (M.Arch.) and ARC 501 Professional Architecture Studio 1 (B.Arch.) have been updated to ensure that students are capable of defining assessment criteria. Students use their identified criteria to assess alternatives, make design decisions, and develop their schemes. This is done as part of an integrative design project, beginning at an early stage of the project. The task force, along with a new studio coordinator and the ARC 500 (M.Arch.) and ARC 501 (B.Arch.) studio instructors, created two new lectures and workshops (Instructor Lecture 1: Pre-Design Methods and Instructor Lecture 2: Sustainable Strategies) to guide students in creating, documenting, and applying assessment criteria in their design schemes. Pre-Design Methods includes topics, such as site analysis, program requirements, code research, building and site precedents, and scheme assessment criteria. Sustainable Strategies includes an overview of climate change, green building frameworks, the impact of buildings on water and energy consumption, waste, and carbon emissions, basic and advanced strategies for sustainable design, building ratings systems, synergistic design strategies, and evaluative procedures. Updated assignments require students to create alternative schemes and produce illustrated comparative analyses that lead to informed and sound design decisions. Faculty and external reviewers provide students with a review of their scheme comparisons before students proceed with project development. Students refine their schemes based on the identified evaluative criteria. Subsequent assignments have been updated, requiring students to clearly and effectively integrate and illustrate building systems. This includes plumbing, mechanical, electrical, and fire protection. Assignments require students to produce technical wall sections, details, reflected ceiling plans, systems diagrams, and a systems-integration 3D digital building “chunk” model that shows components. See response to C.3 below for additional steps taken to address issues with integrative design.

North Carolina State University, 2023 Response: Annotated student work from ARC 500 and ARC 501 Integrative Studios is included in this report to demonstrate students’ ability to identify/define design problems, set evaluative criteria (illustrated in either matrix, list, or narrative format), analyze solutions, compare/predict the effectiveness of preliminary schemes, and implement solutions through design development processes. Student work for an entire design project is included to show: 1.) Pre-design Research Booklets (problem identification, site analysis, programming and user requirements, code/accessibility requirements, and precedents), 2.) multiple preliminary design schemes (Pre-Design Charrette) for comparison based on student-identified criteria, 3.) schematic design and design development of the chosen scheme, and 4.) implementation of the final, integrative scheme. See Appendix items A and B for ARC 500/501 Integrative Studio syllabus and deliverables. NOTE: The student work PDF files are bookmarked and annotated for ease of navigation. We are showing the same student work projects in C.2 and C.3 because these two SPCs are aligned in our Integrative Studios.

C.3 Integrative Design: Ability to make design decisions within a complex architectural project while demonstrating broad integration and consideration of environmental stewardship, technical documentation, accessibility, site conditions, life safety, environmental systems, structural systems, and building envelope systems and assemblies.

2018 Visiting Team Assessment:

B. Arch: Evidence was not found in student work presented. The projects presented in ARC 501 and 502 illustrated integration of environmental stewardship, site conditions, and building

envelope systems and assemblies, but failed to appropriately address all other criteria covered by this SPC.

M. Arch: Evidence of student achievement at the prescribed level was not found in student work presented. The projects presented in ARC 501 and 502 illustrated integration of environmental stewardship, site conditions, and building envelope systems and assemblies, but failed to appropriately address other other criteria covered by this SPC.

North Carolina State University, 2021 Response: The School of Architecture's Integrative Studio Task Force addressed this SPC and the constituent SPCs that are required for successful completion of SPC C.3 Integrative Design. As a result, instructors have updated ARC 500/501 syllabi and created a new ARC 500/501 Integrative Studio Phases, Lectures, Deliverables, and SPCs outline (see Appendix items A and B). The outline maps assignments to individual SPCs within the realm of C.3 Integrative Design: B.2 Site Design, B.3 Codes and Regulations, B.4 Technical Documentation, B.5 Structural Systems, B.6 Environmental Systems, B.7 Building Envelope Systems and Assemblies. ARC 500 and ARC 501 studios are coordinated in terms of learning objectives, SPCs, schedules, lectures, workshops, and deliverables. Course lectures, workshops, and assignments for ARC 500 Architectural Design: Professional Studio (M.Arch.) and ARC 501 Professional Architecture Studio 1 (B.Arch.) have been updated to ensure that students are capable of designing an integrated design project that addresses each of the SPC components of C.3. Refer to the Integrative Studio Phases, Lectures, Deliverables, and SPCs outline provided in the Appendix for details on lecture/workshop content and descriptions of assignments. Updated assignments require students to clearly and effectively integrate and illustrate environmental stewardship strategies, technical drawings and specifications, accessibility requirements, site conditions, life safety, environmental systems, PME, fire protection, and building envelope systems. Students are required to produce a pre-design research booklet, technical wall sections, construction details, site and floorplans, building/site sections, reflected ceiling plans, mechanical and structural systems diagrams, code compliance diagrams, physical study models, a systems-integration ("chunk") 3D digital model, and preliminary cost estimates with summarized life-cycle/operational costs. A series of instructor and guest-led lectures and workshops that prepare students for the assignments is a significant update to the Integrative Design studio. Topics include: Pre-design Methods, Sustainable Strategies, Environmental Systems, Codes, Building Envelopes, Systems Integration, Electrical, Lighting, Fire Protection, and Cost Estimating, and Outline Specifications. Students are provided with several intermediate reviews during the semester to receive feedback that will lead to more complete, refined, and integrated design schemes. Student work from these studios is assessed on an annual basis as part of NC State University's Assessment of Academic Programs.

North Carolina State University, 2023 Response: Annotated student work from ARC 500 and ARC 501 Integrative Studios is included in this report to demonstrate students' ability to identify/define design problems, set evaluative criteria (illustrated in either matrix or narrative format), analyze solutions, compare/predict the effectiveness of preliminary schemes, and implement solutions through schematic and design development processes. Student work for an entire design project is included to show: 1.) Pre-design research booklets (problem identification, site analysis, programming and user requirements, code/accessibility requirements, and precedents), 2.) multiple preliminary design schemes for comparison based on student-identified criteria, 3.) schematic design and design development of the chosen scheme, and 4.) implementation of final, integrative scheme that illustrates: environmental stewardship, technical documentation, accessibility, site conditions, life safety, environmental systems, structural systems, and building envelope systems and assemblies. See Appendix items A and B for ARC 500/501 Integrative Studio syllabus and deliverables. NOTE: The student work PDF files are

bookmarked and annotated for ease of navigation. We are showing the same student work projects in C.2 and C.3 because these two SPCs are aligned in our Integrative Studios.

II. Changes or Planned Changes in the Program

Please report such changes as the following: faculty retirement/succession planning; administration changes (dean, department chair, provost); changes in enrollment (increases, decreases, new external pressures); new opportunities for collaboration; changes in financial resources (increases, decreases, external pressures); significant changes in educational approach or philosophy; changes in physical resources (e.g., deferred maintenance, new building planned, cancellation of plans for new building).

North Carolina State University, 2023 Response: Faculty updates: (see Appendix item E) Since the last NAAB visit, the School of Architecture has added five new tenure-track/tenured professors: George Elvin, PhD (Associate Professor with tenure), Rosa MacDonald (tenure-track Assistant Professor), Donghwan Moon (tenure-track Assistant Professor), Shawn Protz (tenure-track Assistant Professor), and Traci Rider, PhD (tenured Associate Professor). Professor Patrick Rand, FAIA, retired at the end of the Spring 2021 semester. Administration updates: Associate Professor Sara Queen was named Director of Undergraduate Programs in Architecture in 2020. There have been no changes in dean, school head, provost, or chancellor since the last NAAB visit. Changes in enrollment: There have been no significant changes in enrollment over the past three years. We have seen slight increases in undergraduate enrollment. After a slight decrease during Covid, graduate enrollment has rebounded to normal levels. During and since Covid, we have found online open houses to be effective events for engaging out-of-state and international prospective students. New opportunities for collaboration: The School of Architecture is currently working with NC Central University, an HBCU, to establish a pre-architecture program at Central. This program will create collaborative opportunities between our two schools and potentially provide a pipeline for Central students to our M.Arch. program. The school teaches graduate-level collaborative research and design studios with the Department of Landscape Architecture and Environmental Planning. Recent and upcoming Architecture studios include partnerships with industry (National Concrete Masonry Association, Precast Concrete Institute), professional practices (SOM, Fentress Architects, Hanbury), and community organizations and research agencies (NC SeaGrant, NC Coalition to End Homelessness, Town of Nags Head, NC, Lenoir County, NC). The school maintains close ties to AIA Triangle and AIA North Carolina through events, scholarships, and mentoring programs. Financial Resources: There have been no new permanent changes in financial resources. Educational Approach and Philosophy: There have been no significant changes to our mission or educational approach. We continue to evaluate our mission, strategic plan, curriculum, and approach as we adapt to new 2020 NAAB Conditions. A curriculum task force has recently recommended changes that the school is pursuing. Physical Resources: There have just a few changes to physical resources. The School of Architecture has moved into studio spaces in Brooks Hall that were recently vacated when the Department of Graphic and Industrial Design acquired new spaces in Lampe Hall. New Assistant Professor, Shawn Protz, has established space within the college's Materials Lab for a new Ceramics Lab. Professor Wayne Place has completed construction of an on-campus, full-scale, rotatable daylighting research facility.

III. Summary of Preparations for Adapting to 2020 NAAB Conditions

Please provide a brief description of actions taken or plans for adapting your curriculum/ classes to engage the 2020 Conditions.

North Carolina State University, 2023 Response: The School of Architecture has taken many steps to adapt to the new 2020 NAAB Conditions. In order to gain a greater understanding of the new conditions and procedures, the school head and faculty have attended numerous workshops and webinars hosted by the Association of Collegiate Schools of Architecture and the NAAB staff. These include "Principles of Assessment in Design Education," "NAAB Accreditation: 2020 Conditions and Procedures" at the 2021 ACSA Administrators Conference, "Implementing 2020

NAAB Conditions & Procedures" at the ACSA 109th Annual Meeting, and the NAAB sessions at the 2022 and 2023 ACSA Administrators Conferences. The School of Architecture participated in a one-on-one Assessment Coaching Session with Herb Childress through a program offered by ACSA. We have taken the following steps to improve our assessment framework for better alignment with the new NAAB conditions: established a curriculum task force that has made recommendations for curricular updates; mapped new NAAB Program Criteria and Student Criteria to our curriculum and programs to ensure alignment and to reveal any necessary changes; created a new Justice, Equity, Diversity, and Inclusion (JEDI) plan that provides an assessment tool; revised the School of Architecture Procedures Manual; and created an assessment plan and protocols that include assessment area, evidence to collect, benchmarks, frequency, and actions/updates. The faculty has ratified a new Design Development course that will give us additional opportunities beyond studio to address new SP.5 Design Synthesis and SP.6 Building Integration. This new course is currently being routed through the university approval system. NC State University requires the School of Architecture to complete a Program Outcomes Assessment for our B.Arch. and M.Arch. programs and our three graduate certificates (Energy and Technology in Architecture, City Design, and Public Interest Design). We have updated some components of these assessments to better align with the new conditions. We have mapped the new Program Criteria (PC) to our mission statement and determined the most critical components of our program that address the PCs. We recently began a new strategic planning process in response to updated university- and college-level strategic plans.

IV. Appendix (include revised curricula, syllabi, and one-page CVs or bios of new administrators and faculty members; syllabi should reference which NAAB SPC a course addresses. Provide three examples of minimum-pass student work for each SPC 'not met' in the most recent VTR.)

North Carolina State University, 2023 Response: Appendix items include: A.) Updated ARC 500/ARC 501 Integrative Studio syllabus, B.) ARC 500/501 Integrative Studio Phases, Lectures, Deliverables, and SPCs outline, C.) ARC 561 The Practice of Architecture syllabus and assignments, D.) ARC 414/590-014 Environmental Control Systems syllabus, and E.) new faculty and administrator bios

Appendix Item A: Updated ARC 500/501 Integrative Studio Syllabus

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North Carolina State University [ARC 500 or 501]
College of Design, School of Architecture Integrative Studio Syllabus
[semester and year]

Instructors

[Instructor name, title]
[*email*]
[Phone #]
[Office hours]

Course [ARC 500 Architectural Design: Professional Studio] or [ARC 501 Professional Architecture Studio 1 (Integrative Studio)]
Prerequisites [ARC 500: M.Arch. Track 1 and 3, ARC 405] or [ARC 501: B.Arch., BEDA Degree (or equivalent)]
Time Mo/ We/ Fr 1:30pm-5:30pm
Location KAM 300

Course Description: The [ARC 500 or ARC 501] studio is a comprehensive and integrative design experience, and they may be characterized as transformational studios that exist between the foundation studios and the forthcoming options and thesis level studios. Since the ultimate goal of architecture is the complete building with all its complexity and components accounted for, this studio project is essential for the architecture student to understand and to demonstrate his or her ability to effectively and comprehensively address the full range of constraints, conditions, and issues typically encountered in an architectural project. [ARC 500 or ARC 501] will simulate design processes that exist within professional offices, and ask students to integrate and elaborate on the lessons from their prior studios.

Course Objectives:

- Through the design of a particular building, students will understand the relationship between the information, theory, techniques, and values presented and discussed in previous curricular elements.
- Through refinement of their design in detail, the students will begin to experience reality in a comprehensive and inclusive way.
- Through what is considered to be "design development," the student will learn to compare and select systems and techniques, to discriminate between appropriate and inappropriate systems and techniques, and to see the relationships between chosen systems and techniques and their implications on the design of a building.
- By addressing technical, ethical and regulatory parameters, the student will become aware of the professional responsibilities of the architect as related to architectural design.
- By working on the design of a hypothetical building within a "real world" studio context, the students will learn to work independently, to seek out relevant resources, and manage their design process toward productive ends.

Integrative Project:
The intention of this studio is to design a building comprehensively, developing it to greater depth than in previous studios. The semester will be structured so that students design the building in sufficient depth to explore alternatives, and to demonstrate the inclusion of multiple considerations such as:

- Formal and spatial development
- Structural systems
- Building materials
- Environmental and Mechanical systems
- Construction systems
- Building codes
- General economic / resource utilization

Precedents will be examined to demonstrate how buildings have previously addressed these considerations. Students will learn the importance of project consultants and Integrated Project Delivery by engaging specialists throughout the semester design project. The development, representation and presentation of large-scale details, wall sections, and other information normally included in working drawings will be utilized to complement two- and three-dimensional materials typically associated with schematic design.

NAAB 2014 Conditions for Accreditation Student Performance Criteria (SPC):
The School of Architecture [B.Arch./M.Arch] program is accredited by the National Architectural Accrediting Board (NAAB). This course is designed to meet some of the SPC's set forth by NAAB. The following information is taken from the "2014 Conditions for Accreditation, National Architectural Accrediting Board, Inc" and represents the different realms that students must fulfill in this course:

Realm A: Critical Thinking and Representation
A.1 Professional Communication Skills
A.2 Design Thinking Skills
A.3 Investigative Skills
A.4 Architectural Design Skills
A.5 Ordering Systems
A.6 Use of Precedents

Realm B: Building Practices, Technical Skills, and Knowledge
B.1 Pre-Design
B.2 Site Design
B.3 Codes and Regulations
B.4 Technical Documentation
B.5 Structural Systems
B.6 Environmental Systems
B.7 Building Envelope Systems and Assemblies
B.8 Building Materials and Assemblies
B.9 Building Service Systems
B.10 Financial Considerations

Realm C: Integrated Architectural Solutions
C.2 Integrated Evaluations and Decision-Making Design Process
C.3 Integrative Design

Realm D: Professional Practice
D.1 Stakeholder Roles in Architecture

NAAB 2020 Conditions for Accreditation Program Criteria (PC) and Student Criteria (SC):
The School of Architecture [B.Arch./M.Arch] program is accredited by the National Architectural Accrediting Board (NAAB). This course is designed to meet some of the PC's and SC's set forth by NAAB. The following information is taken from the "2020 Conditions for Accreditation, National Architectural Accrediting Board, Inc" and represents the different realms that students will fulfill in this course:

PC.2 Design
PC.3 Ecological Literacy and Responsibility
PC.5 Research and Innovation
SC.1 Health, Safety, and Welfare in the Built Environment
SC.3 Regulatory Context
SC.4 Technical Knowledge
SC.5 Design Synthesis
SC.6 Building Integration

Textbooks
The following texts will provide useful reference information:

- T*he Architect's Studio Companion: Rules of Thumb for Preliminary Design*; Edward Allen and Joseph Iano
- *Building Construction Illustrated*; Francis D.K. Ching and Cassandra Adams
- *Building Codes Illustrated*; Francis Ching and Steven Winkel
- *Architectural Detailing; Function, Constructability, Aesthetics*; Edward Allen + Patrick Rand
- *Architectural Graphic Standards, Student Edition*; Bruce Bassler, Ed.
- *Materials for Design*; Victoria Ballard Bell and Patrick Rand

- 2018 North Carolina Building Code: https://codes.iccsafe.org/public/collections/nc
- ANSI/ICC A117.1-2009 Accessible and Usable Buildings and Facilities: https://codes.iccsafe.org/public/document/toc/559/

Expenses & Materials
General materials, computers, software, and printing required for design and presentation of projects.

Course Delivery
Due to the COVID-19 pandemic, public health measures continue to be implemented across campus. Students should stay current with these practices and expectations through the Protect the Pack website (https://www.ncsu.edu/coronavirus/). The sections below provide expectations and conduct related to COVID-19 issues.

Health and Participation in Class
We are most concerned about your health and the health of your classmates and instructors/TAs.

- If you test positive for COVID-19, or are told by a healthcare provider that you are presumed positive for the virus, you should not attend any hybrid or face-to-face (F2F) classes and work with your instructor on any adjustments necessary; also follow other university guidelines, including self reporting (Coronavirus Self Reporting): Self-reporting is not only to help provide support to you, but also to assist in contact tracing for containing the spread of the virus.
- If you feel unwell, even if you have not been knowingly exposed to COVID-19, please do not come to a F2F class or activity.
- If you are in quarantine, have been notified that you may have been exposed to COVID-19, or have a personal or family situation related to COVID-19 that prevents you from attending this course in person (or synchronously), please connect with your instructor to make alternative plans, as necessary.
- If you need to make a request for an academic consideration related to COVID-19, such as a discussion about possible options for remote learning, please talk with your instructor.

Health and Well-Being Resources

These are difficult times, and academic and personal stress are natural results. Everyone is encouraged to take care of themselves and their peers. If you need additional support, there are many resources on campus to help you:

- Counseling Center (NCSU Counseling Center)
- Student Health Services (Health Services | Student)
- If the personal behavior of a classmate concerns or worries you, either for the classmate's well-being or yours, we encourage you to report this behavior to the NC State CARES team: (Share a Concern).
- If you or someone you know are experiencing food, housing or financial insecurity, please see the Pack Essentials Program (Pack Essentials).

Need Help?

If you find yourself in a place where you need help, academically or otherwise, please review these Step-by-Step Help Topics.

Course Policies
Use of cell phones and other communication devices is prohibited during class time unless approved by instructors.

General Education Program (GEP) Information:
GEP Category: This course does not fulfill a General Education Program category.
GEP CO-Requisites: This course does not fulfill a General Education Program co-requisite.

Grading

Grading will be based on work ethic (process), intellectual rigor (depth of idea), and the quality of the presented products. As in all other courses in the College of Design, work completed for this course must comply with the NCSU Code of Student Conduct. The Code will be rigorously adhered to and Academic Dishonesty will be dealt with as governed by the Code. Students are strongly urged to refer to and abide by this code. You may obtain a copy from the College of Design Registrar. For additional information, you may contact the Coordinator of the Office of Student Conduct.

This is the comprehensive architectural design studio. As such, your grades will be largely based on one major semester-long comprehensive design project. We will provide you feedback on your progress via individual desk critiques, informal pin-ups, and formal reviews. We will also have individual midterm interviews with any student who would like to receive interim (50% complete) feedback. At any point during the semester, students may schedule an appointment with their primary instructor to discuss progress. Instructors will provide you a list of requirements for each major review. Final grades will conform to the university grading scale for graduate students and will be based on progress as well as product. All work is to be completed by the beginning of desk crits and reviews. Submitted work that is incomplete will be graded appropriately. Late work will be down graded 1 letter grade for each (calendar) day late. Work that is more than 5 days late will not be accepted. The following grading scales (including +/- grades) will apply:

A Superior design skills, product, and effort. Student has exceeded requirements and expectations for the studio. Student brings new and updated work to each class session. Self-motivation, breadth of knowledge relating to architectural design issues, and ability to create integral and inspired design solutions is clearly evident. Contribution to the studio environment is in a leadership capacity. Ability to present ideas through drawing, modeling, and verbal means exhibits the highest level of achievement. The hallmark of an A student is the desire to question and critique him or herself and to pursue new ideas and/or technical skills.

B Better than satisfactory design skills, product, and effort. Student has met the requirements and expectations of the studio with distinction. Student brings new and updated work to each class session. Drawing and modeling skills are highly developed. Student is a positive and active member in the studio environment.

C Satisfactorily meets the stated requirements of the course (all work is complete and on time). Student brings new and updated work to each class session. Design projects show minimum competence relative to design skills, product, and effort.

D Marginally meets the stated requirements of the course (work is incomplete and/or late). Student fails to bring new and updated work to multiple class sessions. Work fails to demonstrate full understanding and execution of the concepts and skills required for the studio.

F Fails to meet stated requirements of the course.

https://policies.ncsu.edu/regulation/reg-02-50-03/

For architectural design projects, grades are earned in two primary areas: process and product:

- Product - assigned studio projects
- Process - professionalism, rigor, steady productivity, attendance, and participation

The product grade is evaluated during the reviews and is based on a variety of factors, including but not limited to: stated requirements, graphic presentation, craft, verbal presentation, overall design, ability to convey information, and attention to detail.

Grading Components

Component	Weight Details
Process	20%
Pre-design Charrette	15%
Schematic Design Review	15%
Wall Section Case study	5%

Technology Charrette	15%
Final review	30%

Work Ethic and Rigor
Ultimately this is your work and it represents you. You are responsible for all aspects of the design, production, and presentation. Be prepared to make the necessary investment to produce the highest quality work possible. You are encouraged to explore and challenge your knowledge and ideas in search of innovative, strong, and convincing solutions to bold and visionary concepts.

Policies on Incomplete Grades
If an extended deadline is not authorized by the Graduate School, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) by the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at http://policies.ncsu.edu/regulation/reg-02-50-03. Additional information relative to incomplete grades for graduate students can be found in the Graduate Administrative Handbook in Section 3.18.F at http://www.fis.ncsu.edu/grad_publicns/handbook/

Late Assignments
Assignments must be posted or turned in according to the stated requirements. Failure to turn in your work on time and as specified will result in a grade of zero.

Attendance Policies
For complete attendance and excused absence policies, please see http://policies.ncsu.edu/regulation/reg-02-20-03
Attending class is mandatory and class time cannot be made up. If you have to be absent/late from class, you must let the instructor know in advance (if possible), either in person, by phone or email.

Absences Policies
Students are responsible for all lecture/workshop information and assignments that they miss due to absences. You are allowed only one unexcused absence. Each absence thereafter will result in a five-point deduction from your final grade. More than three unexcused absences will result in a failing (F) grade. A student may not request more than five excused absences. After reviewing the circumstances, the instructor will determine if a failing grade (F) or an incomplete (IN) will be assigned for exceeding the number of acceptable excused absences.

Makeup Work Policy
A student may turn in assignments late only with documentation of an excused absence. Make up work must typically be done within one week of returning to class. Professors will negotiate other arrangements and schedules, as they deem appropriate.

Juries
At the conclusion of a project and throughout the process of design, an open forum of feedback will be conducted. In order to facilitate a studio discourse, the work will be reviewed by various individuals whom the studio instructor solicits. Juries are essential to the architectural education process and students are required to attend. Students are expected to attend all peer reviews and contribute at multiple levels (criticism, note taking, sketching, etc.) The instructor also holds the right to withhold a student from a review for failing to produce required materials.

Presentations
Presentations shall be formal reviews to your peers and/or invited jurors. Your presentation both visually and verbally shall be of the highest quality possible and be well organized to clearly communicate your design solution. You are expected to respect your peers during their presentation by listening and contributing to their review. All work is required to be complete and ready for presentation at the start of the review. Document your work and be prepared to provide all digital files to the instructor/teaching assistance after each presentation.

Students with Disabilities
Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.1)
https://policies.ncsu.edu/regulation/reg-02-20-01/

Non-Discrimination Policy
NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at

- https://policies.ncsu.edu/policy/pol-04-25-05/ or
- https://oied.ncsu.edu/home/.

Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Diversity, Equity and Inclusion:
Architecture is made to serve people and as a part of the global community we recognize diversity within our school as well as the self-expression of our students. The School of Architecture values how diversity cultivates a rich learning environment. It is a fundamental principle that each individual has the right to learn without fear of character depredation or retribution for personal opinions. Students and professors must expect and help foster a learning environment of trust and respect. An individual must never suffer in the learning environments because of race, religion, gender, sexual orientation, ethnicity or national origin. The School of Architecture seeks to build a positive and encouraging community that promotes diversity, equity, inclusion, and justice.

Health + Safety Policy
As part of your educational experience at the College of Design, you will be expected to participate in classes, field trips, and workshops in locations both on and off the campus. You will be expected to fulfill your class assignments using equipment, tools, and machinery belonging to the university and/or your own equipment, tools, and machinery. It is expected that you will use proper care and caution and will assume responsibility for your own health and safety. In addition, you are expected to review NC State School of Architecture Studio Culture Statement,
http://design.ncsu.edu/sites/default/files/NC-State-School-Of-Architecture-Studio-Culture.pdf

Supporting Fellow Students in Distress
As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another to ensure that this classroom and the campus as a whole remains a safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you. When this is the case, we would encourage you to report this behavior to the NC State Students of Concern website: http://studentsofconcern.ncsu.edu. Although you can report anonymously, it is preferred that you share your contact information so they can follow-up with you personally.

Transportation
Students will be required to provide their own transportation to class. Field trips will be offered, but students are not required to attend. Students who choose to attend field trips are required to provide their own transportation.

ARC500/501 Integrative Studio

Phases, Lectures, Deliverables and SPCs

PHASE I: PRE-DESIGN

Instructor Lecture 1: Pre-Design Methods:

SPCB1 **SPC C2** Site analysis methods; Program and adjacency analysis; Introduction to building codes; Sustainability standards; Precedent study; Siting/massing design and examples; Design phases and decision making process; Stakeholder roles in architecture.

SPC D1 The project client - personnel from the NCSU University Architects Office (Lisa Johnson, Chris Johnson and Tom Skolnicki), will be invited to give a lecture on the roles of the stakeholders in the project, university master plan background information, and design expectations from the client side.

Instructor Lecture 2: Sustainable Strategies

SPCB6 Review of "green" building rating systems

Student Deliverables: Pre-Design Reference Booklet (Team work)

Working in teams of three people, students will compile information in a consistently formatted (11"x17") facing pages booklet that can be used as reference for the rest of the semester. The booklet should include: front and back cover, table of contents, brief introduction of the project, team member information, and the following sections:

1. **History**: Create a brief narrative about the project site, surrounding area, the existing building, and types of programs offered.

SPCB1 2. **Site Analysis**: Analyze natural features (Solar path, wind, topography, vegetation), vehicular and pedestrian traffic, relationship to other built objects, adjacent building uses, views, service utilities, etc. Produce site analysis diagrams to document the findings of the above analyses. Prepare CAD base drawings, elevations of surrounding buildings, photographs, site sections and a digital site model to share within the team.

SPC B1 3. **Program Analysis**: Study the spatial requirements for the project (instructors will provide a base program). Your team shall include the requirements for each program space. Be sure to illustrate all dimensional requirements (including height). This section should have text, diagrams, and images that illustrate program requirements and adjacencies.

SPC B1 4. **Code Research**: Determine occupancy use, type of building construction, exit requirements, accessibility (ADA) requirements, and number of toilets for your building. Include a drawing of a typical multi-toilet and single toilet restroom layout. Compile code data sheets for everyone's use.

SPC B1 5. **Sustainable Strategies**: Document potential sustainable and building design strategies. Projects in the studio will be designed to address the full scope of standards across select building certification programs including LEED and the Living Building Challenge (http://www.living-future.org/). These systems address performance categories including Site, Water, Energy, Health & Happiness, Materials, Equity and Beauty. Deliverables will include strategy analysis and documentation.

SPC A6 6. **Building Precedents**: Find, analyze, and document relevant building precedents in terms of 1) site and outdoor space design; 2) indoor space types (such as dining room, study lounge, dorm unit, etc.); and 3) building material and image. Produce text and diagrams that illustrate the relevant characteristics.

SPC C2 7. **Assessment criteria**: Propose a list of assessment criteria for evaluating site and building implications of different design options.

Student Deliverables: Pre-Design Charrette Package (Individual work)

Each student creates **two-three** schemes of siting/massing design, presents the design schemes in the pre-design charrette, and selects one scheme to move forward. For each design scheme, produce a set of drawings in consistent format (11' x 17') and models, including:

SPCB2 **SPC C3**

1. **Site Plan**: in response to adjacent buildings, topography, climate, orientation, pedestrian and vehicular traffic patterns, parking, entry access, service, vegetation, open spaces, streetscape, etc.
2. **Digital and physical 3D massing model in context**: building massing and major site features outlined in Item 1 above. Scale of psychical model: 1”=100’-0” minimum.

SPC B3

3. **Floor plan blocking diagrams**: present the floor plan(s) that have entrances to exterior and a typical floor plan above; on each plan, show immediate site context (if any), building entrances (if any), horizontal circulation (corridor), vertical circulation (fire stair, open stair, elevator), blocks of major assignable spaces (e.g. a department as a “chuck” without laying out smaller secondary spaces); indicate indoor and outdoor elevation levels to show how the building negotiates with the topography.
4. **Parti diagram**: an idea sketch of initial response to the site and program; in plan and/or in section.

SPC C2

5. **Schemes assessment**: Evaluate the two-three schemes by rating them with predefined assessment criteria after the charrette; decide which option to move forward with.

Compiled pre-design submittal: Combine the findings of the Pre-design Reference Booklet (team effort) and your individual charrette package into an 11x17 book as your individual pre-design submittal.

PHASE II – SCHEMATIC DESIGN

Instructor Lecture 3: Environmental Systems:

SPCB6 Solar geometry; shading design strategies and demonstration by solar simulation tools; passive heating and cooling strategies and demonstrations by energy analysis tools; daylighting design strategies and demonstration with lighting simulation tools.

Instructor Lecture 4: Fire Codes Review:

SPC B3 Occupancy loads calculation, number of exists, width of egress path, lengths of egress path (common path of travel, travel distance & dead end), area of refuge, construction fire ratings, etc.; Fire protection systems and equipment; ADA codes and diagrams.

Student Deliverables: Schematic Design Review Package

Each student creates a schematic design package to present at the midterm review. The drawings shall be formatted in sheets of the same size. The package should include the following as minimum:

SPCB2

1. **Vicinity Plan**: illustrate your building and site design in a broader context. Scale: 1”=100’-0”

SPC C3

2. **Site Plan**: refine the selected site plan from Phase II. The site plan should include adjacent buildings, topography, solar orientation, pedestrian and vehicular traffic patterns, parking, entry access, service, vegetation, open spaces, streetscape, etc. Scale: 1”=40’-0” minimum.
3. **Physical building model in site context**: Scale: 1”=40’-0” minimum.

SPC B3 **SPC B9**

4. **Floor plans**: the lower level floor plan(s) that have exterior entrances must include the immediate site features and should be at a scale of 1/16”=1’-0” minimum. Upper level plans can be reduced to 1/32”=1’-0”, if needed. On each floor plan show: proper exterior and interior wall thickness, columns and grids, horizontal circulation that meets egress width and length requirements, vertical circulation (fire stairs, open stair, elevator), bathrooms that meet plumbing & ADA codes, mechanical room, interior and exterior doors (width and swing), steps and ADA ramps, and other immediate landscape features. Graphically, show line weight, stair arrows and dashed overhead lines, interior and exterior elevation level marks, labels and/or furniture in all program spaces, labels of all plans, north arrow, and scale.

SPC B2

5. **Site+Building sections:** create two site+building sections cut through major features of the project, preferably in two different directions, to illustrate the relationship between the building and site. Include site elements, adjacent buildings, and column grid lines. Scale: 1/16”=1’-0” minimum.
6. **3D renderings**: start three exterior and three interior renderings; develop at least one each to finish level
7. **Building elevations**: Two minimum, preferably rendered to show materials. Scale 1/16”=1’-0”

minimum.

SPC B6 8. **Environmental system design strategies:** Articulate your strategies of addressing environmental design parameters, such as climate, solar, water, and site, by using sustainability rating systems. Demonstrate the effectiveness of selected strategies by diagrams, narratives, and/or assessment tools. Examples are 1) shading designs for windows with different solar orientations and indicate shading period based on climate. Use physical (e.g. sun angle simulator) and/or digital (e.g. Ecotect Sun Path generator) tools to assess the effectiveness of the shading designs; 2) Assess daylit zones in a typical floor by using daylighting coverage rule of thumbs; 3) Assess natural ventilation strategies for residential units by using Climate Consultant and rule of thumbs.

PHASE III – WALL SECTION CASE STUDY

Instructor Lecture 5: Building envelope and wall section documentation:

SPCB7 **SPC B8** Heat flow through solid building enclosure and through transparent elements; Thermal envelope and bridging; Moisture transfer and condensation; Building cladding, insulation, moisture protection materials and relationships; Common wall construction types (brick veneer, metal panel, stucco, precast, etc.).

SPC B4 Instructor will demonstrate in Revit the process of developing wall sections and details.

Student Deliverables: Wall section and details for studio pinup (Team work)

Students work in teams of three to select, draw, and analyze a significant wall section from one of the precedents below:

SPCA6 **Suggested Precedent Buildings for Case Study:** (Approved by instructor, other buildings can be selected, if the information of the buildings is readily available and can be obtained in a timely manner).

01 Kunsthaus Bregenz	1997	Peter Zumthor
02 Kunstmuseum Liechtenstein	2000	Christian Kerez
03 Sacred Heart Church	2000	Allmann Sattler Wappner Architekten
04 Clyfford Still Museum	2001	Allied Architecture Works
05 Residential Building in Sebastianstrasse	2001	Baumschlager-Eberle
06 Wohnbebauung Im Raiser	2004	Kohlmayer Oberst Architects
07 de Young Museum	2005	Herzog + de Meuron
08 Jugendamt Don Basco in Mainz	2008	Bauleitung
09 Operations Building in Frutigen	2008	Muller + Truniger
10 Wyly Theater	2009	REX
11 Poetry Foundation	2011	John Ronan
12 Steinfeld Retirement and Nursing Home	2014	Dietger Wissounig Architekten

SPC B4 **SPC B7** **SPC B8** Be prepared to present the wall section and detail drawings by highlighting material qualities, waterproofing and insulation techniques, and design intent. You will likely have to "fill in the blanks" when the reference material lacks information. As a minimum, each team will produce the following drawings:

1. One complete wall section drawing (without break lines if possible) at 1 1/2"=1'-0" (Text height: ¼")
2. Overlay tracing paper on the wall section and use single lines to show waterproof and insulation layers
3. Two drawings of important details from the wall section at 3"=1'-0" (Text height: ¼")
4. One axonometric or other 3D illustration of a portion of the wall/roof assembly

PHASE IV – DESIGN DEVELOPMENT

Instructor Lecture 6: HVAC, Structures and Systems Integration:

SPCB6 **SPC B9** **SPC C3** Mechanical system – Plant types (DX vs. Chiller systems), delivery types (all air vs. water/air systems) and control types (VAV, CU and Dual Duct); Structural system – gravity loads resisting components and lateral loads resisting strategies; Integration of architectural, structural, and mechanical systems in the interstitial spaces.

Instructor Lecture 7: Electrical, Lighting, Fire Protection and Preliminary Cost Estimate:

SPCB9 Electrical and data room space requirements (main room vs secondary closets); Electric lighting design rule of thumbs and light fixture layout on ceiling plan; Demonstration of creating a ceiling plan in Revit; Calculation and Documentation of occupancy loads, travel distances, egress widths; Cost estimation based on per SF hard cost and soft cost.

Instructor Lecture 8: Outline Specs

SPCB4 Introduction to specifications; Review of outline spec format and examples;

Student Deliverables: Technical Systems Design Package for Technology Charrette

Further develop the design in terms of architectural, electrical, mechanical, and structural systems. In addition to refining all the deliverables outlined in Phase II, create the following drawings (in the same sheet format as in Phase III) & models:

SPCB4 **SPC B7** **SPC B8**

1. **Wall section**: One wall section at ¾"=1'-0" minimum with text height at 3/32". Wall section must show: line weights, hatch for surfaces being cut, notations, dimensions, column grid, structure, fireproofing, insulation, waterproofing, elevation marks, mechanical ducts and registers.

   Construction detail: One detail at 3"=1'-0" with text height at 3/32". Graphically, show line weights, hatch for surfaces being cut, notations, dimensions, and grid.

   Digital construction detail episode model: Produce a digital 3D model of the construction detail required above. Illustrate the components of the assembly, and use color and/or texture to define materials with notations.

SPC C3 2. **Digital Building Section Model** (the "chunk" model) at 1/8"=1'-0". Select a section cut through the most "telling" location of the building and create a physical model that starts from this cut and includes a narrow "slice" or a "corner" of the building beyond that cut. In this model, integrate the simplified versions of the wall, roof, and floor assemblies, structural members, ductwork, finished ceiling, and other architectural elements.

SPC B5 3. **Structural diagrams**: Produce a framing plan of a typical floor, and identify the path of resisting gravity loads and the hierarchy of gravity resisting elements (e.g. columns, main girders, secondary joists, floor decking). Propose a lateral load resisting strategy (i.e. sheer wall, braced frame, or moment connection) and identity the lateral resisting elements in the framing plan and/or in a building section diagram. You may also use 3D drawings to illustrate the elements and strategies above.

SPC B6 **SPC B9**

4. **Mechanical diagrams**: Propose an active mechanical scheme (e.g. water-cooled chiller with AHUs, air-cooled chiller with FCUs, Packaged DX system, etc.). In a building section diagram, illustrate the locations of major plant equipments, vertical air/water delivery paths, and control elements, such as VAV boxes and thermostats. In a building plan diagram, identify the hierarch of the air/water delivery system and control elements (e.g. shaft, main trunk line, flex duct, supply diffuser, VAV boxes, thermostats, etc.)

SPC B3 5. **Code compliance narratives and diagrams:** Indicate building occupancy type and type of construction, show occupancy load calculations, and demonstrate code compliances for building height, number of exits, exit distance, egress width, travel distance, common path of travel, dead end corridor, areas of refuge, etc.

SPC B10 6. **Preliminary cost estimate:** Prepare a cost estimate based on building square and cost per square foot. Include both "hard" and "soft" costs.

PHASE V – FINAL DOCUMENTATION

Student Deliverables: Final review package

The final review package includes all deliverables in Phase II and Phase IV, refined and developed to the finish level in the same sheet format.

Appendix Item C: ARC 561 The Practice of Architecture Syllabus and Assignments

ARC 561 - 001 The Practice of Architecture syllabus, [semester and year]

Instructor - Marshall Purnell, FAIA, NOMAC

mepurnel@ncsu.edu Cell: 2024376912 **Teaching**

Assistant – [TA namel] [TA email]

Class Meeting Times: Thursdays, 7:10PM - 9:55PM Location:

[building and room #]

Instructor's Office Hours: By Appointment

Course Overview:

The intention of this seminar and lecture course is to address the issues of professional practice in architecture. The class will focus on the evolution of architectural practice and how someone entering the profession can begin to understand the responsibilities and choices in practice. What does it mean to be an architect and what does society expect from us? How do firms differ in composition and focus, and what are available choices for your career path? The profession is changing rapidly, and many architects wonder if their practice will be viable in the next decade. The semester will examine the forces at work in shaping the practice of architecture and help students to understand the world that they will be entering in a context of traditional practice, new directions, and the larger world in which architecture exists.

Topics Discussed Weekly Include:

The first week will serve as a welcome and introduction to the course. Over the course of the semester each week we will focus on topics such as those listed below (not necessarily in the listed order). We will have a presentation/lecture (sometimes given by a guest practitioner), quizzes and/or an in-class research assignment and presentation. Topics include:

Ethics and Social Responsibility
Collaboration: *Teams, Partners, Consultants and Others*
Project Delivery Methods Contemporary
Models of Practice Communication
Project Management The
Client
Marketing & Business Development
Budgets, Fees, Financing, Feasibility, Operations Costs, and Lifecycle Costing Starting Your Own
Firm
Bid Day: *Cost Estimating*
Construction Administration
Role of Research in the Profession of Architecture Alternative
Careers
What's Next: *The Future of the Profession*

In-Class Research Exercise:

Most class sessions will begin with a presentation/introduction on the topic for the evening and a description of several problems/topics to be examined by class teams. The class will sometimes be divided into teams of 4 or more students for each session. The teams will use laptop computers to research and develop a presentation that addresses the topic or problem assigned to them. A beginning

list of readings, sources and references will at times be provided in advance on the class Moodle page as appropriate. The class will employ and teach basic research skills to investigate the topics under consideration. The team composition will change every class session. The instructor(s) and guest(s) will be available to the teams providing insights and assistance in guiding their inquiry. Near the end of each class meeting, the class will reconvene as a whole and each team will present a brief (usually
8-minute or less) response to their research assignment. The team presentations will be made with the assistance of "MS PowerPoint" or like software after which an open forum discussion, with all students, guests, and faculty participating. Each team and team member will be assessed based on the quality of participation and research conducted in each class session research assignment.

Several sessions will be structured as panel discussions, where the panelists will present varied points of view, followed by an open discussion with the class. Individual and written assignments will also occur during the semester, focusing on the type of writing and communication that is important in practice: The ability to convey clear ideas through compelling and succinct language.

Research Project:

A major component of your final grade will be a near semester-long written and oral case study research project. Teams will be selected for the topic, research and writing of your project. A list of past topics for the research project will be posted, and teams will select a topic for their project so as not to replicate past topics - note that only one team may select a topic (no duplications).

Learning Outcomes and NAAB Criteria:

This course addresses the following NAAB Student Performance Criteria (SPC) from the 2014 Conditions for Accreditation: B.10 Financial Considerations, D.1 Stakeholder Roles in Architecture, D.2 Project Management, D.3 Business Practices, D.4 Legal Responsibilities, and D.5 Professional Conduct

This course will address the following NAAB Program Criteria (PC) and Student Criteria (SC) from the 2020 Conditions for Accreditation: PC.1 Career Paths, PC.5 Research and Innovation, PC.6 Leadership and Collaboration, PC.8 Social Equity and Inclusion, SC.1 Health, Safety, and Welfare in the Built Environment, SC.2 Professional Practice, and SC.3 Regulatory Context

After successfully completing the course, a student in ARC 561 will be able to:

- Work collaboratively to quickly form research teams and investigate a specific research task
- Generate and present a coherent and concise team presentation to a group of their peers
- Apply existing life-cycle cost estimating software to compute cost estimates
- Describe and understand the role of the client in architecture
- Itemize and detail the role of the architect and architectural firms in project management
- Define the professional ethics and legal responsibilities faced by architects in today's world
- Explain the social responsibility of architects in their local and global community
- List and diagram current models of project delivery in architecture • Describe the role of research in the modern profession of architecture, and define the importance of pursuing research.
- Describe and evaluate common office organizational structures and management practices
- Identify and evaluate alternative career paths available to architectural program graduates

Each class session will require efficient collaboration and team skills, a focus on the requirements, an effective work process, and preparation. Following the end of each week's class, the course Moodle page will reset with a new set of links, videos and readings for the next class session. Previewing these links and resources will greatly enhance your ability to efficiently complete the following week's research assignment within the allotted three-hour class period. The links and other resources will merely serve as a 'jumping-off point for teams to begin their research. You are expected to begin with the resources provided, but find as many additional, relevant sources as are needed to complete the assignment. The last hour of the class will be used for teams to provide short, concise 6 to 8 minute presentations to the whole class on your research findings. Teams are expected to keep a written record of the sources they have used, but may use any combination of oral or graphic methods to present their findings to the class.

Everyone will be required to utilize a laptop, tablet, smartphone, or other device with internet capabilities each class period. When the Moodle page resets for the next class, you will also be given team assignments for the next research exercise, so you may also wish to communicate with your team in advance. If your team elects to present their findings with MS PowerPoint or other visual media, please use the class Google Drive account to upload the presentation.

Deliverables:

- A Research Project with a topic related to the practice of architecture. Specific requirements will be provided early in the semester.
- A final 15- to 20-minute team oral presentation to the entire class of your Research Project findings during the last class meetings.
- Separate In-Class or Out-of-Class Research/Writing Assignments, and in many cases, a presentation to the class.
- Several quizzes will be administered for grading.

Readings and Resources:

Most of the necessary resources for the class such as: videos, websites, movies and other resources will be available as linked through the class Moodle page, on the reserve shelf at the library, or in digital reserve through the library. We will be assigning regular readings from the following text as background for many of the class research projects, and you may wish to or from the bookstore:

Pressman, A. (2006). *Professional Practice 101: Business Strategies and Case Studies in Architecture*. Hoboken: Wiley. Both the Pressman text, and the *Architecture Student's Handbook of Professional Practice*, (2009). Hoboken, John Wiley and Sons are insightful texts and can be found in the COD Library.

Assessment:

All grades will be reported numerically during the course. The only conversion to a letter grade will occur at the end of the semester as your numerical scores are converted to a letter for final submission to the University system. The in-class research exercises, quizzes, presentations, semester research project, participation, and attendance will count for the following percentages of a 100 point scale:

Attendance: **5%**
Participation: **10%**
Presentation) In-Class Presentations/Quizzes: **60%**
Final Case Study Project: **25%** Overall (Weighted 80% Written and 20% Oral)
Semester total: **100%**

A+	98-100 points	
A	94-97 points	Exceptional and unique work
A-	90-93 points	
B+	87-89 points	
B	84-86 points	Good work, somewhat above the requirements
B-	80-83 points	
C+	77-79 points	
C	74-76 points	Satisfactory work, not exceeding requirements
C-	70-73 points	
D	60-69 points	Unsatisfactory, not meeting requirements
F	Below 60 points	Failure, demonstrating a need to repeat the class

Attendance:

Attendance for every class is mandatory, and critical to the success of the class. We will endeavor to comply with the University Policies of attendance and submittal due dates: http://policies.ncsu.edu/requlation/req-02- 20-03. A portion of your grade will be assigned for attendance. During the first day of class attendance is not taken, however beyond this point you will have a pro rated portion of your attendance grade deducted for each absence. Attendance is 5% of grade total value. However, assignments missed from unexcused absences will be discounted accordingly. Missing four classes will result in a failing grade. 10% of the final grade will also be given based on participation: quality and frequency of comments, questions, and discussion.

Americans with Disabilities Act (ADA) Policy Statement:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statue that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation

Information can be found at https://dso.dasa.ncsu.edu/students/accommodations/

Academic Integrity Statement:

Strict standards of academic honesty will be enforced according to the University policy on academic integrity. We expect that student's final upload of any test or individual assignment means that you have neither given nor received unauthorized aid. Consult the following website for further details: https://policies.ncsu.edu/policy/pol-11-35-01/

Diversity, Equity and Inclusion:

Architecture is made to serve people and as a part of the global community we recognize diversity within our school as well as the self-expression of our students. The School of Architecture values how diversity cultivates a rich learning environment. It is a fundamental principle that each individual has the right to learn without fear of character depredation or retribution for personal opinions. Students and professors must expect and help foster a learning environment of trust and respect. An individual must never suffer in the learning environments because of race, religion, gender, sexual orientation, ethnicity or national origin. The School of Architecture seeks to build a positive and encouraging community that promotes diversity, equity, inclusion, and justice.

Late Work:

All work will be due at the times stated on the Course Calendar or as part of the problem assignment. Late work will be accepted at the discretion of the instructor based on the circumstances. It will be deducted by a full grade for being late initially and by another full grade for the second twenty four hour period being late. It will not be accepted after this second deduction period. In case of professional time conflicts, (i.e. Employment Interviews etc.) students must consult with the instructor and negotiate appropriate arrangements in advance.

In the event of an unforeseen and/or extenuating circumstance, an email notice or physician's excuse describing the problem must be submitted and approved by the instructor. Another due date may be assigned with no late penalty for work previously assigned and due. Work missed from the absence may be graded accordingly or excused at the discretion of the instructor. In case of illness a telephone/email message will generally suffice; documentation of the situation is required within two business days of the missed due date.

Students with Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.1) https://policies.ncsu.edu/regulation/reg-02-20-01/

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at

- https://policies.ncsu.edu/policy/pol-04-25-05/ or
- https://oied.ncsu.edu/home/.

Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Health + Safety Policy

As part of your educational experience at the College of Design, you will be expected to participate in classes, field trips, and workshops in locations both on and off the campus. You will be expected to fulfill your class assignments using equipment, tools, and machinery belonging to the university and/or your own equipment, tools, and machinery. It is expected that you will use proper care and caution and will assume responsibility for your own health and safety. In addition, you are expected to review NC State School of Architecture Studio Culture Statement, http://design.ncsu.edu/sites/default/files/NC-State-School-Of-Architecture-Studio-Culture.pdf

Supporting Fellow Students in Distress

As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another to ensure that this classroom and the campus as a whole remains a safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you. When this is the case, we would encourage you to report this behavior to the NC State Students of Concern website: http://studentsofconcern.ncsu.edu. Although you can report anonymously, it is preferred that you share your contact information so they can follow-up with you personally.

North Carolina State University
ARC 561: Professional Practice
Instructor: Marshall Purnell
Week 10: Outline Specifications Assignment

Assignment:

Using the examples that were shared in class as a reference, write an outline specification for two major items used in your current studio project, choosing from Construction Specifications Institute specifications sections 1 through 14.

Due: Beginning of class on Week 11 in a single PDF file. Upload to the file to Moodle.

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North Carolina State University
ARC 561: Professional Practice
Instructor: Marshall Purnell
Week 11: Take-home Assignment – Project Feasibility and Financing

Assignment:

A few years from now you and one of your successful friends are at the game and you tell your friend that you just got your license to practice architecture. Your friend can relate because they passed the Bar exam a year earlier. Your friend shares with you that the firm just closed a case and he/she is due a significant bonus. Your friend has a lot that his grandfather left him worth $3 million years ago and wants to know if this will allow her/him to finance that income property they want to build.

Your friend turns to you and says:

"What will it cost for me to build a twelve-unit (all two bedrooms) apartment building and hire you as my architect?"

Questions you should ask:

Do you have the land?
Answer: (yes)

What is your budget?
Answer: (you tell me what I need)

Do you have the financing?
Answer: (yes, I think so but it depends on how much it cost)

When do you want to start and when do you need completion of construction?
Answer: (I don't know what is possible?)

Do you have a contractor or a method of building the project in mind?
Answer: No

Your task is to give your new client:

1. An estimated cost for constructing a twelve-unit apartment Building (all two bedrooms @ 1100SF ea) on land they already own.
2. An estimated time for completing both the design and construction.`
3. A recommendation about how to finance the construction.
4. An architectural fee (inclusive of your consultants) for your services.

Due: Beginning of class on Week 12 in a single PDF file. Upload to the file to Moodle.

Appendix Item D: ARC 414 / 590-014 Environmental Control Systems Syllabus

North Carolina State University - School of Architecture
ARC414 / ARC590-014: ENVIRONMENTAL CONTROL SYSTEMS

SYLLABUS - SPRING 2021

COURSE FORMAT:	Lecture
MEETING TIME:	11:45am-1:30pm, T. & Th. (See schedule for details)
CREDITS / GRADING:	3 Credits / A, B, C, D (with +/-), and F.
PRE-REQUISITES:	ARC 211 - Natural Systems and Architecture Junior standing in BEDA or Architecture Graduate status GEP requirement (none)
STUDENT EXPENSES:	Required text: $76.95 (180-day online access) or $89.95 (print)
INSTRUCTORS:	Jianxin Hu, PhD., Registered Architect, LEED AP. Associate Professor of Architecture jhu3@ncsu.edu Erica Unger (Acoustics) Professor of Practice ekrobert@ncsu.edu
TEACHING ASSISTANT:	Jessica Hall jahall23@ncsu.edu TA office hours are offered via ZOOM (see course schedule)

COURSE DESCRIPTION:

This course aims to understand principles of energy and how energy including light, heat, and sound interact with physical phenomena such as air, water, and solid objects to maintain human comfort and well-being in buildings. Students are introduced to mechanical and electrical equipment used at various times and in various places to illuminate, heat, cool, vent and tune, buildings. Students are guided through measurement assignments, calculation problems, and system design projects to provide a link between individual component understanding and creative application of building technologies in architecture.

When building, services are designed to use natural systems and are backed up by efficient mechanical systems, only when needed, they will reduce life cycle costs, conserve upstream material and energy resources, decrease downstream impacts, and provide healthier, more desirable buildings to inhabit. Course lectures, discussions, and assignments expose students to sustainability issues, and help students develop the technical skills necessary to lead the design process towards appropriate building technologies.

TEACHING OBJECTIVES:

After completion of this course, students will:

- Understand the concepts and applications building systems.
- Develop the technical knowledge and vocabulary required for appropriate systems integration into buildings.
- Be able to identify and describe the elements and functions of mechanical and electrical equipment used in heating, cooling, ventilating, and lighting buildings.

- Be able to identify and describe the elements, principles, implications, and functions of water/waste systems, vertical transportation, fire safety and protection, and acoustic systems in architecture.

NAAB 2014 Conditions for Accreditation Student Performance Criteria (SPC):
The School of Architecture [B.Arch./M.Arch] program is accredited by the National Architectural Accrediting Board (NAAB). This course is designed to meet some of the SPC's set forth by NAAB. The following information is taken from the "2014 Conditions for Accreditation, National Architectural Accrediting Board, Inc" and represents the different realms that students must fulfill in this course:

Realm B: Building Practices, Technical Skills, and Knowledge
B.6 Environmental Systems
B.9 Building Service Systems

NAAB 2020 Conditions for Accreditation Program Criteria (PC) and Student Criteria (SC):
The School of Architecture [B.Arch./M.Arch] program is accredited by the National Architectural Accrediting Board (NAAB). This course is designed to meet some of the PC's and SC's set forth by NAAB. The following information is taken from the "2020 Conditions for Accreditation, National Architectural Accrediting Board, Inc" and represents the different realms that students will fulfill in this course:

PC.3 Ecological Literacy and Responsibility
SC.1 Health, Safety, and Welfare in the Built Environment
SC.3 Regulatory Context
SC.4 Technical Knowledge

COURSE TOPICS & SCHEDULE

	Tuesday	Thursday
1	**10-Jan** **Topic 1: Thermodynamics** Read: Textbook Chapter 1 (Page 1-10)	**12-Jan** **Topic 2: Comfort and climate** Read: Textbook Chapter 1 (Page 11-22) Complete: Review Questions of Chapter 1 (Page 23)
2	**17-Jan** **Topic 3: Heat flow & heat transfer through opaque envelope** Read: Textbook Chapter 2 (Page 27-35)	**19-Jan** **Topic 4: Heat transfer through glass, infiltration & ventilation** Read: Textbook Chapter 2 (Page 36-42) Complete: Review Questions of Chapter 2 (Page 43)
3	**24-Jan** **Topic 5: Solar movement** Read: Textbook Chapter 3 (Page 47-66)	**26-Jan** **Topic 6: Shading design** Read: Textbook Chapter 3 (Page 67-74) Complete: Review Questions of Chapter 3 (Page 75)
4	**31-Jan** **Topic 7: Passive heating** Read: Textbook Chapter 4 (Page 79-87)	**2-Feb** **Topic 8: Passive cooling** Read: Textbook Chapter 4 (Page 88-94) Complete: Review Questions of Chapter 4 (Page 95)
5	**7-Feb** Watch: Exam 1 Review Video on Moodle	**9-Feb** **Exam 1 (Open-book via Moodle 12:00-1:15pm)** (Covering Topic 1, 2, 3, 4, 5, 6, 7 and 8)
6	**14-Feb** **Topic 9: Light Fundamentals** Read: Textbook Chapter 5 (Page 99-106)	**16-Feb** Wellness day - no class
7	**21-Feb** **Topic 10: Daylighting** Read: Textbook Chapter 5 (Page 107-126)	**23-Feb** **Topic 11: Electric lighting** Read: Textbook Chapter 5 (Page 127-148) Complete: Review Questions of Chapter 5 (Page 149)
8	**28-Feb** **Topic 12: HVAC components & small building HVAC** Read: Textbook Chapter 6 (Page 153-168)	**2-Mar** Project 1 Introduction (See description on Moodle) **Topic 13: Large building HVAC-I** Read: Textbook Chapter 6 (Page 169-179)
9	**7-Mar** **Topic 14: Large building HVAC-II** Read: Textbook Chapter 6 (Page 180-188) Complete: Review Questions of Chapter 6 (Page 189) **Project 1 Virtual Tours** Watch: Case-study building tours videos for Project 1 on Moodle	**9-Mar** **Project 1 Presentation (HVAC) via ZOOM** **Upload presentation on Moodle by the end of the day.**
10	**14-Mar** Spring Break	**16-Mar** Spring Break
11	**21-Mar** **Topic 15: Fire safety & fire protection** Read: Textbook Chapter 11 Complete: Review Questions of Chapter 11 (Page 340)	**23-Mar** Watch: Exam 2 Review Video on Moodle
12	**28-Mar** **Exam 2 (Open-book via Moodle 12:00-1:15pm)** (Covering Topic 9, 10, 11, 12, 13, 14 and 15)	**29-Mar** **Topic 16: Vertical transportation** Read: Textbook Chapter 10 Complete: Review Questions of Chapter 10 (Page 311)
13	**4-Apr** Project 2 Introduction (Acoustics) **Topic 17: Acoustics-I: Characteristics of Sound** Read: Textbook Chapter 9 (Page 237-253)	**6-Apr** **Topic 18: Acoustics-II: Sound within a space** Read: Textbook Chapter 9 (Page 254-266)
14	**11-Apr** **Topic 19: Acoustics-III: Sound between spaces** Read: Textbook Chapter 9 (Page 267-276) Complete: Review Questions of Chapter 9 (Page 277)	**13-Apr** **Project 2 Presentation (Acoustics) via ZOOM** **Upload presentation on Moodle by the end of the day**
15	**18-Apr** Project 3 Introduction (for ARC590 students only, see description on Moodle) **Topic 20: Electricity** Read: Textbook Chapter 7 Complete: Review Questions of Chapter 7 (Page 209)	**20-Apr** **Topic 21: Water** Read: Textbook Chapter 8 Complete: Review Questions of Chapter 8 (Page 234)
16	**25-Apr** Watch: Exam 3 Review Video on Moodle **Project 3 desk crits (on ZOOM for ARC590-014 students only)**	**27-Apr** **Exam 3 (Open-book via Moodle 12:00-1:15pm)** (Covering Topic 16, 17, 18, 19, 20 and 21)
17	**2-May** **ARC590-014 students to submit Project 3 on Moodle by May 2nd**	

TEXTBOOK

Required Textbook:

Both reading and homework assignments are from the one required course textbook:

Building Environmental Control Systems Illustrated, Preliminary Edition; by Jianxin Hu; Publisher: Cognella;

The required textbook can be ordered directly from Cognella website for:

E-Book Price
180-day Access: $76.95
Purchase: $84.95

Print Price
$80.95 + $9 s/h = $89.95

Ordering Instructions: Purchase your book here: **https://store.cognella.com/83154-1A-001**

Other Reference Books (may be available in the Design Library):

Mechanical and Electrical Equipment for Buildings, 12th Edition; by Walter T. Grondzik, Alison G. Kwok, Copyright 2015, by John Wiley and Sons, ISBN 978-1-118-61590-4 (also known as "The MEEB book")

Efficient Buildings Design Series Volume II: Heating, Ventilating, and Air Conditioning, by J. Trost, Copyright 1999, by Prentice-Hall, Inc., ISBN 9780130803368

Building Codes Illustrated, 5th Edition; By F. Ching. ISBN 978-1-119-15092-3

EXAMS

There will be three open-book exams offered online via MOODLE Quiz. A calculator will be needed to complete the exams. There will be no make-ups given for a missed exam.

PROJECTS

ARC414 students are required to complete the following two projects:
Project 1 - HVAC case study project
Project 2 - Acoustics project

ARC590 students are required to complete Project 3 in addition to the above two projects:
Project 3 – HVAC design of the concurrent studio project

LECTURE VIDEOS

Course contents are organized by topics and delivered via online videos published on MOODLE. Students are required to watch the videos according to the course schedule.

CLASS PARTICIPATION (ZOOM link: https://ncsu.zoom.us/j/91019692651)

While this course is primarily delivered by pre-recorded videos, students are required, as indicated on the schedule (items in red font), to:

1. write your questions and/or comments on the contents of each unit before the live Q&A session of that unit. Enter your questions/comments in the google sheet shared with you at:
   https://docs.google.com/spreadsheets/d/1u37-uEan7l3yHbj1o8pBaLZCJxPHvkwX5raBr7MNZug/edit?usp=sharing
2. attend the "Q&A Sessions" at the end of each unit via ZOOM, in which your questions on the google sheet will be addressed. Attendance will be taken.
3. attend all other "Live & Required" sessions via ZOOM. Attendance will be taken.

The "Course Participation" component in Grading is based on your participation in the above "live" activities.

GRADES

For ARC414 Students

Exam One	18%
Exam Two	18%
Exam Three	18%
Project 1 – HVAC case study	18%
Project 2 – Acoustics	18%
Class Participation	10%
Total	**100%**

For ARC590-014 Students

Exam One	18%
Exam Two	18%
Exam Three	18%

Project 1 – HVAC case study	12%
Project 2 – Acoustics	12%
Project 3 – HVAC design	12%
Class Participation	10%
Total	**100%**

There will be a deduction of 15% per day for late assignments. Grades conversion from numbers to letter:

A+ 97-100 %	B+ 87-89.9 %	C+ 77-79.9 %	D+ 67-69.9 %	F 0-59.9 %
A 93-96.9 %	B 83-86.9 %	C 73-76.9 %	D 63-66.9 %	
A- 90-92.9 %	B- 80-82.9 %	C- 70-72.9 %	D- 60-62.9 %	

DIVERSITY, EQUITY AND INCLUSION

Architecture is made to serve people and as a part of the global community we recognize diversity within our school as well as the self-expression of our students. The School of Architecture values how diversity cultivates a rich learning environment. It is a fundamental principle that each individual has the right to learn without fear of character depredation or retribution for personal opinions. Students and professors must expect and help foster a learning environment of trust and respect. An individual must never suffer in the learning environments because of race, religion, gender, sexual orientation, ethnicity or national origin. The School of Architecture seeks to build a positive and encouraging community that promotes diversity, equity, inclusion, and justice.

PRIVACY

Students will be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

ACCOMMODATIONS

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Services Office at Suite 2221, Student Health Center, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01).

NCSU CODE OF STUDENT CONDUCT

Academic Integrity is the backbone of the Code and will be rigorously adhered to. Academic dishonesty will be appropriately dealt with in accordance with the "North Carolina State University Code of Student Conduct". Therefore, students are strongly urged to refer to and abide by this code. This document is very explicit on cheating and plagiarism. Students are expected to be knowledgeable about the Code and its implications in the work related to this course. This document can be viewed on the NCSU web site at: http://policies.ncsu.edu/policy/pol-11-35-01. For additional information, you may contact the Department of Student and Community Standards, 300 Clark Hall, 919-515-2963.

Students are responsible for reviewing the NC State University PRR's, which pertains to their course rights and responsibilities:

- Equal Opportunity and Non-Discrimination Policy Statement https://policies.ncsu.edu/policy/pol-04-25-05 with additional references at https://oied.ncsu.edu/equity/policies/
- Code of Student Conduct: https://policies.ncsu.edu/policy/pol-11-35-01
- Grades and Grade Point Average https://policies.ncsu.edu/regulation/reg-02-50-03
- Credit-Only Courses https://policies.ncsu.edu/regulation/reg-02-20-15
- Audits https://policies.ncsu.edu/regulation/reg-02-20-04

Appendix Item E: New Faculty and Administrator Bios

New full-time, tenure-track faculty:

- George Elvin, PhD, Associate Professor
  Dr. Elvin joined the faculty just prior to our last accreditation visit. He teaches both undergraduate and graduate studios, and he offers a graduate seminar on architecture for extreme environments. Elvin is the author of *Integrated Practice in Architecture: Mastering Design-Build, Fast-Track and Building Information Modeling* (AIA/John Wiley & Sons, 2007). His research and experience deepen the school's capabilities in sustainability, resilience, and integrative design. Dr. Elvin is a part of the teaching team in our integrative studios that is addressing SPCs not met.

- Rosa McDonald, Assistant Professor
  Prof. McDonald joined the faculty in fall 2022. She teaches undergraduate and graduate studios and a seminar on project research. McDonald's scholarship focuses on sustainability and more traditional energy efficiency measures in architecture through daylighting, shading systems, and energy modeling technologies. Prof. McDonald is currently working with as a consultant with students in the ARC 501 integrative studio, focusing on pre-design research and code analysis.

- Donghwan Moon, AIA, Assistant Professor
  Prof. Moon joined the faculty in spring 2022. He teaches undergraduate and graduate studios and an introductory drawing class. Moon is an architect and urbanist whose scholarship focuses on Public Interest Design and social infrastructure. He is a principal MMKPLUS, a multidisciplinary design practice, where he has worked on award-winning projects worldwide. Though Prof. Moon is not directly involved in courses that are addressing SPCs not met, he is responsible for teaching introductory and intermediate studios that prepare students for design challenges in the integrative studios.

- Shawn Protz, Assistant Professor
  Prof. Protz joined the faculty in fall 2020. He teaches undergraduate and graduate studios, a core introductory course on digital design processes, and a graduate seminar on architectural ceramics. Prof. Protz is a registered architect and principal of Protz Studio. He was hired to develop the school's digital design and material culture. He has established a new digital ceramics lab at the school. Though Prof. Protz is not directly involved in courses that are addressing SPCs not met, he is responsible for teaching digital processes to beginning students that prepare them for design challenges in the integrative studios.

- Traci Rider, PhD, Associate Professor
  Dr. Rider joined the faculty in 2018. She teaches in both the School of Architecture and our college's Doctor of Design (D.Des.) program. Dr. Rider is well known for her expertise on sustainability and health and wellbeing in the built environment. Dr. Rider teaches graduate seminars on research methods and healthy and sustainable design. Dr. Rider is an integral contributor to the integrative studios that are addressing SPCs not met. For each of these studios, she leads a sustainable strategies workshop for students early in the semester that prepares them to make informed and evaluative decisions in their design processes.

New administrator since last NAAB visit:

- Sara Queen, AIA, Associate Professor, Director of Undergraduate Programs in Architecture
  Prof. Queen was named Director of Undergraduate Programs in Architecture in Fall 2020. She has been on the faculty since 2011. Prof. Queen has strengthened our student academic advising, recruiting, and admissions processes. An expert in beginning design pedagogy, she also directs our First Year Experience (FYE) Program.

Appendix Item E: New Faculty and Administrator Bios

George Elvin, PhD (New tenure-track professor)
Associate Professor of Architecture

Bio:
George Elvin, PhD, is an Associate Professor of Architecture at NC State University where his teaching and research focus on learning from nature about how plants and animals adapt to extreme environments, and then applying those lessons to resilient building design. He looks at how people adapt to extreme environments, and he recognizes the wisdom of native communities in that subject. His areas of expertise include architecture and extreme environments and resilient building design and adaptation.

Dr. Elvin is the author of two books: *Post -Petroleum Design* (Routledge, 2015) and *Integrated Practice in Architecture: Mastering Design-Build, Fast-Track and Building Information Modeling* (AIA/John Wiley & Sons, 2007). He has published widely and given talks and workshops in 14 countries. Dr. Elvin has been a fellow of the Center for Research, Education, and Service, the Scholarship of Teaching and Learning Institute, and the University of Edinburgh's Institute for Advanced Studies in Humanities. Dr. Elvin has received the following degrees: Ph.D. Architecture (University of California at Berkeley), M.A. Architecture (University of California at Berkeley), B.S. Architecture (University of Maryland, College Park).

Shawn Protz (New tenure-track professor)
Assistant Professor of Architecture, Digital Technology

Bio:
Shawn Protz joined the faculty in the fall of 2020 as Assistant Professor of Architecture, Digital Technology. Prior to arriving at NCSU, he taught undergraduate and graduate courses at The School of Architecture (at Taliesin), the University of Arizona, and Auburn University. He has explored a range of subjects spanning from structural and environmental systems to digital representation and fabrication; past classes have covered design communication, building information modeling, climatic design, housing, inflatable architecture, and tectonics. At the NCSU School of Architecture, Protz focuses on building a vibrant digital culture, and develop coursework and research projects exploring emerging digital systems and materials. Presently he is pursuing techniques and applications for 3D-printed ceramics. His areas of expertise are digital design processes, architectural ceramics, and architectural design.

Protz is a registered architect in Arizona, California, the District of Columbia, and Pennsylvania, and a LEED Accredited Professional. He runs a design practice, Protz Studio, with his wife and partner Christina Maria Alvarez McMillan. Their work ranges from architecture and interiors to furniture and building components, in particular specializing in screen-printed patterned ceramic tiles. Prior to beginning Protz Studio, he worked with award-winning firm KieranTimberlake on key projects including the High Horse Ranch, Houghton Memorial Chapel & Multifaith Center, and Loblolly House; and with Studio Rick Joy on the Princeton Transit Hall & Market, among other works. Prof. Protz received a Master of Architecture from Princeton University and a Bachelor of Arts Major in Architecture, with a Minor in Hispanic Studies from the University of Pennsylvania.

Appendix Item E: New Faculty and Administrator Bios

Traci Rider, PhD (New tenure-track professor)
Assistant Professor of Architecture

Bio:
Dr. Traci Rose Rider is Assistant Professor of Architecture, Doctor of Design faculty, and PhD Faculty at North Carolina State University's College of Design. Dr. Rider's research has focused on the relationship between the design culture and the notion of sustainability, exploring factors impacting environmental attitudes of designers including environmental education, learned associations, and informal influences. Dr. Rider teaches courses focusing on sustainability and health for the School of Architecture, addressing topics such as existing building operations and maintenance, and holistic considerations for both health and sustainability. Her funded research projects include methods for introducing building science and health topics to middle school students in North Carolina through STEM exercises, as well as supporting the development of interdisciplinary focus areas for the NC State in the areas of Sustainable Cities.

Dr. Rider's professional experience over the past twenty years has included work in international design firms, green building non-profits, university extension, and sustainability consulting. Dr. Rider has presented and been published in the proceedings of conferences such as Architectural Research Centers Consortium (ARCC) and the National Outreach Scholarship Conference (NOSC). She has also been featured in Dwell magazine, was granted the prestigious individual U.S. Green Building Council (USGBC) Leadership Award in Education for 2005 and was included in a group labeled as "The Re-Inventors" in Vanity Fair's Green Issue in May 2006, in the company of established visionaries such as William McDonough, Paul Hawken and Sim van der Ryn. She has authored two books with W.W. Norton and has a chapter in a book on interdisciplinary work, *Collaboration and Student Engagement in Design Education* (IGI Global, 2016). Dr. Rider received a PhD in Design (Sustainability in Architectural Education) from NC State University, an M.S. in Human-Environment Relations from Cornell University, and Bachelor of Architecture from the University of Cincinnati.

Sara Queen, AIA (New administrative role since last NAAB visit: Director of Undergraduate Programs in Architecture)
Associate Professor of Architecture, Director of Undergraduate Programs, Director of First Year Experience

Bio:
Sara Queen is an Associate Professor at the School of Architecture teaching a range of undergraduate and graduate studios as well as advanced graduate research seminars. Sara was recently honored as the 2017 Emerging Professional by the North Carolina AIA Chapter for her extraordinary accomplishments in architectural design, design discourse, architectural education, and mentoring of the next generation of architects. Additionally, Sara's teaching excellence has been recognized through the national ACSA / AIAS New Faculty Teaching Award in spring of 2014, the 2016 NC State University Outstanding Teacher Award, the Alumni Association Outstanding Teacher Award, and the NCSU TH!NK Faculty Fellowship in Critical and Creative Thinking. Her areas of expertise include infrastructural networks and mapping methodologies and beginning design pedagogy.

In addition to the scholarship of teaching, Sara's ongoing research investigates infrastructural networks through mapping methodologies with the goal of facilitating deeper, more diverse understandings of urban systems and the processes which shape physical place, cultural space and social territory. Sara has presented at numerous national and international conferences including the Architectural Research Centers Consortium and European Association for Architectural Education International Conference, the National Conference on the Beginning Design Student, the Council of Educators in Landscape Architecture National Conference, and the East Midlands History and Philosophy Research Network International Conference. She received a Masters in Architecture from Harvard University Graduate School of Design and Bachelor of Environmental Design in Architecture from NC State University.

Rosa McDonald (New Tenure Track Professor)
Assistant Professor of Architecture

Bio:
Rosa McDonald is an Assistant Professor at the School of Architecture. Prior to joining the faculty in 2022 she taught in the interdisciplinary and architecture first year studios for the past five years, and served as a teaching assistant in other graduate seminars and PhD courses with subjects including tectonics, energy analysis, and research paradigms. She has also been a regular guest reviewer for the advanced architecture airport studio. Professor McDonald's areas of expertise include sustainability, energy efficiency, daylighting, shading systems and energy modeling technology.

Rosa's scholarly interests began with a focus on sustainability and more traditional energy efficiency measures in architecture through daylighting, shading systems, and energy modeling technologies. Her research interests have expanded to include the investigation of how leveraging the ecological and biophilic benefits of daylight and vegetation can foster opportunities for green living systems as integral parts of our built environment. She is currently pursuing a PhD in Design at NC State University in the areas of Design for Sustainability, Design for Health and Well-being, and Design and Technology.
Rosa has received various scholarly and design awards including the Gensler Diversity Scholarship that recognizes emerging architecture talent from minority communities, the Alpha Rho Chi Medal for leadership, service, and the promise of professional merit, the College of Design Dean's Wings on Wings Award for significant contributions to the college's community, and the ARCC King Medal for excellence in architectural and environmental research. She was also a member of the design studio that was awarded the Best Architecture University Award for the "Future Airports: Global Design Thinking" Exhibit with Fentress Architects at the Venice Biennale. Rosa received a Bachelor of Environmental Design in Architecture, a Bachelor of Architecture, and a Master of Architecture, all from NC State University.

Donghwan Moon (New Tenure-Track Professor)
Assistant Professor of Architecture, Urban Design

Bio:
Donghwan Moon, AIA, is an architect, urbanist, and educator. His multidisciplinary design practice MMKPLUS focuses on creating contextual, timeless, and socially responsible places through extensive research on architecture, landscape, and infrastructure. He has worked on various projects globally, including city masterplans, mixed-use developments, cultural buildings, and public parks. MMKPLUS won multiple awards, including the Public Architecture Award of Korea, the Korean Architecture Award, and the IFLA Landscape Architecture Award. His work and research have also been widely recognized through publications and exhibitions, including Architectural Record, Archdaily, and the Seoul Biennale of Architecture and Urbanism. Professor Moon's areas of expertise include urban design, Public Interest Design, and social infrastructure.

Working as a director of Mtree—a non-profit design group—Moon has also been actively involved in public interest design for marginalized groups in developing countries. By investigating innovative technologies and collaborative design processes, his team has transformed communities into healthy, equitable, and sustainable places. Their work has been showcased at professional and academic venues worldwide. Prior to joining NC State, he was an Adjunct Assistant Professor at New York Institute of Technology and has served as a design critic in many universities in the US and South Korea. He holds a Master of Architecture in Urban Design from Harvard University Graduate School of Design (GSD) and a Bachelor of Architecture from Syracuse University.