

COURSE SYLLABUS

Course #/title: Arch 231 - Exploring the X, Y, and Z Wood Connection
Number of credits: 3 (*undergraduate & graduate*)
Term and year: Spring 2025
Days and Time: TTH 10:30AM - 11:20AM
Location: Renaissance Hall's Room TBD
Instructors/Email: Nicholas Wickersham, nicholas.wickersham@ndsu.edu

Office Hours: Confirm with instructor (*appointments via email, additional hours in the woodshop will be made available*).

Course Description

This seminar is about the experience of working with wood at the full one-to-one scale. Working with wood at a workable scale allows for a greater understanding of its idiosyncrasies and inherent properties. These experiences of material exploration will inform and benefit the student in the future when they begin to specify, draw, detail, and imagine new avenues for wood within their fully realized projects.

This project acts as a vehicle to allow students to explore the material of softwood and to further utilize analog and digital tools to reshape wood in new and inventive ways. There has been a massive decline in making in the post-COVID era. Making is a vital part of architectural education and the new tools regarding digital fabrication promise to be a larger portion of tomorrow's architecture. This class will promote more use of the 3D Printer, CNC Router, and other digital and analog tools.

The Cartesian Coordinates of X, Y, and Z are typically required elements of most architectural projects. For the rest of this short seminar, we will investigate the intersection of the column and two beams. The first measure of the student projects should be structural. Then with time permitting we will explore additional ideas such as material irregularities, construction, transportation, preservation, thermal performance, fire, attachment of additional elements, and more. Each student will be asked to explore one of these three categories: homogeneous, coupling, and redundant (*there is always the possibility to find another category or create a new unique hybrid*).

Source + Field Trip

Where does lumber come from, how much is available, how is it processed, and what are some examples of how it is best used? We will investigate all these questions and more on our field trip. Our university is positioned just west of a huge timber basket (*large area for harvesting timber*), which puts us at an advantage for showing students the source of lumber. We will take a short trip to a timber stand, a lumber mill, and an example of a mass timber building. This is an opportunity to understand the difference of lumber today versus what lumber was many years ago. With these conversations we can begin to address how much of this resource we might be allocated on a yearly basis, understand the amount time in which it needs to properly grow, and can shed greater light on the potential of sustainability and possibilities of implementation.

Within the first few weeks of the spring 2025 semester, we will rent a van to visit a timber stand, timber mill, and a few examples of mass timber buildings. We hope to visit the following examples:

T3 Minneapolis - 323 North Washington Avenue, Minneapolis, MN

Butler Square Building - 100 N 6th St, Minneapolis, MN 55403

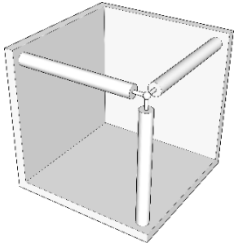
And others...

Methodology (Framing)

Exploration and iteration are some of the best methods to truly understand these materials. This class is about setting aside time and creating space to work with this material at its full scale - while accepting the fact that mistakes will happen; but, with every mistake, we will take the time to listen to the material and, with patience, we will hopefully gain a better understanding of its properties. We will design the system to its fullest potential, allowing follow-through; and then, as a team, we will critically analyze the work that has been

done. From this criticism we will implement these ideas and concepts into the next iteration and will continue this loop for as long as the semester allows.

The size of each member - X, Y, and Z is completely up to the student. We will create a reinforced box that will absorb the additional forces that are applied to the intersection of the X, Y, and Z connections. All students will put their initial models in the box, and we will apply force and pressure to see how they resist the applied forces. We will utilize this tool to further understand structural feasibility.



Three-sided support to absorb the forces and loads applied on the X, Y, Z connections.

Three Categories of Wood Research

Homogeneous (*Merriam-Webster*) – adjective - *ho·mo·ge·neous* | *hō-mə-ˈjē-nē-əs* - ˈjēn-yəs

1. of the same or a similar kind or nature
2. of uniform structure or composition throughout

Homogeneous Wood Connection will consist of any and all wood to connections. The only outside material that will be acceptable will be glue.

Examples of Category – mass timber, CLT, glulam, LVL, log cabin

Ways of Making – stacking, laminating, combining, and more



Tamedia Office Building by Shigeru Ban - <https://www.archdaily.com/478633/tamedia-office-building-shigeru-ban-architects>

Coupling (*Merriam-Webster*) – noun - *cou·pling* | ˈkə-plɪŋ -pə-lɪŋ

1. the act of bringing or coming together: pairing
2. a device that serves to connect the ends of adjacent parts or objects
3. the joining of or the part of the body that joins the hindquarters to the forequarters of a quadruped

Coupling Wood Connection will consist of any materials that bridge the wood material. These bridging materials could be made or purchased.

Examples of Category – typical 2x construction, bespoke connectors and adaptors, flitch plate connectors, and others

Ways of Making – bridging, attaching, linking, nailing, screwing



Pine Eagle Chapel at Camp Tiak - Wiggins, Mississippi by Fay Jones

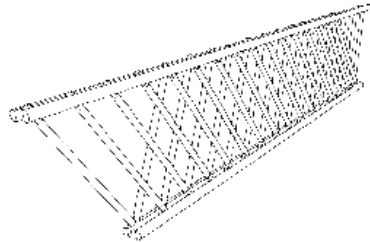
Redundant (*Merriam-Webster*) – adjective - re·dun·dant | ri-ˈdɛn-dənt

1. exceeding what is necessary or normal: superfluous
2. characterized by or containing an excess specifically: using more words than necessary
3. characterized by similarity or repetition a group of particularly redundant brick buildings
4. profuse, lavish
5. serving as a duplicate for preventing failure of an entire system (such as a spacecraft) upon failure of a single component

Redundant Wood Connection - is a hybrid between homogeneous and coupling. Connections need to be repetitive but can be any material.

Examples of Category – trusses, lamella, and others.

Ways of Making – stacking, duplication of existing, replicating, mimicking, etc.



Rural Studio - Thinnings Bridge - Payne Lake Talladega National Forest

Course Schedule

Start of the Project – Students will pick one of the categories above – Homogeneous, Coupling, or Redundant, and think about what ideas, concepts, and other elements they might consider adding to this category.

Research | Field Trip – Students will visit a timber stand, a lumber mill, and architectural examples of timber buildings within the region.

Research | Case Studies – Each student will research various case studies regarding the category that they have selected. For these case studies we will use the list of readings and resources listed below as well as other external sources. Students will compare and contrast the material's potential, structural qualities, financial, longevity, and other areas that can inform their research. Students will build a ½ scale model based on the best case study/ies and further analyze its strengths and weaknesses. Students will then compile ideas from each of these case studies that will inform their work. Finally, students will define and determine areas in each category that they can expound upon.

List of Selected Readings:

- *Timber Construction Manual* by Thomas Herzog, Julius Natterer, Roland Schweitzer, Michael Volz, and Wolfgang Winter
- *Detail in Contemporary Timber Architecture* by Virginia McLeod
- *Holzbauten S, M, L / Timber Buildings S, M, L: 30 x Architektur und Konstruktion* by Sandra Hofmeister
- *Blank: Speculations on CLT Hardcover* by Hanif Kara and Jennifer Bonner
- *The Function of Form* by Farshid Moussavi

Design | Abstraction – After research we will sketch, draw, physically model, and digitally model so that we may gain a unique perspective of what we are exploring. We will utilize the strengths, weaknesses, and other criteria from our case studies, combined with other concepts, to achieve a new direction of exploration for each student project.

Physical Mockups – After the initial design phase, students will then construct three physical models: ½ Scale, Full Scale, and a Final Scale. “One time is an anomaly. Two times is a coincidence. Three times is proof.” – Riley Sager, ‘Lock Every Door.’ We will build the full scale for two of the three models to truly understand what we are working with. The first two models will be subjected to large amounts of force to test the structural stability of the model. After each model is made, we will have a review critique where we will invite our guest critics to further help us analyze the work that has been done and allow us to gain new perspective.

Biographies

Nicholas E. Wickersham - Primary Seminar Instructor (*Architectural Focus*)



Nicholas E. Wickersham is an Assistant Professor at North Dakota State University's Architecture Department. He has previously taught at Southern Mississippi University, University of New Mexico, and James Madison University. Mr. Wickersham holds both a Bachelor of Architecture and Interior Architecture from Auburn University. At Auburn University, he participated in the Rural Studio during his 2nd year where his team deconstructed a wooden church and helped reassemble it. During his 5th year thesis project, his group designed a roundwood pedestrian bridge for the Talladega National Forrest. He received his Master of Architecture at the University of Virginia where he further explored material studies and fabrication. He is also a licensed architect in the State of Mississippi. He was selected to participate in the Glenn Murcutt Masterclass 2012 in Australia. He was recently selected to participate in the Timber Design Faculty Development Workshop at Clemson University in 2022.

Seth Willison - Reviewer | Critic (*Material Focus*)



Founder & CEO, Willison Timberworks Design Build, LLC; Licensed Contractor

Seth is a native of South Mississippi, a place where the people and the culture are endeared to him forever. Raised his entire life in Stone County, he has pursued careers in education, the military, and finally in architecture. He holds a Bachelor's Degree from the University of Southern Mississippi and a Master's Degree in Architecture from the University of Colorado Denver. He has also received a Certificate of Traditional and Classical Design from the Institute of Classical Art & Architecture Rocky Mountain chapter through the University of Colorado's traditional and classical design curriculum. He continued to take courses in classical design through the ICAA Southern California chapter under the tutelage of very skilled and attentive teachers, including Erik Evens of Evens Architects at KAA Design Group. His varied career and education experiences have taken him from Mississippi, to Colorado,

to California and around the world.

The University of Colorado's Design Build Bluff program honed his skills and career vision for Willison Timberworks Design Build. In the Design Build Bluff program, he was part of a talented team of directors and students that designed and built a residence, called Hozho House, for a Diné family in the Dinéah lands in Southeast Utah. His first job in architecture, after his time in Colorado, was at KAA Design Group in Los Angeles, California with Even's Architects, specializing in traditional and classical design. At KAA, with such a talented and capable team, his vision for residential architecture was fostered, refined, and launched.

Throughout the years from Mississippi to California and back to the Mississippi Gulf Coast, through the help of dedicated teachers, employers, friends, and colleagues, Seth has developed the ideas, philosophies, and designs that have led to Willison Timberworks Design Build. He hopes that you find his ideas and designs inspiring, fresh, and beautiful.

Golpar Garmestani - Reviewer | Critic (*Structural Focus*)



Golpar Garmestani is a Licensed Structural Engineer with 9 years of industry experience in Architecture and Engineering. She has designed a variety of bridges such as post tensioned box girder, U tub girders, cable stayed, and a concrete segmental Arch. These bridges have had different types of construction methods such as using gantry, built on false work, balanced cantilever, unidirectional cantilever, and span by span. Some of these bridges have been vehicular, some have been light rail bridges, and some are pedestrian bridges. Garmestani holds a Bachelor of Architecture and Interior Architecture from Auburn University and Master's in Civil Engineering with focus on structures. During her undergraduate degree she was part of a team of students who relocated St. Luke's episcopal Church to its original location on Cahawba River in Alabama. During her undergraduate thesis year, her group designed a three span roundwood pedestrian bridge out of juvenile wood for the Talladega National Forrest. After one year of working as a graduate architect, designing office buildings in Atlanta, GA. she pursued her passion for bridges from structural engineering standpoint and returned to Auburn University to get her Master degree and she has been practicing as a bridge engineer ever since.

Jeff Hanson - Woodshop Technician (*Buildability Focus*)



Jeff's career in making and design started with his work as a cabinet maker. After several years he decided that he wanted to do more in his career and so returned to college at Bemidji State University majoring in Technical Illustration/Graphic Design with an emphasis in Model Making. After graduation Jeff was awarded an internship with Walt Disney Imagineering in their Dimensional Design department.

Following that internship, he began work as a Model maker for Arctic Cat Inc and then moved into the Engineering department for Arctic Cat doing prototype work and working as a cnc router and programmer. The next step in Jeff's career was to go to work for Northern Contours first as a Product Manager in the furniture department and then moving into Research & Development where he specialized in design, build and setup of national trade shows.

Jeff's career started at NDSU in 2012 in the School of Design. His focus is on keeping shop users working safely and overseeing the shop. The position at NDSU allows Jeff to pass along his expertise in making, which is very fitting for his final years in the workforce.