Mississippi State Program



What is the purpose of the PCI Studio Program



Precast-Prestressed not usually taught in the direct path of studies particularly in architectural programs





The Process

- 1. Approach a professor about interest in the studio program
- 2. Develop a preliminary proposal outline
- 3. Gain "buy in" from other faculty and deans, as well as other colleges
- 4. Producers and Associate member teams
 - a. Financial support
 - b. In kind support
- 5. Finalize the proposal and submit.
- 6. Proposal accepted, legal documents signed, and money distributed
 - a. \$ 25,000 per year for up to 4 years
- 7. Schedule: guest speakers, workshops, travel/ trips to the convention, project reviews, plant tours etc.



Where has it been?



pci-foundation.org



MISSISSIPPI STATE UNIVERSITY™ COLLEGE OF ARCHITECTURE, ART AND DESIGN

Collaborative Studio with Construction Sciences and the School of Architecture



1st year – 64 students 2nd year - 84 students











Plant Tour - Jackson Precast

Industry Partners





















Studio Organization



Project Delivery Theater

Assignment:

- Student teams explored a project delivery method and then developed a skit to teach their classmates about the project delivery method
 - Design Bid Build
 - Construction Management Multi-Prime (CM MP)
 - Construction Management at Risk (CM@Risk)
 - Design Build (DB)
- Skits were recorded as videos to present online to class due to COVID restrictions
- Addition of street-level retail spaces to enhance the walkability and retail options in downtown Starkville

Team 10

Students:

- Bettina Boland (ARC)
- Creed Broom (ARC)
- Nate Haley (ARC)
- Clint Vanderford (BCS)
- Arec Wesley (BCS)



Project Delivery Theater



Exploring Precast Concrete

Assignment:

- Conducted in the Structures II course and studio •
- Part 1: Concrete Mix Designs
 - Student teams came up with four different concrete mixes and then made test cylinders
 - Test cylinders were tested by the Civil Engineering • department
 - Students created lab report based on data gathered
 - Then used data to design new mix for Part 2 •
- Part 2: Concrete Formwork •
 - Students designed new concrete mixes and formwork for a concrete disc
 - Discs were graded on (1) how far they could be thrown, • (2) how light they were, and (3) how little damage it sustained when it landed after being thrown
 - **Reinforced mini-beams replaced the concrete discs**
 - Students created a lab report based on this new data ٠







Research

Assignment:

- Four Supergroups ٠
 - Building Code, Zoning, and Accessibility (BCS Students)
 - Precedent Study (ARC Students)
 - Precast Concrete (ARC & BCS Students)
 - Building the Existing (ARC Students)
- Precast Concrete
 - General Information on Precast Concrete
 - Materiality Research
 - Identify sources, costs and lead times for raw materials and finished panels.
 - Identify any specialized labor and equipment needs required for the various materials.
 - Research 2021 IBC to determine all codes related to precast concrete.
 - Research embodied energy, durability, and sustainable aspects
 - Structural Precast Concrete Elements Analysis
 - Structural Forces Structural Design Code, Gravity Forces, **Tornado Forces**
 - Thermal Performance Climate Research, U-Value, Air and Water Infiltration

Precast Concrete, continued

- Architectural Precast Concrete Panels Analysis
- Types of Precast Panels
 - Advantages and Disadvantages Environmental





Influences, Man-made Influences, Green Strategies

Precast Panel Exploration

Schematic Design and Design Development:

• Students explored mix design and form liner materials





2021 Studio Program



Innovation Hub Parking Garage

Design:

- Parking garage addition to the Cadence Building in • downtown Starkville, MS
- New Innovation Hub for MSU Research Park •
- Addition of street-level retail spaces to enhance the ٠ walkability and retail options in downtown Starkville



Requirements:

- Architectural design aspects of the precast structural system
- Architectural precast cladding system
- How these precast systems integrate into the existing historic building
- Construction aspects were the creation and installation of the custom architectural precast cladding system
- Project budget and scheduling
- Student teams were composed of 2-3 architecture students and 1-2 Building Construction Science students for teams of 4-5 students.

Faculty:

- ARC Ryan Ashford, Alexis Gregory, Hans Herrmann
- BCS Mohsen Garshasby, Briar Jones
- 66 students, 16 teams, 39 ARC students, 27 BCS students



Students:

- Bo Allison (BCS)
- Ashlen Davis (ARC)
- Gizem Karsi (ARC)
- Jake Lindley (ARC)
- Jack Ogletree (BCS)







Students:

- Bo Allison (BCS)
- Ashlen Davis (ARC)
- Gizem Karsi (ARC)
- Jake Lindley (ARC)
- Jack Ogletree (BCS)







2022 Studio Program



2022 Habitat: Design Competition – Climate Positive Concrete Housing

Design:

- Development of a Habitat for Humanity house that can be repeated on an existing site
- Client was Starkville Area Habitat for Humanity •
- Teams developed a design for a three-bedroom house meeting all the Habitat for Humanity requirements using precast concrete as the primary architectural cladding material
- Size Approximately 1,200 SF •
- Budget \$ 110,000; use of volunteer labor to keep costs down

I ACSA		f © ⊻ 🖬 🖬 🛓 ۹ 🚍
	Home • Programs and Events • Competitions • 2022 Habitat Competition SUBMISSION DEADLINE: JUNE 1, 2022 2022 Habitat Competition Climate Positive Concrete Housing	
	SCHEDULE April 13, 2022 Registration Deadline June 1, 2022 Submission Deadline Summer 20 Jury Conv Overview Program Registration Rules Resources	022 Summer 2022 renes Winners Announced
	INTRODUCTION In response to the simultaneous crises of Housing, Climate and Equity, this competition challenges students to envision the ideal Habitat home in one of seven North American regions. The Association of Collegiate Schools of Architecture (ACSA) is pleased to announce the HABITAT Design Competition : Climate Positive Concrete Housing for the 2021-2022 academic year. The competition is a partnership between the National Ready Mixed Concrete Association (NRMCA) and Habitat for Humanity International, Inc. The Habitat Design Competition: Climate Positive Concrete Housing is based on the Habitat for Humanity U.S. Construction standards for affordable, resilient, sustainable & accessible homes. The competition will challenge students, working individually or in teams, to explore a variety of design issues related to the use of concrete in design and construction of a Habitat home.	BUILD WITH STRENGTH ACHINON OF MANY MARK COMPACT AND COMPACT ACHINON OF MANY MARK COMPACT AND COMPACT ACHINON OF MANY AND ACHINA ACHINA ACHINA

Requirements:

- Design
- precast concrete
- students for teams of 4-5 students.

Faculty:

- BCS Mohsen Garshasby, Briar Jones
- students

Each team developed three different house designs and three different construction systems for the house exterior walls as part of Schematic

Then narrowed down to one house design and one construction system for the final presentation The exterior wall designs are to take into account durability, tornado resistance, structural loading, thermal performance, cost, assembly by nonprofessional labor, time, and aesthetics using

• Student teams were composed of 2-3 architecture students and 1-2 Building Construction Science

• ARC – Ryan Ashford, Alexis Gregory, John Poros • 75 students, 16 teams, 43 ARC students, 32 BCS

2022 Habitat: Design Competition – Climate Positive Concrete Housing

Location:

- Kelly Estates
- 821 16th Section Road, Starkville, MS 39759
- Oktibbeha County





08 16th Section Rd



2022 Habitat: Design Competition – Climate Positive Concrete Housing

Architectural Panel Exploration:

- Small Panel
 - Rubber Formliner
 - MDF Form
 - Form made of any material team was interested in
- Final larger panel
 - Rubber Formliner
 - MDF Form
- Other ideas explored
 - Color additives
 - Face finish
 - Cement retarder











Students:

- Jacob Bryson (ARC)
- Kobe Clouthier (ARC)
- Chapman Cooper (BCS)
- Elizabeth Gallagher (BCS)
- Elaine Otts (ARC)













Students:

- Jacob Bryson (ARC)
- Kobe Clouthier (ARC)
- Chapman Cooper (BCS)
- Elizabeth Gallagher (BCS)
- Elaine Otts (ARC)







ERONG W

TYPICAL MALL 1 1/2" = 1' - 0"



2023 Studio Program



Innovation Hub Parking Garage

Design:

- Parking garage addition to the Cadence Building in • downtown Starkville, MS
- New Innovation Hub for MSU Research Park •
- Addition of street-level retail spaces to enhance the ٠ walkability and retail options in downtown Starkville



Requirements:

- Architectural design aspects of the precast structural system
- Architectural precast cladding system
- How these precast systems integrate into the existing historic building
- Construction aspects were the creation and installation of the custom architectural precast cladding system
- Project budget and scheduling
- Student teams were composed of 3 architecture students and 2 Building Construction Science students for teams of 5 students.

Faculty:

- ARC Ryan Ashford, Alexis Gregory
- **BCS** Briar Jones





Students:

- Caeli Finch (ARC)
- Becca Garrick (ARC) •
- Ryan McDaniel (BCS) ٠
- Ellen Overstreet (ARC) •
- Alex Tannehill (BCS)







Normal Concrete: panel volume: 150 cubic feet weight of concrete: 150 lbs/cubic feet weight of panel: 22,500 lbs

DIAGRAM | PANEL MEASUREMENTS

30,

Weight Information:

Lightweight Concrete:

panel volume: 150 cubic feet weight of concrete: 110 lbs/cubic feet weight of panel: 16,500

Students:

- Caeli Finch (ARC)
- Becca Garrick (ARC) ٠
- Ryan McDaniel (BCS) ٠
- Ellen Overstreet (ARC) •
- Alex Tannehill (BCS)



FINCH, GARRICK, MCDANIEL, OVERSTREET, & TANNEHILL

<u>Students:</u>

- Caeli Finch (ARC)
- Becca Garrick (ARC)
- Ryan McDaniel (BCS)
- Ellen Overstreet (ARC)
- Alex Tannehill (BCS)



PCI STUDIO | ARC 3546 | BCS 3126

FINCH, GARRICK, MCDANIEL, OVERSTREET, & TANNEHILL