CASE STUDY: Design of pedestrian timber bridges in an AE Studio

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ABOUT THE COURSE
AE Studio: Interdisciplinary Design - Pedestrian Timber Bridges
COURSE OBJECTIVES

AE COLLABORATION IN EDUCATIONAL SETTING

CREATIVE USES OF TIMBER AS STRUCTURAL MATERIAL

STUDIO FORMAT FOR ENGINEERING EDUCATION

ABOUT THE COURSE

CASE STUDIES

WINTER 2010

WINTER 2011

WINTER 2012

CONCLUSIONS
COURSE STRUCTURE

PROGRESSIVE COMPETITION

CONCEPT REVIEW
MID-REVIEW
FINAL-REVIEW

PROGRESSIVELY INCREASING A/E TEAMS

CASE STUDIES
PRELIMINARY DESIGN
DESIGN DEVELOPMENT

PROFESSIONAL PANEL REVIEW

ARCHITECTS
ENGINEERS
A/E FACULTY
## COURSE STRUCTURE

CE471/471L (4-units), ARC 402/406/L (9-units) 10-week course

<table>
<thead>
<tr>
<th>WEEK</th>
<th>ACTIVITIES</th>
<th>TEAM COMPOSITION</th>
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<tr>
<td>1-2</td>
<td>Case Study, Concept Design and Concept Selections</td>
<td>6-8 case study teams, 12-18 individual concepts</td>
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<td>Faculty Review</td>
<td>8-10 concepts progress</td>
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<td>3-6</td>
<td>Preliminary Design</td>
<td>8-10 teams</td>
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<td>Professional Panel Review</td>
<td>4-5 designs progress</td>
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<td>7-10</td>
<td>Design Development</td>
<td>4-5 teams</td>
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<tr>
<td></td>
<td>Professional Panel Review</td>
<td>1 design selected</td>
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14-22 architectural students  
11-18 engineering students
CASE STUDIES
CASE STUDIES

Case Study 1
Madison Bridge
Madison, WI
GLB beam

Case Study 2
Da Vinci Bridge
Akershus, Norway
Arch-deck supported

Case Study 3
Reuss River Bridge
Flüelen, Switzerland
Arch-deck suspended

Case Study 4
Travesina Bridge
Viamala, Switzerland
Truss
Case Study 5
Far Moor Bridge
Yorkshire, UK
Stress-Laminated Arch

Case Study 6
Zappalar Bridge
Zappalar, Chile
Beam/Arch

Case Study 7
Martigny Bridge
Restaroute, Switzerland
Suspension
WINTER 2010
Cal Poly Pomona Engineering Bldg 17 to Bldg 9
SITE/PROJECT

IMPROVE ADA-COMPLIANT ACCESS BETWEEN BUILDINGS

CREATE ICONIC STRUCTURE FOR COLLEGE OF ENGINEERING

CREATE STUDENT CONGREGATION AREA BETWEEN CLASSES

BRIDGE AS A LEARNING TOOL

SPAN 75 FT (MIN 25 FT CLEAR)

2-3 FT ELEVATION DIFFERENCE
DESIGNS

1st place

**Space Truss**

*Architects:* Nathan Houck, Greg Sagherian, Robert Yamnitz, Elane Yiu,
*Engineers:* Bethany Lopez, Daniel Mourad, Ryan Turner, Samson Wong.

*Original design concept by Robert Yamnitz.*

2nd place

**The Ridge**

*Architects:* Bridget Flecky, Eubie Han, Edward Kang
*Engineers:* Gean Na, Alex Quinonez, Fernando Sesma.

*Original Design Concept by Eubie Han*
RIDGE - MODEL

ABOUT THE COURSE
CASE STUDIES
WINTER 2010
WINTER 2011
WINTER 2012
CONCLUSIONS
WINTER 2011
Angeles Forest, West Fork San Gabriel River
PROJECT

PROVIDE ADA-COMPLIANT ACCESS BETWEEN DAY-USE AREA AND TRAIL

VISUALLY ESTHETICALLY PLEASING DESIGN

PLEASANT HIKING EXPERIENCE

SPAN 100-140 FT (ALIGNMENT DEPENDENT)

25 FT ELEVATION DIFFERENCE
PROJECTS

MID-REVIEW
PROJECTS

FINAL-REVIEW
PROJECTS

QUADRA-BRIDGE
1ST PLACE

LATTICE-BRIDGE
QUADRA – 1ST PLACE (RENDERINGS)

Architects: Maro Asipyan, Matthew Terry,
Engineers: Christian Hainds, Francisco Perez, Bryan Strege.
Original Design Concept by Mathew Terry
QUADRA - MODEL
QUADRA - DETAILING

ABOUT THE COURSE

CASE STUDIES

WINTER 2010

WINTER 2011

WINTER 2012

CONCLUSIONS
Architects: Ron Kwok, Gerardo Ramirez, Garrett Wehan,
Engineers: Daniel Bradbury, Henry Chi, Richard Hennings, Sevak Isakhanyan.
Original Design Concept by Gerardo Ramirez
WINTER 2012
Angeles Forest, East Fork San Gabriel River
SITE

ABOUT THE COURSE
CASE STUDIES
WINTER 2010
WINTER 2011
WINTER 2012
CONCLUSIONS
PROJECT

PROVIDE OPTIONAL DRY RIVER CROSSING (ADA COMPLIANCE NOT REQUIRED)

ESTHETICALLY PLEASING DESIGN

PLEASANT HIKING EXPERIENCE

LIMITED ACCESS

SPAN 45-75 FT

25 FT ELEVATION DIFFERENCE
PROJECTS

TRUSS BRIDGE

ARCO IRIS

THE CROSSING

KNEE BRACE BRIDGE

NO WHERE BRIDGE
TRUSS BRIDGE - 1ST PLACE

Architects: Richard Delarosa, Candice Myers, Harold Ornelas, Leo Rodriguez, Johnny Tran;
Engineers: Kun Chang, Henry Chi, Huong Vu.
Original Design Concept by Harold Ornelas
TRUSS BRIDGE - DETAILING
TRUSS BRIDGE – STRUCTURAL MODEL

General Sap Model
THE CROSSING

Architects: Sabrina Blackman, Brice Colton, Robert Higa, Hannah Lee
Engineers: Jonathan Quezada, Robert Veloz.
Original Design Concept by Hannah Lee.
ARCO IRIS

Architects: Juan Delgado, Hector Ruvalcaba, Sevan Simonian, Blake Thompson
Engineers: Marcos Avalos, Nhan Mai.
Original Design by Sevan Simonian.
NO WHERE BRIDGE

Architects: Dana Falk, Alice Liang, Marcus Richeson, Annabelle Rigg
Engineers: Mathew Archer, James Ferguson.
Original Concept by Marcus Richeson.
KNEE-BRACE

Architects: Maro Asipyan, Abner Morales, Fabian Rosales, Matthew Terry,
Engineers: Vahe Heyrapetian, Vache Heyrapetian.
Orginal Design Concept by Matthew Terry
KNEE-BRACE

- Handrails
- Deck
- Stringers
- Interlaced GLB
- Knee-brace

Axial Load Diagram

Moment Diagram
CONCLUSIONS
CONCLUSIONS

EFFECTIVE USE OF WOOD AS STRUCTURAL MATERIAL STARTS WITH EDUCATION OF ARCHITECTS AND ENGINEERS

COLLABORATION BETWEEN THE TWO IS IMPORTANT TO CREATING AESTHETICALLY PLEASING DESIGNS

THE WOOD INDUSTRY ACTIVE SUPPORT OF THIS TYPE OF EDUCATIONAL ACTIVITIES IS IMPORTANT FOR INDUSTRY GROWTH
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