Teaching Bicycle and Pedestrian Topics to University Students

Friday, October 18, 2019

U.S. Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
Investment in roadway safety saves lives
http://safety.fhwa.dot.gov

Panelists

- Kristen Brookshire, MCRP
  - Research Associate, UNC Highway Safety Research Center

- Kari Watkins, PhD, PE
  - Associate Professor, Civil and Environmental Engineering, Georgia Tech

- Tab Combs, PhD, MCRP
  - Research Associate, City and Regional Planning, UNC Chapel Hill

Housekeeping

- Problems with audio?
  - Dial into the phone line instead of using “mic & speakers”
- Webinar issues?
  - Re-load the webpage and log back into the webinar. Or send note of an issue through the Question box.
- Questions?
  - Submit your questions at any time in the Question box.

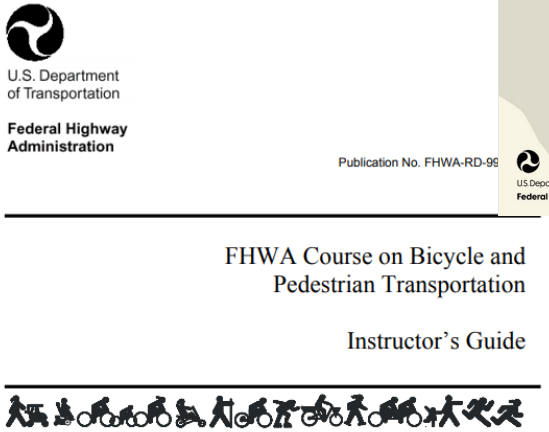
2019 FHWA Bicycle and Pedestrian Transportation University Course

Course Contents

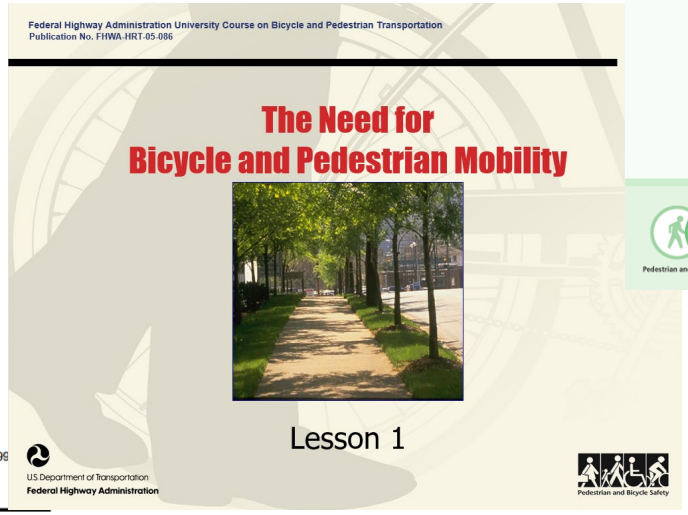
- 21 course presentations
- Instructor guide
- Assignments
- Menu of readings
- Menu of videos

www.pedbikeinfo.org/FHWAcourse

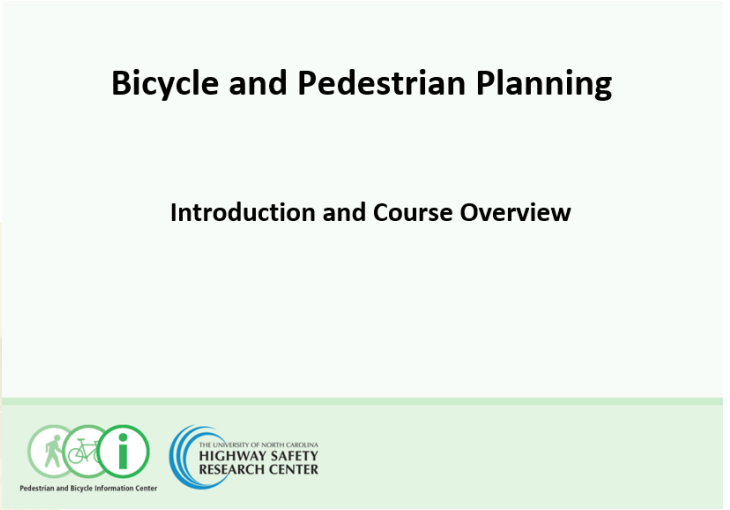
Previous Iterations



1999



2006

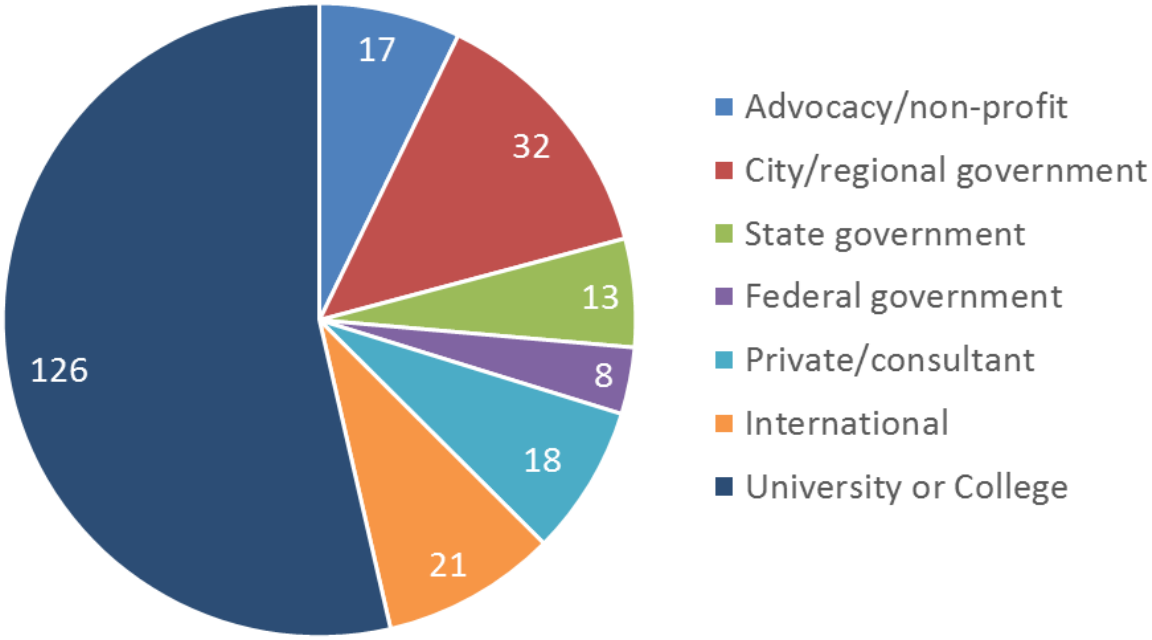


2011

Course Update Process

- Review previous versions and other transportation course syllabi
- Consult advisory panel members
  - Academia and professional practice
- Review recent reports and guidelines
- Solicit input from TRB Subcommittee on Bike/Ped University Education

Requests for PBIC Course Materials 2010-2014



FHWA Course Modules

- Introduction to Pedestrian and Bicycle Transportation
- The Benefits of Designing Streets for Walking and Bicycling
- User and Mode Characteristics
- Factors Influencing Mode Choice
- Planning for Walking and Bicycling
- Policies that Support Pedestrian and Bicycle Planning
- Bicycle and Pedestrian Data for Planning
- Designing for Walking and Bicycling
- Strategies for Safer Speeds
- Intersections
- Safety Analysis
- Facility and Network Analysis
- Trails
- Accessibility and ADA
- Inclusive Public Engagement
- Connections to Transit and Shared Mobility
- School Travel
- Temporary Facilities and Maintenance
- Systems Perspectives
- Leadership in Implementation
- Equity in Pedestrian and Bicycle Transportation

FHWA Course Modules

- Introduction to Pedestrian and Bicycle Transportation
- The Benefits of Designing Streets for Walking and Bicycling
- User and Mode Characteristics
- **Factors Influencing Mode Choice**
- Planning for Walking and Bicycling
- Policies that Support Pedestrian and Bicycle Planning
- **Bicycle and Pedestrian Data for Planning**
- Designing for Walking and Bicycling
- **Strategies for Safer Speeds**
- Intersections
- **Safety Analysis**
- **Facility and Network Analysis**
- Trails
- Accessibility and ADA
- **Inclusive Public Engagement**
- Connections to Transit and Shared Mobility
- **School Travel**
- Temporary Facilities and Maintenance
- **Systems Perspectives**
- **Leadership in Implementation**
- **Equity in Pedestrian and Bicycle Transportation**

Instructor Guide

- Sample description:

5. Planning for Walking and Bicycling

Fundamental module covering the planning process, common elements of bicycle and pedestrian master plans, and the purpose and rationale for creating plans. Special attention is given to the context in which planning takes place and the relationships between plans, engineering practice, and the policy environment. Planning activities like facility analysis, performance measurement, and public engagement are covered in subsequent modules.

Assignment Prompt: Local Ped/Bike Plan Evaluation

What's New?

- Walking and bicycling are presented together
- More detailed slide decks in lieu of student workbooks
- Concepts woven throughout
  - Equity, rural contexts, international examples, health, Vision Zero, Complete Streets
- Menu of videos
- More assignments and exercises

Connections to Transit and Shared Mobility

Instructor course information

U.S. Department of Transportation
Federal Highway Administration

Report No. FHWA-SA-19-034

Outline

- Planning for transit
  - First mile/last mile
- Designing with transit
- Shared mobility
- Curbside management

U.S. Department of Transportation
Federal Highway Administration

Access for All Users

- The access needs of all users must be considered
  - Vulnerable groups
    - Older adults, people with disabilities, youth
- Access in all stages of trip
  - En route to transit
  - At transit stops
  - On transit vehicles

U.S. Department of Transportation
Federal Highway Administration

Notes: Older adults, people with disabilities, and children have particularly high rates of pedestrian and transit transportation use (due to limited mobility, no access to cars, etc.). These groups have needs that will require additional infrastructure considerations. Every group participating in active transportation and transit has different needs and use characteristics. Insofar as possible these needs should all be addressed by the design of the transit system and transit access routes.
Connection to other Module: User and Mode Characteristics
Source: Nabors, D., Schneider, R., Level, D., Lieberman, K., Michell, C. (2008). *Pedestrian Safety Guide for Transit Agencies.* FHWA. [FHWA-SA-07-017]. Available: https://safety.fhwa.dot.gov/ped_bike/ped_transit/ped_transguide/

Equity and Transit

- Accessibility
  - Spatial distribution
  - Travel time
- Personal security around transit
  - At stops, stations, and on vehicles

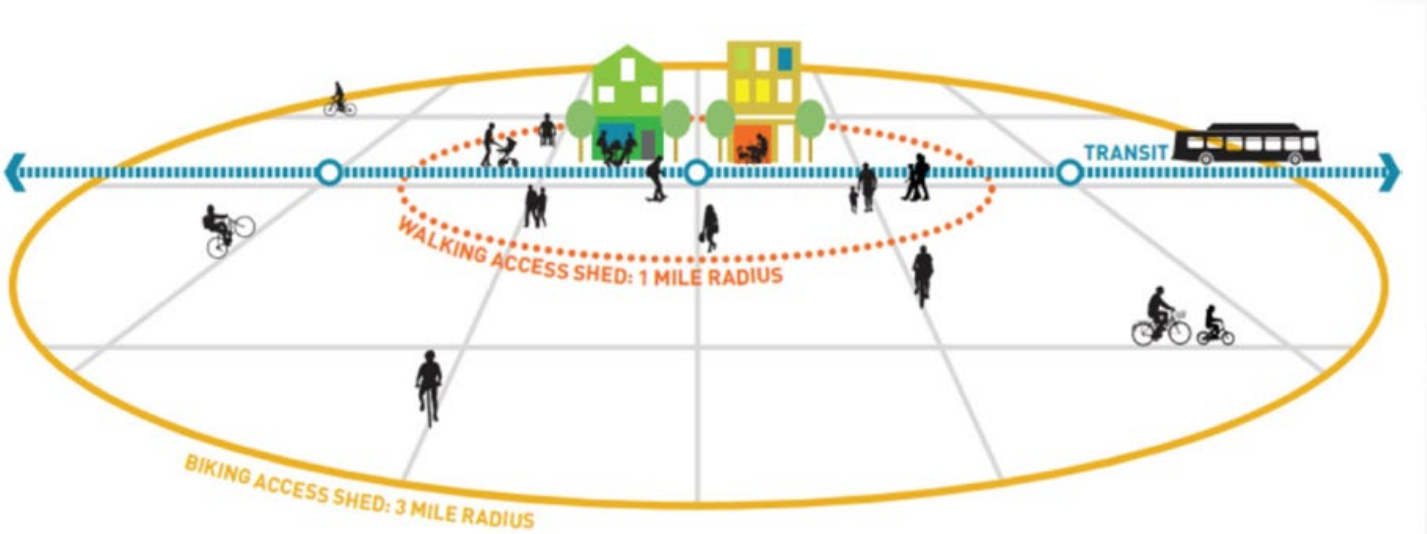
U.S. Department of Transportation
Federal Highway Administration

Key Message: Accessibility refers to people's overall ability to reach desired services and activities. It is important to examine if/how equitably a transit system is distributed among different populations. This requires considering the travel time between different destinations. Personal security around transit also represents an equity concern. For example, women are more likely to feel vulnerable to victimization and harassment near or at transit stations (Loukaitou-Sideris, 2014).

Source:

1. Foth, N., Manaugh, K., & El-Geneidy, A. M. (2013). Towards equitable transit: examining transit accessibility and social need in Toronto, Canada, 1996–2006. *Journal of transport geography*, *29*, 1-10.
2. Nathan McNeil, Jennifer Dill, Drew DeVitis, Russell Doubleday, Allison Duncan, and Lynn Weigand. (2017). *FTA Report No. 0111: Manual on Pedestrian and Bicycle Connections to Transit*. Federal Transit Administration.

Transit Access Shed



Atlanta Regional Commission via Federal Transit Administration

U.S. Department of Transportation
Federal Highway Administration

Key Message: Graphic representation of how access sheds vary by mode.
Notes: This is a simplistic approach that involves drawing buffers around the transit point of interest.
Question for Students: *What factors related to accessibility are not considered with this approach?*
Source: Figure 2-1 in Nathan McNeil, Jennifer Dill, Drew DeVitis, Russell Doubleday, Allison Duncan, and Lynn Weigand. (2017). *FTA Report No. 0111: Manual on Pedestrian and Bicycle Connections to Transit.* Federal Transit Administration, Washington, DC. Available: https://www.transit.dot.gov/about/research-innovation

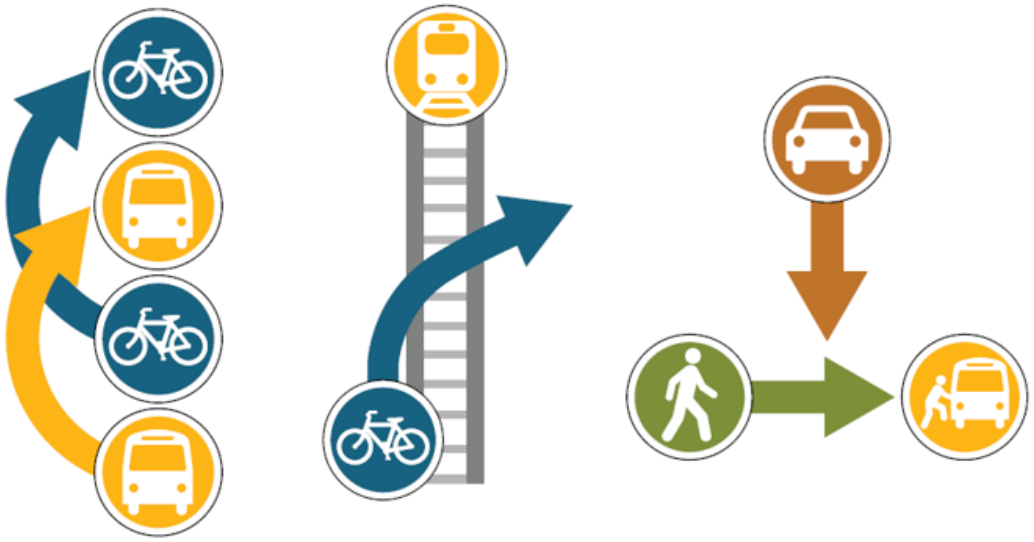
Example: LA Pathway Plan

- Decreasing point-to-point distances through increased (and safer) road crossing opportunities and pedestrian shortcuts
- Supporting multimodal transfers (bike-share to transit, transit to car-share, etc.)
- Improving pedestrian facilities within existing areas through street lighting, sidewalk repairs, curb ramps, etc.

U.S. Department of Transportation
Federal Highway Administration

Notes: Los Angeles METRO developed a strategic plan targeting its first/last mile issue. The proposal was a regional transit access network made up of multimodal routes to and between transit. Proposed improvements focused on developing active transportation along specific access routes as determined through extensive GIS analysis. After identifying the desired access routes based on existing conditions, safety, etc. infrastructure improvements were identified to incentivize travel along those routes. The types of improvements are listed on the slide.
Source: Los Angeles County Metropolitan Transportation Authority (METRO). (March 2014) First Last Mile Strategic Plan & Planning Guidelines.

Common Transit Conflicts



U.S. Department of Transportation
Federal Highway Administration

Key Message: There are design solutions for each of these conflicts, but sometimes it's more important to consider agency goals and priorities and the network. Not every street can serve every mode equally – decisions will need to be made about tradeoffs.

Notes: The left side depicts the problem of "leap frogging," which occurs when a bus and bike are traveling on a roadway in the same direction and pass each other at multiple places. The bicyclist is traveling at a constant speed with the bus passing, pulling into a stop, departing the stop, passing the bicyclist, and traveling to the next stop. If agencies decide that a street with this conflict type is a priority route for both modes, then one potential solution is to float the bus top on an island between the bike lane and motor vehicle travel lanes (example shown on next slide). Or an agency may decide that there is a parallel route for one of the modes that can maintain network connectivity while separating the modes.

Pedbikeimages.org – Seattle DOT

U.S. Department of Transportation
Federal Highway Administration

Notes: This example from Seattle, Washington, shows how a floating bus island allows the bus to stop in-lane, which decreases delay for the bus while allowing it to re-enter traffic without waiting for a gap in passing drivers. The bike lane separation also prevents conflicts between bicyclists and stopped buses.

Design and Guidance Resources

- Available from:
  - Federal Highway Administration
  - Federal Transit Administration
  - National Association of City Transportation Officials
  - Institute of Transportation Engineers
  - American Public Transit Association
  - Transit Cooperative Research Program
    - Reports 95 and 153; Synthesis 62

Click to add notes

Ridesourcing and Transit

- Partnerships between transit agencies and transportation network companies (TNCs)
  - Commonly provides subsidized TNC trips
  - May target first/last mile connections, paratransit users, people in low-density areas, late-night riders, and/or "guaranteed ride home" participants
- Challenges
  - Data-sharing agreements
  - ADA compliance
  - Ridesourced rides replacing transit trips

U.S. Department of Transportation
Federal Highway Administration

Source:

1. National Academies of Sciences, Engineering, and Medicine. (2019). *Partnerships Between Transit Agencies and Transportation Network Companies*. Washington, DC: The National Academies Press. https://doi.org/10.17226/25425.
2. Clewlow, Regina R. and Gouri Shankar Mishra (2017) *Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States*. Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-17-07

Summary

- Access for all users must be considered the in design and placement of transit stops and stations
- Most transit riders arrive on foot and well-planned bicycle and pedestrian access can increase the transit service area
- Regardless of the changing micromobility technologies, there are common factors that agencies can manage and regulate

U.S. Department of Transportation
Federal Highway Administration

Click to add notes

Assignments

Prompts

- ✓ Transportation Autobiography
- ✓ Policy Brief
- ✓ Waypoint Tour
- ✓ Community Mode Share Comparison
- ✓ Local Ped/Bike Plan Evaluation
- ✓ Developing Policy to Support Local Planning Goals
- ✓ Network Screening Exercise
- ✓ Reflection and Critique of Public Engagement Process
- ✓ School Arrival and Departure Field Observations
- ✓ School Policy Briefs
- ✓ Comparison of Policies
- ✓ Pedestrian Access During Construction
- ✓ Media Portrayal and Perception of Pedestrian and Bicycle Crashes

Full Assignments

- ✓ Field Counting Exercise
- ✓ Corridor Observations
- ✓ Observations and Design Recommendations
- ✓ Bicycle Level of Service and Level of Traffic Stress Analyses
- ✓ Walkability Assessment/Audit
- ✓ Tactical Urbanism Project
- ✓ Pitching an Intervention (In-Class Competition)

Assignments

- Group Assignment
- Individual Assignment
- Writing
- Presentation
- Fieldwork

www.pedbikeinfo.org/FHWAcourse

Integrating Pedestrian and Bicycle Transportation into Engineering Curriculum

Dr. Kari E. Watkins
Georgia Institute of Technology

October 17, 2019

Georgia Institute of Technology

How I used FHWA / PBIC materials

- New position at Georgia Tech
  - Previously a transit researcher
  - Asked to teach multiple new multimodal courses
- Modules were an initial starting point
  - Lecture slides as base for my own modules
  - Assignments possible to use as is
- References to read more to educate myself

Georgia Tech

Our Curriculum Goals

- Encourage students to think multimodally
- Introduce design guides that supplement traditional guides
- Incorporate project and field work
- Overcome barriers to good planning and design
  - Changing engineering mindset
  - Educating future professionals from all aspects of the process (highway designers, traffic engineers, land use planners, developers)

Georgia Tech

Civil Engineering Transportation Courses

- **Introduction to Transportation** (undergrad core)
  - One to two modules
- **Multimodal Transportation** (undergrad elective)
  - Ten modules (five weeks) plus quizzes
  - Design Project
- **Sustainable Transportation Abroad** (undergrad elective)
  - Fourteen week course
  - One week embedded study abroad in Netherlands
- **Complete Streets Design** (graduate elective)
  - Fourteen week course

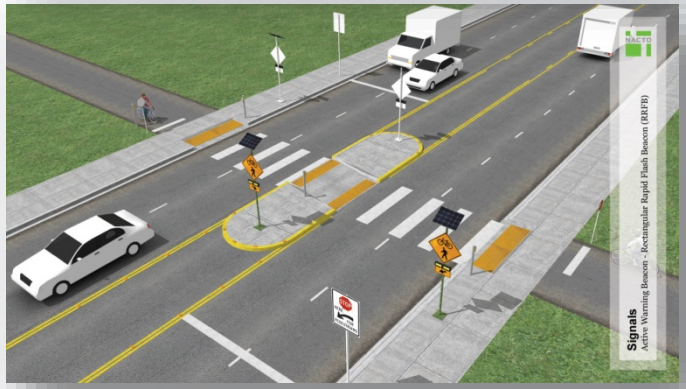
Introduction to Transportation

- Undergrad core course
- Incorporate themes of multi-modality throughout
- One to two specific modules
  - Need for ped/bike facilities
  - Planning for ped/bike facilities
  - Design for ped/bike facilities
- In-class exercise using local intersection redesign
- Incorporate cyclists and pedestrians into final project

Georgia Tech

Multimodal Transportation

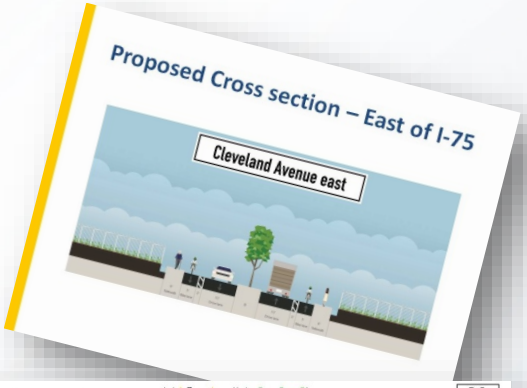
- Undergrad elective course
- Freight and passenger multimodality
- Ten modules
  - Complete streets
  - Access management & Traffic calming
  - Pedestrian design & ADA
  - Bikeway design
  - Urban street design
  - Performance measurement

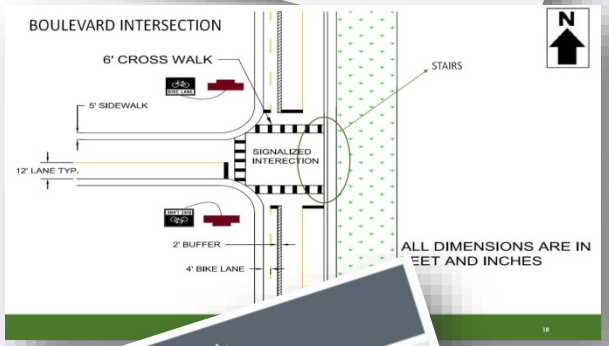


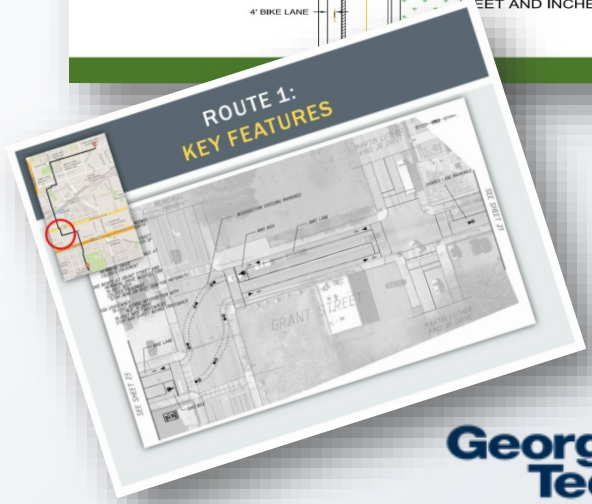
Georgia Tech

Multimodal Transportation Course Project

- Complete Streets Design
  - Assess users of corridor
  - Balance street space use for all modes
- Local corridors suggested by Atlanta Bike Coalition, City of Atlanta, Atlanta Regional Commission
- Final report and presentation
  - Representative cross-sections
  - Proposed design two major intersections
  - Representative design for minor intersections
  - Overall circulation for various modes



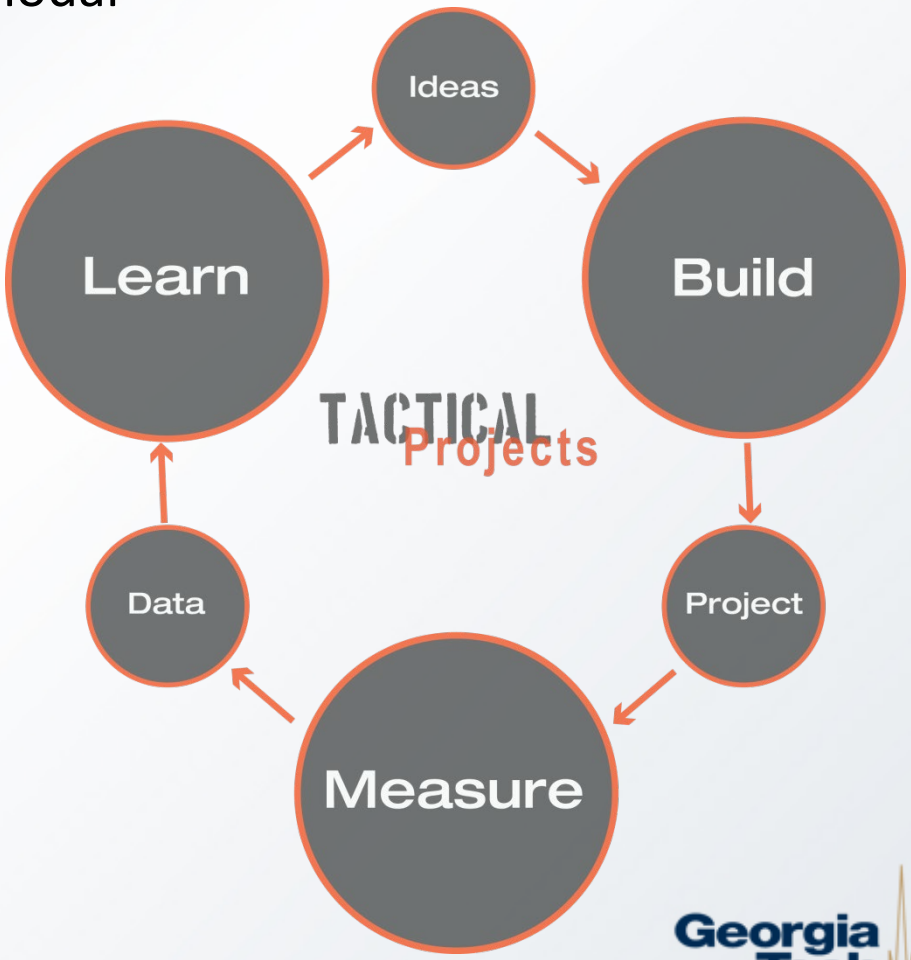




Georgia Tech

Complete Streets Design Course

- First half
  - Students combined with Multimodal Transportation Course
- Second half
  - Tactical Urbanism project
  - Learn skills necessary
    - Performance Metrics
    - Data Collection
    - Permitting
  - Execute physical project
  - Credit to Dr. Wes Marshall, U Colorado



Georgia Tech

Sustainable Transportation Abroad

- New Global Engineering Leadership minor
- One to two weeks abroad
  - 1st: Netherlands
  - Tour cities on bike and transit
  - Presentations by local engineers and planners
  - Credit to Dr. Rob Bertini, Cal Poly; Dr. Peter Furth, Northeastern; Portland State

Georgia Tech

How has this helped the students and ATL?

- Student interest in bike/ped design and planning
- Niche skills
  - Ownership over projects
  - Area of expertise within firm
  - Advancement at younger age
- More people trained in bike / ped design
  - Changing a Southern city

Thank You!

Dr. Kari Edison Watkins

Associate Professor

Civil & Environmental Engineering

kari.watkins@ce.gatech.edu

(206) 250-4415

Georgia Tech

Successful assignments…

Extend concepts presented in the lectures	• Push students to get comfortable applying concepts to new situations • Develop critical thinking and reasoning skills • Offer students a chance to explore new ideas
Allow students to pursue their interests	• We all have unique life experiences & career paths
Don't always have a right answer	• There's rarely 1 right way to address a planning problem • Flexible assignments allow students to explore & evaluate alternatives • Put as much weight on process & reasoning as on the final product
Push students to identify & value multiple perspectives	• All public decisions involve tradeoffs! • Dominant narratives got us into this mess…
Are satisfying & have a point	• More buy-in, more cooperation, more retention

What about group work?

Waypoint tour

Extends Lesson 8 – core principles of active travel

Process: Students travel to 5-6 waypoints via non-car mode, noting…

- Routes taken; street types traveled
- Modes & traveler types accommodated
- Suitability of route for the students' mode
- Interactions among modes
- Things that work, things that don't (why, for whom)

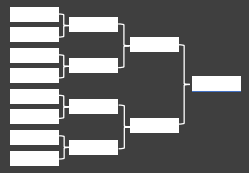
Objectives

- Pushes students to think about how different street designs do/don't work across people & modes
- Highlights complexity of multimodal design
- Develops observational skills
- Builds empathy

Deliverables

- 750-word lab report including observations, sketches/selfies @ waypoints, & route map
- Brief presentation to class

Pitching an Intervention - Game



Best as late course synthesis exercise

Objective: get students to…

- Think holistically about designing for pedestrians/bicyclists
- Communicate & rationalize design ideas to non-expert decision-makers

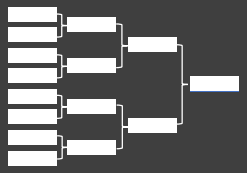
Premise

- Students employed as town planners or engineers
- Town has limited $ to improve ped/bike safety
- In teams, students develop plans for safety intervention at a known conflict area; compete against each other to pitch their ideas to Council (& win the “$”)

Logistics

- Game is designed for >75 min period & ~30 students but can be adapted. Pre-assign students to teams to save time.
- Game play requires 2 outside assistants to serve as judges/council liaisons
- Students may want to bring laptops/tablets w/ internet access
- Additional details in course materials

Game play – Round of 8



I. Select intervention area

4 minutes

- Teams identify a local area (intersection or segment) in need of an intervention.
- Alternatively, the instructor can pre-identify study areas/hotspots and assign them to teams at the start of the competition.

II. Preliminary recommendations - Prep

12 minutes

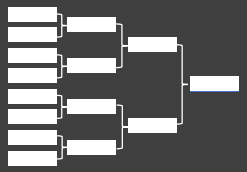
- Teams identify 1+ substantial safety failures at their location from pedestrian & bicycle perspectives.
- Teams prepare 3 min pitch to explain why/for whom it's a problem; make preliminary suggestion for intervention

III. Preliminary recommendations - Judging

16 min total

- Teams square off in dyads; each team takes 3 minutes to explain why their problem is the worst and pitch preliminary fix
- Judges choose team with the strongest argument; may offer feedback

Game play – Semifinals



IV. Intermediate recommendations - Prep

16 minutes

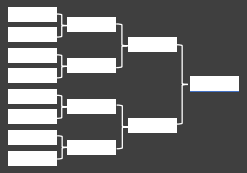
- Winning teams from round of 8 further develop proposed interventions; prepare 3-min pitch to sell their idea.
- Losers from round of 8 serve as assistants to their victors

V. Intermediate recommendations - Judging

8 minutes

- Opposing teams pitch their refined interventions to the judges
- Winners advance; remaining students become spectators (or additional judges)

Game play – Finals



VI. Final recommendations - Prep

6 minutes

- Finalists put finishing touches on their 3-minute pitches

VII. Final recommendations - Judging

8 minutes

- Finalists square off; victor decided by judging or vote

VIII. Wrap-up

5 min

- Present awards, debrief activity
- Emphasize goal: quickly articulate in plain language
  - A hazardous situation for ped/bikes
  - Rationale for action
  - Realistic intervention options

Discussion

- Send us your questions online
- Course materials
  - www.pedbikeinfo.org/FHWAcourse
- Follow-up with us:
  - **Kristen Brookshire** brookshire@hsrc.unc.edu
  - **Kari Watkins** kari.watkins@ce.gatech.edu
  - **Tab Combs** tacombs@email.unc.edu
- Archived
  - www.pedbikeinfo.org/webinars