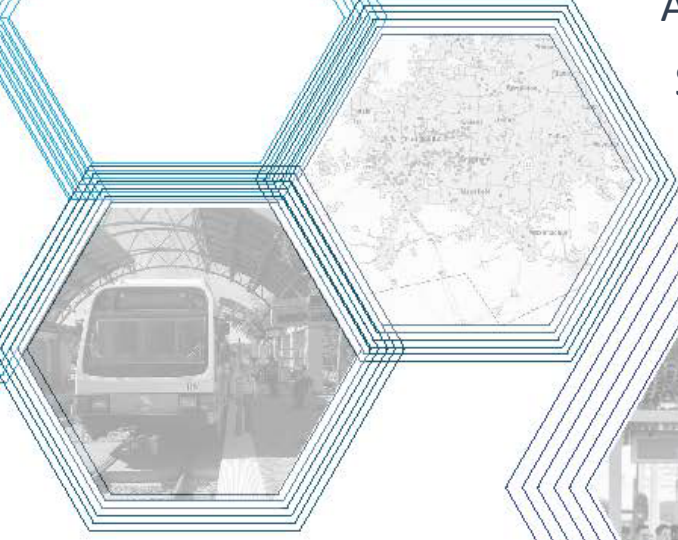




TRANSPORTATION EQUITY CURRICULUM GUIDANCE DOCUMENT

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FINAL REPORT

TRANSPORTATION EQUITY CURRICULUM

Guidance Document

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Acknowledgments

This work was supported by a grant from the Center for Transportation Equity, Decisions, and Dollars (CTEDD) funded by U.S. Department of Transportation Research and Innovative Technology Administration (OST-R) and housed at The University of Texas at Arlington.

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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Transportation Equity Curriculum: Guidance Document		5. Report Date May 2022	
		6. Performing Organization Code	
7. Author(s) Tia Boyd, Kristine M. Williams, FAICP, Carolyn McAndrews, Ph.D., Yicong Yang, Anurag Pande, Ph.D., Shams Tanvir, Ph.D.		8. Performing Organization Report No.	
9. Performing Organization Name and Address Center for Transportation, Equity, Decisions and Dollars (CTEDD) USDOT University Transportation Center The University of Texas at Arlington 601 W.Nedderman Dr. Suite 103 Arlington TX 76019-0108 United States		10. Work Unit No. (TRAVIS)	
		11. Contract or Grant No.	
12. Sponsoring Organization Name and Address United States of America Department of Transportation Research and Innovative Technology Administration		13. Type of Report and Period Covered	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract <p>Transportation is needed to access jobs, food, health care, recreational and open spaces, and other important services and destinations. Equity in transportation planning helps to ensure equal access to affordable and reliable transportation, as well as fairness in the distribution of its benefits and burdens. Without inclusive processes, transportation planning can overlook the needs of and negatively impact low-income communities, minorities, persons with disabilities, the elderly, children, and other traditionally underserved populations.</p> <p>Many agencies and communities across the nation are seeking to address equity concerns and encourage livability, economic growth, and active transportation. Planning and transportation professionals must understand how to successfully plan for equity by identifying and addressing a broad range of transportation needs. It is also important that transportation professionals have a clear understanding of their roles as advocates for and partners with disadvantaged communities.</p> <p>This curriculum will provide emerging professionals with the training and tools needed to successfully integrate equity into transportation decision-making processes. Students taking the course will gain an appreciation for the historic impetus to consider equity and a deeper understanding of related concepts, including accessibility, mobility, affordability, and sustainability. Beyond this foundational knowledge, emerging professionals will acquire skills that can be put into practice and propel equity to the forefront of the transportation planning profession. This curriculum will provide those emerging professionals with the foundation and tools needed to successfully advance equity in transportation decision-making for years to come. This report contains the modules, activities, and other relevant information that may be added to existing course materials through a plug-and-play approach or for a full course on transportation equity.</p>			
17. Key Words equity, education, transportation, urban planning		18. Distribution Statement	
19. Security Classification (of this report) Unclassified.	20. Security Classification (of this page) Unclassified.	21. No. of Pages	22. Price

Table of Contents

Acknowledgements.....	2
About the Curriculum	3
Background.....	3
Course Objectives.....	3
Methodology	4
Curriculum Structure	5
Modules	6
Module Template	6
Modules and Relevant Disciplines.....	9
Modules, Learning Outcomes, and Relevant Core Competencies	10
Module 1: History and Theory of Transportation Equity	12
Discipline Applicability	12
Subtopics.....	12
Learning Objectives.....	12
Readings.....	12
Videos.....	14
Learning Outcomes and Evaluation	15
Learning Outcome Assessment Rubric	16
Module Evaluation	17
Module 2: Identifying Underserved Communities and their Needs	18
Discipline Applicability	18
Subtopics.....	18
Learning Objectives.....	18
Readings.....	18
Learning Outcomes and Evaluation	20
Learning Outcome Assessment Rubric	21
Module Evaluation	22
Module 3: Equity in Travel Analysis.....	23
Discipline Applicability	23
Subtopics.....	23
Learning Objectives.....	23
Readings.....	23

Learning Outcomes and Evaluation	25
Learning Outcome Assessment Rubric	26
Module Evaluation	27
Module 4: Involving Underserved Communities	28
Discipline Applicability:	28
Subtopics	28
Learning Objectives	28
Readings	28
Videos	30
Learning Outcomes and Evaluation	31
Learning Outcome Assessment Rubric	32
Module Evaluation	33
Module 5: Evaluating Plans and Projects	35
Discipline Applicability	35
Subtopics	35
Learning Objectives	35
Readings	35
Videos	36
Learning Outcomes and Evaluation	37
Learning Outcome Assessment Rubric	38
Module Evaluation	39
Module 6: Access to Opportunity	40
Discipline Applicability	40
Subtopics	40
Learning Objectives	40
Readings	40
Videos	42
Learning Outcomes and Evaluation	43
Learning Outcome Assessment Rubric	44
Module Evaluation	45
Module 7: Equity of Emerging Modes	47
Discipline Applicability	47
Subtopics	47
Learning Objectives	47

Readings.....	47
Videos.....	49
Learning Outcomes and Evaluation	50
Learning Outcome Assessment Rubric	51
Module Evaluation	52
Module 8: Transportation, Public Health, and Equity	53
Discipline Applicability	53
Subtopics.....	53
Learning Objectives.....	53
Readings.....	53
Videos.....	56
Learning Outcomes and Evaluation	57
Learning Outcome Assessment Rubric	58
Module Evaluation	59
Module 9: Equity in Transportation Funding.....	60
Discipline Applicability	60
Subtopics.....	60
Learning Objectives.....	60
Readings.....	60
Videos.....	61
Learning Outcomes and Evaluation	62
Learning Outcome Assessment Rubric	63
Module Evaluation	64
Activities.....	65
Activities Template	65
Pre-class Activity.....	66
Implicit Bias	66
Beginning of Class Activities	66
Class summary for course content recall.....	66
During Class Activities.....	67
Knowledge Probe Questions for In-class Discussion	67
After Class Activities	70
Muddiest point paper	70
Matching Terms	70

Reflection Paper.....	72
Additional Active Learning and Class Assessment Techniques	75
Assignments.....	76
Handouts.....	78
Inclusive Language Resources	79
Variables to Identify Underserved Communities	80
Public Involvement Techniques.....	82
Data Items and Sources for Project Screening	83
Access to Opportunity.....	83
Health and Environment.....	84
Affordability	85
Mobility	86
Burdens.....	87
Health Equity Tools and Data Sources.....	88
References	91
Appendix Analysis of Planning Syllabi.....	92
Overview.....	92
Objectives	92
Data and methods	92
Results	92
Discussion	98
Conclusions.....	99

List of Tables

Table 1. Modules and Relevant Disciplines..... 9
Table 2. Modules, Learning Outcomes, and Relevant Core Competencies..... 10
Table 3. Modules and Relevant Assignments 76

Acknowledgements

This project was funded by the Center for Transportation Equity, Decisions and Dollars at the University of Texas at Arlington. The report was authored by Tia Boyd along with Kristine M. Williams, FAICP, Carolyn McAndrews, Ph.D., Yicong Yang, Anurag Pande, Ph.D., Shams Tanvir, Ph.D.

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The authors acknowledge and thank the project advisory committee for their helpful guidance on the curriculum and available resources.

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The authors also acknowledge and thank the student assistants from the University of South Florida, University of Wisconsin–Madison, and California Polytechnic State University for their hard work on various elements of the curriculum.

Charles Clarke, University of South Florida

Taylor Dinehart, University of South Florida

William Andrews, California Polytechnic State University

Liana Salma Saker, California Polytechnic State University

About the Curriculum

The Transportation Equity Curriculum is a joint project of the Center for Urban Transportation Research (CUTR) at the University of South Florida (USF), the University of Wisconsin–Madison, and California Polytechnic State University (CalPoly). It was produced under a grant from the Center for Transportation Equity, Decisions and Dollars (CTEDD) at the University of Texas at Arlington. The objective of this project was to prepare a curriculum on equity for graduate transportation programs (planning, engineering, public policy, etc.) that incorporates active learning techniques.

The nine modules in this report address various topics of importance to transportation planning with a targeted focus on equity. The modules are designed to be used in two ways: (1) plug-and-play, to supplement existing classes, and/or (2) as a full course on equity in transportation. This guidance document was developed to support the instructor in delivering the course materials and can be used to develop the course syllabus.

Background

Policies and guidance that address equity in planning include Title VI of the Civil Rights Act of 1964, the National Environmental Policy Act (NEPA), Americans with Disabilities Act (ADA), Executive Order 12898–Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, Executive Order 13166–Improving Access to Services for Persons with Limited English Proficiency, and more recently, Executive Order 13985–Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, and Executive Order 14008–Tackling the Climate Crisis at Home and Abroad, which created Justice 40. To successfully enforce requirements and follow guidance for equity, transportation professionals need an appropriate educational background in this complex and multifaceted aspect of transportation.

Although equity has become a prominent issue in transportation planning and other professions, many professionals still grapple with transitioning from equity as a concept to equity as actionable practice (Shilon et al., 2020). Educators have the difficult task of ushering the future generation of professionals to a more robust understanding of equity in practice (Lung-Amam et al., 2015). To accomplish this goal, transportation programs should provide students numerous opportunities to learn about equity through active learning and by engaging with diverse populations in underserved communities (Lung-Amam et al., 2015; Shilon et al., 2020).

The goal of the transportation equity curriculum is to provide educators with a resource to train future transportation professionals. The instruction provided through this curriculum will fill a significant gap in transportation education and further advance equity.

Course Objectives

The curriculum is designed to familiarize students with the following:

- The history and theory of equity in transportation
- Various concepts and considerations for equity in transportation practice
- The implications of inequities in transportation for underserved populations
- Tools, data sources, and methods to measure and evaluate equity in transportation
- Evaluation of the relative strengths and weaknesses of transportation practice from an equity perspective

Methodology

Development of the curriculum began with the identification and review of available materials including literature on equitable transportation practices, other available materials on equity in transportation (documents from federal, state, and local agencies), available syllabi from university courses on equity or those that include related materials, relevant model curriculum, pedagogical resources from a variety of disciplines, and other educational materials. The project team also relied on their previous research and course materials on related topics including equitable transportation decision-making practices, public involvement, access to healthcare, health and the built environment, sustainable mobility, transportation economics and analysis, and multimodal transportation planning.

Resources were identified through literature searches, an exploratory search using Google™, and a review of document repositories such as [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) and the [Association of Collegiate Schools of Planning \(ACSP\) Committee on Diversity Syllabus Book](#). These resources were obtained from a variety of agencies and organizations including:

- Federal Highway Administration (FHWA)
- Congress for the New Urbanism (CNU)
- American Planning Association (APA)
- Urban Land Institute (ULI)
- U.S. Department of Transportation (U.S. DOT)
- American Association of State Highway and Transportation Officials (AASHTO)
- National Cooperative Highway Research Program (NCHRP)
- Greenlining Institute
- Victoria Transport Policy Institute (VTPI)

An analysis of existing planning syllabi was conducted to evaluate the extent and nature of the gap in transportation education. The analysis supported the project team in understanding how planning-related courses, on any topic, introduce questions of social equity. This analysis also supplemented the review of available materials to identify specific readings, assignments, and pedagogical approaches that were relevant to the development of the transportation equity curriculum. Findings and conclusions from this analysis were used to shape the curriculum design and ensure that its content addresses the needs of educators and emerging professionals involved in transportation. A complete summary of the analysis of planning syllabi is included in the [Appendix](#).

Elements of the curriculum structure such as the learning objectives, learning outcomes, competencies, evaluations/assessments, and related activities allow for integration into existing graduate-level programs. These elements were modeled after various pedagogical resources including the Planning Accreditation Board (n.d.-a), the Accreditation Board for Engineering and Technology (n.d.), Anderson & Krawthwohl (2001), Asur & Alhassan (2014), Novak (2006), George Washington University (n.d.), and the National Academies Press (1999). These resources were helpful in ensuring that the curriculum meets student learning needs and adds value to professional transportation planning practice.

An Advisory Committee was formed to provide necessary feedback throughout the curriculum development process. Advisory Committee members include individuals representing academia, local government, and the private sector with expertise in fields related to equity in transportation (see [Acknowledgements](#)). These individuals contributed to curriculum development and provided necessary resources and information to ensure the production of a high-quality transportation equity curriculum.

Curriculum Structure

The curriculum introduces various topics of relevance to equity in transportation. It is divided into nine modules that are designed to be used in one of two ways. First, one or more modules can be used for “plug-and-play” style lectures to add or enhance content on equity in transportation in existing courses. Second, all nine modules can be used together as a full course on equity in transportation. For the full course on transportation equity, it is recommended that instructors use the modules consecutively. Each module represents one class session, but lecture materials can be divided into parts to accommodate varying session lengths.

The nine modules are:

- History and Theory of Transportation Equity
- Identifying Underserved Communities and their Needs
- Equity in Travel Analysis
- Involving Underserved Communities
- Evaluating Plans and Projects
- Access to Opportunity
- Equity of Emerging Modes
- Transportation, Public Health, and Equity
- Equity in Transportation Funding

The instructional resources provided for the curriculum, include the module outlines, activities, handouts, and PowerPoint Slides with lecture notes. The module outlines, activities, and handouts are provided in this guidance document. The PowerPoint slides for use in instruction are provided as separate downloadable files. Assignments related to the Transportation Equity Curriculum modules are included in the Transportation Equity Workbook. Suggested assignments for each module are identified in Table 3 under the [Assignments](#) section of this guidance document.

Modules

This section reviews the various modules in the Transportation Equity Curriculum. It begins with an overview of the basic template used to develop the modules and proceeds with each of the module details.

Module Template

The module outlines guide the instructor in teaching the content. Each module follows the template provided below.

Module #: Name of module

A brief description of the module's purpose.

Discipline Applicability

A suggested list of the primary disciplines to which the module may apply. Modules may be cross-cutting and apply to one or more disciplines.

Subtopics

A list of key subtopics related to the module.

- Subtopic 1
- Subtopic 2
- Subtopic 3

Learning Objectives

A list of three to five learning objectives that specify the competencies students should be able to demonstrate after completing the module. Learning objectives were developed using Bloom's Taxonomy.

- Learning objective 1
- Learning objective 2
- Learning objective 3

Readings

A list of suggested reading material that can be used to identify one or more required and/or optional readings for each module. The majority of the readings listed can be found online at no cost to the instructor or students. Many of the other texts and documents can be requested at no cost through the college/university library.

Videos

A list of suggested videos that can be used to identify one or more required and/or optional videos for each module. Not all modules include a list of videos. NOTE: some videos are embedded into the related PowerPoint presentation.

Learning Outcomes and Evaluation

Learning outcomes and related competencies, instructional methods suggested to achieve these outcomes, and assessment methods used to measure student’s progress in meeting the competencies.

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?	Notes
Outcome 1: Derived from learning objective 1.	<input type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input type="checkbox"/> Values	E.g. quiz, exam, activity, paper, class discussion, presentation, etc. used before, at the beginning, during, and/or after class. The instructions and related materials for the Activities and Assignments are provided in this guidance document and are also included in the Transportation Equity Workbook. Sample rubrics for each module are provided.	<input type="checkbox"/> Yes <input type="checkbox"/> No If no, identify what additional steps are needed to achieve the learning outcome and improve student learning.	In what areas do students have difficulty? In what areas are students excelling? Other observations. <i>This section should be completed at the end of each module. The Learning Outcome Assessment Rubric and module evaluation may be used to fill in this column.</i>

Learning Outcome Assessment Rubric

Suggested rubric to assess student level of proficiency in achieving the defined learning outcomes. Instructors are encouraged to use standards established by their institution for grading assignments and providing feedback to students.

Learning Outcomes	Excellent	Good	Below Average
Learning Outcome 1	Exceeds the standard	Meets the standard	Does not meet the standard
Learning Outcome 2			
Learning Outcome 3			

The assessment rubric is adapted from sample rubrics provided to the Planning Accreditation Board (Planning Accreditation Board, n.d.-b)

Module Evaluation

Suggested tool to assess the effectiveness of the module in achieving the learning outcomes. The “Before Module” evaluation is used as a baseline, which can be compared to the “After Module” evaluation. This comparison is useful in assessing if the module has improved students’ understanding of each subtopic or if additional interventions are needed to meet student learning needs in one or more areas.

Before Module

Please describe your familiarity with the following topics:

Subtopic 1

- No prior knowledge
- Beginner
- C Intermediate
- Expert

Subtopic 2

- No prior knowledge
- Beginner
- Intermediate
- Expert

Subtopic 3

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Subtopic 1

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Subtopic 2

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Subtopic 3

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Modules and Relevant Disciplines

The Transportation Equity Curriculum is designed as a multidisciplinary resource for transportation courses and courses that include transportation as a subtopic. Although many disciplines are anticipated to benefit from the curriculum content, suggestions for applicable disciplines are provided for each module. These disciplines include anthropology, economics and finance, engineering, geographic information systems (GIS), history, planning, public health, sustainability, and sociology. The module outlines identify the suggestion for applicable disciplines, which are also summarized in Table 1. Instructors are encouraged to explore each module to determine which module(s) are best suited to meet their course learning objectives and instructional needs.

Table 1. Modules and Relevant Disciplines

Modules	Anthropology	Economics and Finance	Engineering	GIS	History	Planning	Public Health	Sustainability	Sociology
Module 1: History and Theory of Transportation Equity	X		X		X	X		X	X
Module 2: Identifying Underserved Communities and their Needs	X		X	X		X		X	X
Module 3: Equity in Travel Analysis			X	X		X		X	
Module 4: Involving Underserved Communities	X		X			X	X	X	X
Module 5: Access to Opportunity		X	X	X		X		X	
Module 6: Equity of Emerging Modes			X			X		X	
Module 7: Equity of Emerging Modes			X			X	X	X	
Module 8: Transportation, Public Health, and Equity			X			X	X	X	
Module 9: Equity in Transportation Funding		X	X		X	X		X	

Modules, Learning Outcomes, and Relevant Core Competencies

The learning outcomes and evaluation table in each module outline describes the anticipated learning outcomes and identifies the core competencies, the instructional method recommended to achieve the desired learning outcome, and the recommended assessment method to measure student progress in achieving the learning outcomes. Table 2 summarizes the modules, learning outcomes, and relevant core competencies. This curriculum uses knowledge, skills, and values to define the core competencies. In some disciplines and within certain teaching models, values may also be referred to as attitudes, behaviors, or abilities.

Table 2. Modules, Learning Outcomes, and Relevant Core Competencies

Modules and Learning Outcomes	Knowledge	Skills	Values
Module 1: History and Theory of Transportation Equity			
Define equity, equality, and justice as they relate to transportation	X		
Describe theoretical approaches to transportation equity and the implications of incorporating equity considerations into transportation processes	X		
Explain how historic events in transportation history influence transportation policies and laws	X		
Evaluate the processes used to implement equity policies and laws in contemporary transportation practice	X	X	
Module 2: Identifying Underserved Communities and their Needs			
List the characteristics of underserved populations and discuss the indicators used to define underserved communities.	X		
Identify underserved communities using various methods.	X	X	X
Interpret data to understand the transportation needs of underserved populations	X	X	X
Module 3: Equity in Travel Analysis			
Identify the equity concerns associated with various tools for evaluating travel patterns and behavior	X		X
Describe strategies to address equity challenges in data collection and analysis	X	X	
Define Big data and explain how it can support equity studies	X		X
Module 4: Involving Underserved Communities			
Describe the history of activism in transportation	X	X	X

Modules and Learning Outcomes	Knowledge	Skills	Values
Explain community engagement theories and public involvement techniques for involving underserved populations	X	X	X
Identify appropriate qualitative methods for community-engaged research and analysis	X	X	X
Module 5: Evaluating Plans and Projects			
Explain the importance of equity assessments in transportation decision making	X	X	X
List and define equity metrics and indicators for transportation analysis	X	X	
Identify and use equity analysis tools to assess transportation projects in underserved communities	X		X
Module 6: Access to Opportunity			
Analyze the complex relationship between the built environment and accessibility	X	X	X
Describe how the economic and social mobility of various population groups are affected by transportation	X	X	X
Apply strategies and tools to increase the access to employment, education, affordable housing, and transportation for underserved communities	X	X	X
Module 7: Equity of Emerging Modes			
Identify the potential benefits and burdens associated with emerging modes	X		X
Describe the mobility needs of underserved populations and how emerging modes address or neglect these needs	X		X
Evaluate various strategies designed to increase access to emerging modes for underserved populations	X	X	X
Module 8: Transportation, Public Health, and Equity			
Describe transportation as a social determinant of health and health equity	X	X	X
Identify the various health implications of transportation and land use	X	X	X
Compare the public health effects of transportation decision-making and investments on underserved populations	X	X	X
Module 9: Equity in Transportation Funding			
Analyze equity issues as they relate to transportation decision-making and funding	X		
Identify the potential equity impacts of proposed transportation funding mechanisms	X	X	X

Module 1: History and Theory of Transportation Equity

This module introduces equity, equality, and justice in the context of transportation. It presents key theoretical approaches to transportation equity and highlights transportation history, policies, and laws that relate to equity. It could supplement a variety of different course types in disciplines such as anthropology, engineering, history, planning, sustainability, and sociology.

Discipline Applicability

Anthropology, Engineering, History, Planning, Sustainability, and Sociology

Subtopics

- Equity, Equality, and Justice
- Theory
 - Proportionality vs Restorative
 - Vertical vs Horizontal Equity
- History, Policy, and Law
 - Americans with Disabilities Act
 - Environmental Justice
 - Title VI

Learning Objectives

At the end of this module, students will be able to:

- Define equity, equality, and justice as they relate to transportation
- Describe theoretical approaches to transportation equity and the implications of incorporating equity considerations into transportation processes
- Explain how historic events in transportation influence contemporary transportation policies and laws
- Evaluate the processes used to implement equity policies and laws in contemporary transportation practice

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

American Planning Association. (2019). Planning for equity policy guide.

<https://www.planning.org/publications/document/9178541/>

Brenman, M., & Sanchez, T. W. (2012). Planning as if people matter: Governing for social equity. Island Press. <https://islandpress.org/books/planning-if-people-matter>

Bullard, R. (2003). Addressing urban transportation equity in the United States. Fordham Urban Law Journal, 31(5), 1183. <https://ir.lawnet.fordham.edu/ulj/vol31/iss5/2>

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<https://www.whitehouse.gov/omb/briefing-room/2021/07/20/the-path-to-achieving-justice40/>

*Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Videos

Use the list of suggested resources to identify one or more required and/or optional video for this module.

Transportation Research & Education Center at PSU. (2015). Plenary Session, Transportation Equity Roundtable. <https://www.youtube.com/watch?v=0CAC3XS3CtU>

Karner, A. (2020). All of the Above: Transportation Equity Law, Practice, and Advocacy.
<https://www.youtube.com/watch?v=Zl0o0ais380>

Lugo, A. (2018, November 7). Untokening Mobility: Beyond Pavement, Paint & Place.
<https://www.youtube.com/watch?v=BvMs5eOX0kY&feature=youtu.be>

McCullough, S. (2020, July 29). Moving from Equity to Justice in Transportation in a Time of Crisis.
<https://www.youtube.com/watch?v=G1Lk7A6lmzI&feature=youtu.be>

TRB. (n.d.). TRB'S transportation explorers podcast. Episode 13: Gloria Jeff and how transportation equity is a pizza. <https://www.nationalacademies.org/podcasts/trb> (audio only) **use the scroll bar to locate Episode 13*

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to correctly distinguish between equity, equality, and justice as they relate to transportation.	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 1 knowledge probe question #1 After Class: Module 1 matching terms activity	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to describe theoretical approaches to transportation equity and the implications of incorporating equity considerations into transportation processes.	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 1 knowledge probe question #2 After Class: Module 1 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to explain how historic events in transportation influence contemporary transportation policies and laws.	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 1 knowledge probe question #3	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to evaluate processes used to implement equity policies and laws in contemporary transportation practice.	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 1 knowledge probe question #4 During Class: Activity on Implicit Bias	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<i>* If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i>				
<i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
Define equity, equality, and justice as they relate to transportation	Demonstrates a well-developed understanding of equity, equality, and justice as they relate to transportation	Demonstrates an adequate understanding of equity, equality, and justice as they relate to transportation	Does not demonstrate an understanding of equity, equality, and justice as they relate to transportation
Describe theoretical approaches to transportation equity and the implications of incorporating equity considerations into transportation processes	Displays a deep and nuanced understanding of theoretical approaches to transportation equity and can apply them to complex transportation problems	Displays an adequate understanding of theoretical approaches to transportation equity and can apply them to simple transportation problems	May be able to identify or describe theoretical approaches to equity, but is unable to apply them to transportation problems
Explain how historic events in transportation influence contemporary transportation policies and laws	Demonstrates a well-developed understanding of historic events in transportation and can provide a detailed description of how they influence transportation policies and laws	Demonstrates an adequate understanding of historic events in transportation and can describe, in some detail, how they influence transportation policies and laws	Does not demonstrate an understanding of historic events in transportation
Evaluate the processes used to implement equity policies and laws in contemporary transportation practice	Has a thorough understanding of the processes used to implement equity policies and laws in contemporary transportation practice and how to apply them effectively in practice	Understands the processes used to implement equity policies and laws in contemporary transportation practice and how to apply them in practice	Unable to identify processes used to implement equity policies and laws in contemporary transportation practice

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

Equity, equality, and justice in transportation

- No prior knowledge
- Beginner
- Intermediate
- Expert

Theoretical approaches to transportation equity

- No prior knowledge
- Beginner
- Intermediate
- Expert

Transportation history, policies, and laws that relate to equity

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Equity, equality, and justice in transportation

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Theoretical approaches to transportation equity

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Transportation history, policies, and laws that relate to equity

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 2: Identifying Underserved Communities and their Needs

This module describes the characteristics of underserved populations and identifies data sources and analysis methods to identify target groups and their unique transportation needs.

Discipline Applicability

Anthropology, GIS, Demographics, and Planning

Subtopics

- Defining the Underserved Population
 - a. Demographics
 - b. Income Class
 - c. Persons with Disabilities
- Analysis Method
 - a. Threshold Method
 - b. Dot Density Maps

Learning Objectives

At the end of this module, students will be able to:

- List the characteristics of underserved populations and discuss the indicators used to define underserved communities.
- Identify underserved communities using various methods.
- Interpret data to understand the transportation needs of underserved populations

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

AASHTO. (n.d.). Environmental justice and transportation.

<https://environment.transportation.org/education/environmental-topics/environmental-justice/environmental-justice-overview/>

Adkins, A., Makarewicz, C., Scanze, M., Ingram, M., & Luhr, G. (2017). Contextualizing walkability: Do relationships between built environments and walking vary by socioeconomic context?, *Journal of the American Planning Association*, 83:3, 296-314,

<https://doi.org/10.1080/01944363.2017.1322527>

Lubitow, A.; Liévanos, R., McGee, J., Carpenter, E. (2019). Developing data, models, and tools to enhance transportation equity. NITC-RR-1122. Portland, OR: Transportation Research and Education Center (TREC). <https://nitc.trec.pdx.edu/news/advancing-transportation-equity-through-inclusive-travel-survey-data-methods>

Rowangould, D., Karner, A., London, J. (2016). Identifying environmental justice communities for transportation analysis.

https://www.researchgate.net/publication/301705413_Identifying_environmental_justice_communities_for_transportation_analysis

- Sandt, L., Combs, T., & Cohn, J. (2016). Pursuing equity in pedestrian and bicycle planning. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/resources/equity_paper/
- Williams, K., and A. Golub. (2017). Evaluating the Distributional Effects of Regional Transportation Plans and Projects. National Institute for Transportation and Communities (NITC). https://pdxscholar.library.pdx.edu/trec_reports/139/
- Williams, K., Boyd, T., Keita, Y., and Kramer, J. (2021). Transportation equity toolkit. <https://www.cutr.usf.edu/2021/09/transportation-equity-toolkit/>
- Williams, K., Kramer, J., Keita, L., Deba Enomah, L., Boyd, T. (2019). Integrating equity into MPO project prioritization. <https://ctedd.uta.edu/wp-content/uploads/2022/04/CTEDD-018-03-Final-Report.pdf>
- United States Census Bureau. (2021). Data equity resources. <https://www.census.gov/newsroom/press-kits/2021/data-equity-resources.html>
- United States census Bureau. (n.d.) Data for equity. <https://www.census.gov/about/what/data-equity.html>
- *Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to list the characteristics of underserved populations and discuss the indicators used to define underserved communities	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input type="checkbox"/> Values	During class: Module 2 knowledge probe question #1 After Class: Module 2 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to identify underserved communities using various methods	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to interpret data to understand the transportation needs of underserved populations	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 2 knowledge probe question #2	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
List the characteristics of underserved populations and discuss the indicators used to define underserved communities	Has a deep understanding of the complex demographic, economic, social, and cultural characteristics of different populations and underserved communities	Has an adequate understanding of the complex demographic, economic, social, and cultural characteristics of different populations and underserved communities	Does not display an understanding of population and community characteristics
Identify underserved communities using various methods	Effectively uses appropriate quantitative and/or qualitative methods to identify underserved communities and can provide a detailed explanation of the results	Uses appropriate quantitative and/or qualitative methods to identify and understand underserved communities, but has some difficulty in apply the method or interpreting the results	Is unable to apply quantitative nor qualitative methods.
Interpret data to understand the transportation needs of underserved populations	Can draw competent, insightful, and qualified conclusions about the transportation needs of underserved populations	Can draw some conclusions about the transportation needs of underserved populations and demonstrates adequate competency and insight	Is unable to draw appropriate conclusion about the transportation needs of underserved populations

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

Defining underserved populations

- No prior knowledge
- Beginner
- Intermediate
- Expert

Community characteristics and developing community profiles

- No prior knowledge
- Beginner
- Intermediate
- Expert

Methods for mapping and assessing transportation in underserved communities

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Defining underserved populations

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Community characteristics and developing community profiles

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Methods for mapping and assessing transportation in underserved communities

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 3: Equity in Travel Analysis

This module includes methods to identify, evaluate, and understand the transportation needs of vulnerable populations. It could supplement a variety of courses on transportation planning and engineering.

Discipline Applicability

Engineering, Planning, and GIS

Subtopics

- Needs assessment and analysis
- Survey and data collection methods
- Emerging technology

Learning Objectives

- Identify the equity concerns associated with various tools for evaluating travel patterns and behavior
- Describe strategies to address equity challenges in data collection and analysis
- Define Big Data and explain how it can support equity studies

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

Ehrlich, J., Hard, E., Komanduri, A. and Straub Anderson, R. (n.d.). A century of travel surveys informing transportation investments. <https://onlinepubs.trb.org/onlinepubs/centennial/papers/ABJ40-Final.pdf>

Ghasemlou, K., Ergun, M., & Dadashzadeh, N. (2021). Exploring equity in public transportation planning using smart card data. *Sensors*. (Basel, Switzerland), 21(9), 3039. <https://doi.org/10.3390/s21093039>

Griffin, G., Mulhall, M., and Simek, C. (2018). Sources and mitigation of bias in big data for transportation safety. https://safed.vtti.vt.edu/wp-content/uploads/2020/07/02-026_Final-Research-Report_Final.pdf

ITE. (2020) 2020 ITE developing trends. <https://www.ite.org/pub/?id=E0E0B1BC-B252-06AA-3321-784D43999A2E> (see page 13 for Big Data for Active Transportation Analysis)

Lubitow, A.; Liévanos, R., Carpenter, E. and McGee, J. (2021). Transformative transportation survey methods: Enhancing household transportation survey methods for hard-to-reach populations. <https://www.sciencedirect.com/science/article/abs/pii/S1361920921002510>

Lubitow, A.; Liévanos, R., McGee, J., Carpenter, E. (2019). Developing data, models, and tools to enhance transportation equity. NITC-RR-1122. Portland, OR: Transportation Research and Education Center (TREC). https://pdxscholar.library.pdx.edu/trec_reports/199/

Mahendra, A., R. King, J. Du, A. Dasgupta, V. A. Beard, A. Kallergis, and K. Schalch. (2021). Seven transformations for more equitable and sustainable cities. World Resources Report, Towards a More Equal City. Washington, DC: World Resources Institute. <https://doi.org/10.46830/wrirpt.19.00124>. (see chapter 8)

National Academies of Sciences, Engineering, and Medicine. (2011). Women's Issues in Transportation: Summary of the 4th International Conference, Volume 1: Conference Overview and Plenary Papers. Washington, DC: The National Academies Press. <https://doi.org/10.17226/22901>.

National Academies of Sciences, Engineering, and Medicine. (2018). Cell phone location data for travel behavior analysis. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25189>

National Academies of Sciences, Engineering, and Medicine. (2021). Insights, inclusion, and impact: Framing the future for women in transportation. 6th International Conference on Women's Issues in Transportation. <https://onlinepubs.trb.org/onlinepubs/circulars/ec268.pdf>.

Tomer, A, Kane, J, and Vey, J. (2020). Connecting people and places: Exploring new measures of travel behavior. <https://www.brookings.edu/interactives/connecting-people-and-places-exploring-new-measures-of-travel-behavior/>

*Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to identify the equity concerns associated with various tools for evaluating travel patterns and behavior	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 3 knowledge probe question #1, #2, #3 After Class: Module 3 matching terms activity After Class: Module 3 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to describe strategies to address equity challenges in data collection and analysis	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input type="checkbox"/> Values	During class: Module 3 knowledge probe question #4	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to define Big Data and explain how it can support equity studies	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 3 knowledge probe question #5, #6	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
Identify the equity concerns associated with various tools for evaluating travel patterns and behavior	Displays a deep and nuanced understanding of equity concerns associated with various tools for evaluating travel patterns and behavior	Displays an adequate understanding of equity concerns associated with various tools for evaluating travel patterns and behavior	Does not demonstrate an understanding of equity concerns associated with various tools for evaluating travel patterns and behavior
Describe strategies to address equity challenges in data collection and analysis	Has a deep understanding of strategies to address equity challenges in data collection and analysis	Has an adequate understanding of strategies to address equity challenges in data collection and analysis	Cannot describe strategies to address equity challenges in data collection and analysis
Define Big Data and explain how it can support equity studies	Understands Big Data and can effectively explain how it can support equity studies	Has an adequate understanding of Big Data and can adequately explain how it can support equity studies	Is unable to define Big Data and/or is unable to explain how it can support equity studies

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

Equity challenges in data collection and analysis

- No prior knowledge
- Beginner
- Intermediate
- Expert

Big data for equity studies

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Equity challenges in data collection and analysis

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Big data for equity studies

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 4: Involving Underserved Communities

This module addresses cultural diversity and racial issues in public engagement. It includes communication and outreach techniques and strategies to transition from public involvement to community empowerment. It could supplement courses in anthropology, sociology, and public involvement in transportation.

Discipline Applicability:

Planning, Engineering, Human Geography, Anthropology, Public Policy, Sociology.

Subtopics

- Transportation issues in underserved communities
 - Cultural diversity and race
 - Unequal distribution of transportation resources
 - Environmental justice
- Community engagement methods
 - Communication and outreach
 - Public involvement techniques
 - Community empowerment

Learning Objectives

At the end of this module, students will be able to:

- Describe the history of activism in transportation
- Explain community engagement theories and public involvement techniques for involving underserved populations
- Identify appropriate qualitative methods for community-engaged research and analysis

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

Agyeman, J., & Erickson, J. S. (2012). Culture, Recognition, and the Negotiation of Difference: Some Thoughts on Cultural Competency in Planning Education. *Journal of Planning Education and Research*, 32(3), 358–366. <https://doi.org/10.1177/0739456X12441213>

Bullard, R.D., Johnson, G.S. and Torres, A.O. eds. (2004). *Highway robbery: Transportation racism & new routes to equity*. South End Press.

Caltrans. (2020). Caltrans equity statement. <https://dot.ca.gov/about-caltrans/equity-statement>

Creighton, J.L. (2005). *The public participation handbook: Making better decisions through citizen involvement*. John Wiley & Sons.

Flower, L. (2008). *Community literacy and the rhetoric of public engagement*. SIU Press.

Gabel-Scheinbaum, S., Jimenez, D., Roux, L., and Van, A. (n.d.). *Implementing Cultural Competency in Urban Planning*. <https://www.planning.org/knowledgebase/story/9202744/>

- Garcia, I., Garfinkel-Castro, A. and Pfeiffer, D. (2019). Planning with diverse communities (PAS Report 593). https://planning-org-uploaded-media.s3.amazonaws.com/publication/download_pdf/PAS-Report-593.pdf
- Barajas, J. (2017). Bicycle Justice and urban transformation: Biking for all?, edited by Aaron Golub, Melody L. Hoffmann, Adonia E. Lugo, and Gerardo F. Sandoval, *Journal of the American Planning Association*, 83:2, 226-227, DOI: [10.1080/01944363.2017.1285620](https://doi.org/10.1080/01944363.2017.1285620)
- Aaron Golub, Marcantonio, R. & Sanchez, T. W. (2013). Race, space, and struggles for mobility: Transportation impacts on African Americans in Oakland and the East Bay, *Urban Geography*, 34:5, 699-728, <https://doi.org/10.1080/02723638.2013.778598>
- Hooks, B. (2000). Chapter 1. Introduction, in *Where we stand: Class matters*. Psychology Press
- Hooks, B. (2000). Chapter 2. Coming to Class Consciousness, in *Where we stand: Class matters*. Psychology Press.
- Lee, R.J., Sener, I.N. and Jones, S.N. (2017). Understanding the role of equity in active transportation planning in the United States. *Transport reviews*, 37(2), pp.211-226. DOI: [10.1080/01441647.2016.1239660](https://doi.org/10.1080/01441647.2016.1239660)
- Loh, P. (2005). T Riders' Union: A tale of two campaigns in Boston. *Race, Poverty & the Environment*, 12(1), 47–50. <http://www.jstor.org/stable/41555236>
- Lugo, A.E. (2018). *Bicycle/race: Transportation, culture, & resistance*. Microcosm Publishing.
- Mandelbaum, S. J. (1991). Telling Stories. *Journal of Planning Education and Research*, 10(3), 209–214. <https://doi.org/10.1177/0739456X9101000308>
- McCullough, S. R, & van Stokkum, R. (2021). Answers from the Margins: Participatory Planning with Disadvantaged Communities. UC Office of the President: University of California Institute of Transportation Studies. <http://dx.doi.org/10.7922/G2RX99DZ>
<https://escholarship.org/uc/item/0w49r6g5>
- Prasetyo, Y., 2017. From storytelling to social change: The Power of story in the community building. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3094947
- Reboloso McCullough, S. (2021). Ten Ways Transportation Agencies Can Improve Public Engagement with Diverse Communities. UC Office of the President: University of California Institute of Transportation Studies. <http://dx.doi.org/10.7922/G22B8W96>
- Schweitzer, L., & Valenzuela, A. (2004). Environmental Injustice and Transportation: The Claims and the Evidence. *Journal of Planning Literature*, 18(4), 383–398. <https://doi.org/10.1177/0885412204262958>
- Wagner, J. (2013). Measuring Performance of Public Engagement in Transportation Planning: Three Best Principles. *Transportation Research Record*, 2397(1), 38–44. <https://doi.org/10.3141/2397-05>
- Miller Ph D, K., 2018. *Introduction to Design Equity*. University of Minnesota Libraries Publishing. <https://open.lib.umn.edu/designequity/>
- *Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Videos

Carter, K. (2012). Equal or Better: The Story of the Silver Line. <https://vimeo.com/40582561>

Kirwan Institute. (2019). Free to Ride: The Documentary. <https://vimeo.com/300609750>

Holy Post. (2020). Race in America. <https://www.youtube.com/watch?v=AGUwcs9qJXY>

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to accurately describe the history of activism in transportation	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 4 knowledge probe questions #1 & #2 During Class: Activity on Implicit Bias	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to explain community engagement theories and public involvement techniques for involving underserved populations	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	After Class: Module 4 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to identify appropriate qualitative methods for community-engaged research and analysis	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values		<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
Students are able to accurately describe the history of activism in transportation	Displays a deep and nuanced understanding of the history of activism in transportation	Displays an adequate understanding of the history of activism in transportation	Conveys little understanding of the history of activism in transportation
Students are able to explain community engagement theories and public involvement techniques for involving underserved populations	Displays a deep and nuanced understanding of community engagement theories and public involvement techniques for involving underserved populations	Displays an adequate understanding of community engagement theories and public involvement techniques for involving underserved populations	Conveys little understanding of community engagement theories and public involvement techniques for involving underserved populations
Students are able to identify appropriate qualitative methods for community-engaged research and analysis	Uses deep knowledge of transportation equity to identify appropriate qualitative methods for community-engaged research and analysis, is able to justify their use in various contexts	Can identify some qualitative methods for community-engaged research and analysis, but may not be able to adequately justify their use in different contexts	Cannot identify qualitative methods for community-engaged research and analysis or cannot justify their use in any context

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

The history of activism as it relates to transportation

- No prior knowledge
- Beginner
- Intermediate
- Expert

Barriers to public engagement in the transportation planning process

- No prior knowledge
- Beginner
- Intermediate
- Expert

Community engagement theories

- No prior knowledge
- Beginner
- Intermediate
- Expert

Public engagement techniques

- No prior knowledge
- Beginner
- Intermediate
- Expert

Methods for community-based research and analysis

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

The history of activism as it relates to transportation

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Barriers to public engagement in the transportation planning process

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Community engagement theories

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Public engagement techniques

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Methods for community-based research and analysis

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 5: Evaluating Plans and Projects

This module addresses equity-based project screening and prioritization. It could supplement courses on local and regional transportation planning as well as be part of a transportation economics and decision-making course. It includes data sources and analysis tools to evaluate the distribution of benefits and burdens in underserved communities.

Discipline Applicability

Planning and Economic Analysis

Subtopics

- Assessing Benefits and Burdens
- Cumulative and Disproportionate Impacts
- Distributional Equity of Investments
- Spatial Analysis Tools

Learning Objectives

- Explain the importance of equity assessments in transportation decision making
- List and define equity metrics and indicators for transportation analysis
- Identify and use equity analysis tools to assess transportation projects in underserved communities

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

American Planning Association. (2019). Planning for equity policy guide.

<https://www.planning.org/publications/document/9178541/>

Environmental Protection Agency. (2016). Technical guidance for assessing environmental justice in regulatory analysis. https://www.epa.gov/sites/production/files/2016-06/documents/ejtg_5_6_16_v5.1.pdf

Forum of the Equity Caucus at Transportation for America. (2012). Perspectives on advancing economic and social equity in Federal transportation policy: Briefing papers for the 10/25/12 Forum of the Equity Caucus at Transportation for America. <https://www.policylink.org/node/35686>

Krapp, A. (2020). Transportation equity project prioritization criteria.

<https://static1.squarespace.com/static/59e46956bff2000caf3dcfa9/t/5f45624e84f13970aa2d7b59/1598382687041/Transportation+Equity+Project+-+Prioritization+Criteria.pdf>

Martens, K., & Golub, A. (2018). A fair distribution of accessibility: Interpreting civil rights regulations for regional transportation plans. *Journal of Planning Education and Research*.

<https://doi.org/10.1177/0739456X18791014>

Martens, K., Golub, A., Robinson, G. (2012). A justice-theoretic approach to the distribution of transportation benefits: Implications for transportation planning practice in the United States.

https://www.researchgate.net/publication/236119816_A_justice-

[theoretic approach to the distribution of transportation benefits Implications for transportation planning practice in the United States](#)

Twaddell, H., and Zgoda, B. (2020). Equity analysis in regional transportation planning processes volume 1: Guide. <http://www.trb.org/Main/Blurbs/180936.aspx>

Wennink, A., Krapp, A. (2020). Equity-oriented performance measures in transportation planning. https://planning-org-uploaded-media.s3.amazonaws.com/publication/download_pdf/PAS-MEMO-2020-03-04-rev.pdf

Wennink, A., & Krapp, A. (2020). Equity-oriented performance measures in transportation planning. https://planning-org-uploaded-media.s3.amazonaws.com/publication/download_pdf/PAS-MEMO-2020-03-04-rev.pdf

Williams, K. and Golub, A. (2017) Evaluating the distributional effects of regional transportation plans and projects. NITC-RR-862. Portland, OR: Transportation Research and Education Center (TREC). <https://doi.org/10.15760/trec.175>

Williams, K., Boyd, T., Keita, Y., and Kramer, J. (2021). Transportation equity toolkit: Transportation equity needs assessment & project prioritization. <https://www.cutr.usf.edu/wp-content/uploads/2021/09/CTEDD-Transportation-Equity-Toolkit-04212021.pdf>

Williams, K., Kramer, J., Keita, L., Deba Enomah, L., Boyd, T. (2019). Integrating equity into MPO project prioritization. <https://ctedd.uta.edu/wp-content/uploads/2022/04/CTEDD-018-03-Final-Report.pdf>

*Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Videos

Use the list of suggested resources to identify one or more required and/or optional video for this module.

Esri Industries. (2021). Exploring communities through an equity lens. https://www.youtube.com/watch?v=xz8kQ9SH_Jc

Esri Industries. (2021). Achieving transportation equity through GIS. <https://www.youtube.com/watch?v=k3q6d5izC44>

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to explain the importance of equity assessments in transportation decision making	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 5 knowledge probe question #1, #2	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to list and define equity metrics and indicators for transportation analysis	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input type="checkbox"/> Values	During class: Module 5 knowledge probe question #3, #4	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to identify and use equity analysis tools to assess transportation projects in underserved communities	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 5 knowledge probe question #5 After Class: Module 5 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
Explain the importance of equity assessments in transportation decision making	Uses deep knowledge of transportation and equity to provide a nuanced explanation of the importance of equity assessments in transportation decision making	Can provide some explanation of the significance of equity assessments in transportation decision making	Cannot identify the role of equity assessments in transportation
List and define equity metrics and indicators for transportation analysis	Has a thorough understanding of key equity metrics and indicators for transportation analysis	Is familiar with some equity metrics and indicators for transportation analysis	Cannot identify and/or define any equity metrics and indicators for transportation analysis
Identify and use equity analysis tools to assess transportation projects in underserved communities	Displays a thorough understanding of the range of equity analysis tools and indicators and how to apply them to assess transportation projects in underserved communities	Identifies some equity analysis tools to assess transportation projects in underserved communities but is uncertain about their application	Cannot identify equity analysis tools to assess transportation projects in underserved communities

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

Equity assessments for transportation decision making

- No prior knowledge
- Beginner
- Intermediate
- Expert

Equity metrics and typologies

- No prior knowledge
- Beginner
- Intermediate
- Expert

Equity analysis tools and indicators

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Equity assessments for transportation decision making

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Equity metrics and typologies

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Equity analysis tools and indicators

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 6: Access to Opportunity

This module explores access to opportunity for underserved populations, including access to employment, education, and broadband, the interactions between the built environment and accessibility, and the level of affordability for various transportation modes. It could supplement courses on transportation economics, multimodal planning, and pedestrian and bicycle planning and design.

Discipline Applicability

Transportation Economics, Multimodal Planning, Pedestrian and Bicycle Planning and Design

Subtopics

- Accessibility and the Built Environment
- Transportation Affordability
- Broadband and the Digital Divide
- Gentrification and Displacement
- Spatial Mismatch (Job Sprawl, Affordable Housing)
- Transit Justice

Learning Objectives

At the end of this module, students will be able to:

- Analyze the complex relationship between the built environment and accessibility
- Describe how the economic and social mobility of various population groups are affected by transportation
- Apply strategies and tools to increase the access to employment, education, affordable housing, and transportation for underserved communities

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

Aloisi, J. and Johnson, J. (2018). The transportation equity conundrum: 6 ways cities can improve mobility without displacement. Greenbiz. <https://www.greenbiz.com/article/transportation-equity-conundrum-6-ways-cities-can-improve-mobility-without-displacement>

Chetty, R. and Hendren, N. (2017). The impacts of neighborhoods on intergenerational mobility I: Childhood exposure effects. https://opportunityinsights.org/wp-content/uploads/2018/03/movers_paper1.pdf

FHWA. (2019). Guidebook for developing pedestrian and bicycle performance measures. http://www.fhwa.dot.gov/environment/bicycle_pedestrian

Governors' Institute on Community Design. (2017) The Why and How of Measuring Access to Opportunity: A Guide to Performance Management. <https://smartgrowthamerica.org/resources/measuring-access-to-opportunity/>

Karner, A. and Golub, A. (2019). Comparison of two common approaches to public transit service equity evaluation. <https://journals.sagepub.com/doi/10.3141/2531-20>

- Litman, T. (2016). Evaluating accessibility for transportation planning: Measuring people's ability to reach desired goods and activities. Victoria Transport Policy Institute. <https://www.vtpi.org/access.pdf>
- NYC DOT and FHWA. (2019). Access to Opportunity: A Transportation and Housing Study in the Eastern Rockaways. <https://www1.nyc.gov/html/dot/html/about/easternrockaways.shtml>
- Pew Research Center (June 2021). Mobile Technology and Home Broadband 2021. https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2021/06/PI_2021.06.03_Mobile-Broadband_FINAL.pdf
- Pew Research Center. (2021). Internet/broadband fact sheet. <https://www.pewresearch.org/internet/fact-sheet/internet-broadband/>
- Raphael, S. and Stoll, M. (2010). Job sprawl and the suburbanization of poverty. https://www.brookings.edu/wp-content/uploads/2016/06/0330_job_sprawl_stoll_raphael.pdf
- Sandt, L., Combs, T., & Cohn, J. (2016). Pursuing equity in pedestrian and bicycle planning. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/resources/equity_paper/
- Stacy et al. (October 2020). Access to Opportunity through equitable transportation: Lessons from four metropolitan regions. <https://www.urban.org/research/publication/access-opportunity-through-equitable-transportation>
- Tomer, A. (2012). Where the jobs are: Employer access to labor by transit. <https://www.brookings.edu/wp-content/uploads/2016/06/11-transit-labor-tomer-full-paper.pdf>
- Tomer, A., Fishbane, L., Siefer, A., and Callahan, B. (2020). Digital prosperity: How broadband can deliver health and equity to all communities. https://www.brookings.edu/wp-content/uploads/2020/02/20200227_BrookingsMetro_Digital-Prosperity-Report-final.pdf
- Tomer, A., Kneebone, E., Puentes, R., and Berube, A. (2011). Missed opportunity: Transit and jobs in metropolitan America. https://www.brookings.edu/wp-content/uploads/2016/06/0512_jobs_transit.pdf
- Urban Institute. (2020). The unequal commute. <https://www.urban.org/features/unequal-commute>
- Venter, C., Mahendra, A., & Hidaslo, D. (2019). From Mobility to Access for All: Expanding Urban Transportation Choices in the Global South [Working Paper]. <https://files.wri.org/s3fs-public/from-mobility-to-access-for-all.pdf>
- Wasatch Front Regional Council. Access to Opportunities website. <https://wfrc.org/maps-data/access-to-opportunities/>
- Wei, R., Liu, X., Mu, Y., Wang, L., Golub, A., & Farber, S. (2017). Evaluating public transit services for operational efficiency and access equity. <https://www.sciencedirect.com/science/article/pii/S0966692317302016?via%3Dihub>
- Williams, K., Kramer, J., Keita, L., Deba Enomah, L., Boyd, T. (2019). Integrating equity into MPO project prioritization. <https://ctedd.uta.edu/wp-content/uploads/2022/04/CTEDD-018-03-Final-Report.pdf>
- *Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Videos

Handy, S. (2019). Accessibility versus mobility. <https://www.youtube.com/watch?v=4OMv6CgrzvE>

Sardari, R. (2019). Job growth and the spatial mismatch between jobs and low-income residents. <https://www.census.gov/data/academy/webinars/2019/job-growth-spatial-mismatch.html>

Wood, J., Chatman, D., & Hale, D. (2013). How does public transportation affect economic mobility? By <https://www.kalw.org/show/your-call/2013-09-10/today-on-your-call-how-does-public-transportation-affect-economic-mobility>

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?	Notes
Students are able to analyze the relationship between the built environment and accessibility.	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 4 knowledge probe questions #1, #2, and #3 After Class: Module 6 matching terms activity	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to describe how the economic and social mobility of various population groups are affected by transportation.	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 4 knowledge probe question #4 After Class: Module 6 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to apply strategies and tools to increase the access to employment, education, affordable housing, and transportation for underserved communities.	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 4 knowledge probe questions #5, #6, and #7	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
Analyze the complex relationship between the built environment and accessibility	Displays a deep and nuanced understanding of the relationship between the built environment and accessibility and the resulting effects on various underserved populations	Displays an understanding of the relationship between the built environment and accessibility but is unclear about how they affect underserved populations	Conveys little understanding about the relationship between the built environment and accessibility
Describe how the economic and social mobility of various population groups are affected by transportation.	Can provide a comprehensive description of how the economic and social mobility of various population groups are affected by transportation	Can provide a vague description of how the economic and social mobility of various population groups are affected by transportation	Cannot describe the relationship between transportation and economic and social mobility
Apply strategies and tools to increase the access to employment, education, affordable housing, and transportation for underserved communities	Proficiently uses equity-based strategies and tools (in a lab/studio setting) to increase the access to employment, education, and transportation for underserved communities	Displays some understanding of equity-based strategies and tools to increase the access to employment, education, and transportation for underserved communities, but is uncertain about their application	Cannot identify strategies and tools to increase the access to employment, education, and transportation for underserved communities

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

Mobility and accessibility

- No prior knowledge
- Beginner
- Intermediate
- Expert

Transportation costs and the effects on underserved populations

- No prior knowledge
- Beginner
- Intermediate
- Expert

Spatial mismatch

- No prior knowledge
- Beginner
- Intermediate
- Expert

Transit justice

- No prior knowledge
- Beginner
- Intermediate
- Expert

Gentrification and displacement

- No prior knowledge
- Beginner
- Intermediate
- Expert
-

Broadband and the digital divide and how they relate to access to opportunity

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Mobility and accessibility

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Transportation costs and the effects on underserved populations

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Spatial mismatch

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Transit justice

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Gentrification and displacement

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Broadband and the digital divide and how they relate to access to opportunity

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 7: Equity of Emerging Modes

This module incorporates information on ensuring distributional equity of facility and service locations, accommodating the unbanked, affordability, and public programs and subsidies. It could supplement courses on multimodal planning.

Discipline Applicability

Engineering, Planning, and Sustainability

Subtopics

- Shared Mobility
 - Impact of Transportation Network Companies (TNC) on Transit
- Connected and Automated Mobility
- Transportation Electrification
 - Equity from Life Cycle Perspective
 - Energy Generation and Distribution
- Payment and Affordability

Learning Objectives

At the end of this module, students will be able to:

- Identify the potential benefits and burdens associated with emerging modes
- Describe the mobility needs of underserved populations and how emerging modes address or neglect these needs
- Evaluate various strategies designed to increase access to emerging modes for underserved populations

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

Abdelwahab, B., Palm, M., Shalaby, A., & Farber, S. (2021). Evaluating the equity implications of ridehailing through a multi-modal accessibility framework. *Journal of Transport Geography*, 95, 103147. <https://doi.org/10.1016/j.jtrangeo.2021.103147>

Bauer, G., Hsu, C. W., & Lutsey, N. (2021). When might lower-income drivers benefit from electric vehicles? Quantifying the economic equity implications of electric vehicle adoption. *Working Paper*, (2021-06). <https://theicct.org/sites/default/files/publications/EV-equity-feb2021.pdf>

Caggiani, L., Camporeale, R., Dimitrijević, B., & Vidović, M. (2020). An approach to modeling bike-sharing systems based on spatial equity concept. *Transportation Research Procedia*, 45, 185-192. <https://doi.org/10.1016/j.trpro.2020.03.006>

Cohen, S., & Cabansagan, C. (2017). A Framework for Equity in New Mobility. https://www.transformca.org/sites/default/files/A%20Framework%20for%20Equity%20in%20New%20Mobility_FINAL.pdf

- Cohen, S., Shirazi, S., & Curtis, T. (2017). Can we advance social equity with shared, autonomous and electric vehicles? *Institute of Transportation Studies at the University of California, Davis*. https://www.transformca.org/sites/default/files/3R.Equity.Indesign.Final_.pdf
- Cohn, J., Ezike, R., Martin, J., Donkor, K., Ridgway, M., & Balding, M. (2019). Examining the equity impacts of autonomous vehicles: a travel demand model approach. *Transportation research record*, 2673(5), 23-35. <https://doi.org/10.1177/0361198119836971>
- Creger, H., Espino, J., & Sanchez, A. S. (2018). Mobility Equity Framework. https://greenlining.org/wp-content/uploads/2019/01/MobilityEquityFramework_8.5x11_v_GLI_Print_Endnotes-march-2018.pdf
- Dill, J., & McNeil, N. (2021). Are shared vehicles shared by all? A review of equity and vehicle sharing. *Journal of Planning Literature*, 36(1), 5-30. <https://doi.org/10.1177/0885412220966732>
- Eppenberger, N., & Richter, M. A. (2021). The opportunity of shared autonomous vehicles to improve spatial equity in accessibility and socio-economic developments in European urban areas. *European Transport Research Review*, 13(1), 1-21. <https://doi.org/10.1186/s12544-021-00484-4>
- Fedorowicz, M., Bramhall, E., Treskon, M., & Ezike, R. (2020). New mobility and equity: Insights for medium-size cities. *Washington, DC. Urban Institute*. <https://www.urban.org/sites/default/files/publication/102529/new-mobility-and-equity-insights-in-medium-cities.pdf>
- Fitch, D., Mohiuddin, H., & Handy, S. (2020). Investigating the influence of dockless electric bike-share on travel behavior, attitudes, health, and equity. <https://doi.org/10.7922/G2F18X0W>
- Fleming, K. L. (2018). Social equity considerations in the new age of transportation: Electric, automated, and shared mobility. *Journal of Science Policy & Governance*, 13(1), 20. <https://www.sciencepolicyjournal.org/uploads/5/4/3/4/5434385/fleming.pdf>
- Greenlining. (n.d.). Electric vehicles for all: An equity toolkit. <https://greenlining.org/resources/electric-vehicles-for-all/>
- Golub, A., Satterfield, V., Serritella, M., Singh, J., & Phillips, S. (2019). Assessing the barriers to equity in smart mobility systems: A case study of Portland, Oregon. *Case studies on transport policy*, 7(4), 689-697. <https://doi.org/10.1016/j.cstp.2019.10.002>
- Guo, S., & Kontou, E. (2021). Disparities and equity issues in electric vehicles rebate allocation. *Energy Policy*, 154, 112291. <https://doi.org/10.1016/j.enpol.2021.112291>
- Hardman, S., Fleming, K., Khare, E., & Ramadan, M. M. (2021). A perspective on equity in the transition to electric vehicle. *MIT Science Pol. Rev.*, 46-54. <https://doi.org/10.38105/spr.e10rdoaoup>
- Huether, P. E. T. E. R. (2021). Siting electric vehicle supply equipment (EVSE) with equity in mind. *April*, 7, 2021. https://www.aceee.org/sites/default/files/pdfs/siting_evse_with_equity_final_3-30-21.pdf
- Jiao, J., & Wang, F. (2021). Shared mobility and transit-dependent population: A new equity opportunity or issue? *International Journal of Sustainable Transportation*, 15(4), 294-305. <https://doi.org/10.1080/15568318.2020.1747578>
- Ju, Y., Cushing, L. J., & Morello-Frosch, R. (2020). An equity analysis of clean vehicle rebate programs in California. *Climatic Change*, 162(4), 2087-2105. <https://doi.org/10.1007/s10584-020-02836-w>

- Kim, A. J., Brown, A., Nelson, M., Ehrenfeucht, R., Holman, N., Gurran, N., ... & Kresse, K. (2019). Planning and the So-Called 'Sharing' Economy. *Planning Theory & Practice*, 20(2), 261-287. <https://doi.org/10.1080/14649357.2019.1599612>
- Liu, H., Dai, Z., Rodgers, M. O., & Guensler, R. (2022). Equity issues associated with US plug-in electric vehicle income tax credits. *Transportation Research Part D: Transport and Environment*, 102, 103159. <https://doi.org/10.1016/j.trd.2021.103159>
- National Conference of State Legislatures. (2022). State policies promoting hybrid and electric vehicles. <https://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx>
- Palm, M., Farber, S., Shalaby, A., & Young, M. (2021). Equity analysis and new mobility technologies: toward meaningful interventions. *Journal of Planning Literature*, 36(1), 31-45. <https://doi.org/10.1177/0885412220955197>
- Romero-Lankao, P. and Nobler, E. (2021). Energy justice: Key concepts and metrics relevant to EERE transportation projects. Golden, CO: National Renewable Energy Laboratory. NREL/MP-5400-80206. <https://www.nrel.gov/docs/fy21osti/80206.pdf>.
- Shaheen, S., Bell, C., Cohen, A., & Yelchuru, B. (2017). *Travel behavior: Shared mobility and transportation equity* (No. PL-18-007). https://www.fhwa.dot.gov/policy/otps/shared_use_mobility_equity_final.pdf
- Tibbits-Nutt, M. G. (2019). Point of view: Technology for all: How equity, access, and affordability must feature in next-generation vehicle policy. *TR News*, (321). <https://onlinepubs.trb.org/onlinepubs/trnews/trnews321.pdf>
- Tseng, H. K., Wu, J. S., & Liu, X. (2013). Affordability of electric vehicles for a sustainable transport system: An economic and environmental analysis. *Energy policy*, 61, 441-447. <https://doi.org/10.1016/j.enpol.2013.06.026>

Videos

- Shared-Use Mobility Center. (2016). Webinar: Transportation Equity in Shared Mobility, 2016. <https://learn.sharedusemobilitycenter.org/multimedia/webinar-transportation-equity-shared-mobility-case-studies-and-applications-for-sumcs-shared-mobility-toolkit/> (includes pdf of webinar presentations and webinar recording)
- Urban Environmentalists. (2020). Greenlining's mobility equity framework. <https://www.youtube.com/watch?v=otLh1AJdSLE>
- UCLA Institute of Transportation Studies. (2017). Policy Issues in Shared Mobility: Equity and Social Inclusion. <https://www.youtube.com/watch?v=SS1rypM-1wU>

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to identify the potential benefits and burdens associated with emerging modes	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 7 knowledge probe question #1	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to describe the mobility needs of underserved populations and how emerging modes address or neglect these needs	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 7 knowledge probe question #2, #3, #4	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to evaluate various strategies designed to increase access to emerging modes for underserved populations	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	After Class: Module 7 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
Identify the potential benefits and burdens associated with emerging modes	Demonstrates a well-developed understanding of the potential benefits and burdens associated with emerging modes and can effectively apply this knowledge to explain related equity issues	Can identify some of the potential benefits and burdens associated with emerging modes and can appropriately apply this knowledge to explain related equity issues	Coveys little understanding of the potential benefits and burdens associated with emerging modes and is unclear how they affect underserved populations
Describe the mobility needs of underserved populations and how emerging modes address or neglect these needs	Has a deep and nuanced understanding of the mobility needs of underserved populations and can use that knowledge to provide a comprehensive explanation of how emerging modes address or neglect these needs	Is familiar with the mobility needs of underserved populations and can apply that knowledge to explain how emerging modes address or neglect these needs	Is somewhat familiar with the mobility needs of underserved populations, but is not able to effectively communicate how emerging modes can address or neglect these needs
Evaluate various strategies designed to increase access to emerging modes for underserved populations	Has a thorough understanding of strategies designed to increase access to emerging modes for underserved populations and can provide a critical assessment of multiple (three or more) strategies	Has a general understanding of strategies designed to increase access to emerging modes for underserved populations and can provide an adequate assessment of one or two strategies	Cannot identify strategies designed to increase access to emerging modes for underserved populations

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

Benefits and burdens associated with emerging modes

- No prior knowledge
- Beginner
- Intermediate
- Expert

The mobility needs of underserved populations and how emerging modes address or neglect these needs

- No prior knowledge
- Beginner
- Intermediate
- Expert

Strategies designed to increase access to emerging modes for underserved populations

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Benefits and burdens associated with emerging modes

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

The mobility needs of underserved populations and how emerging modes address or neglect these needs

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Strategies designed to increase access to emerging modes for underserved populations

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 8: Transportation, Public Health, and Equity

This module aims to help students develop their knowledge base of the field, planning skills to effectively evaluate public health impacts of transportation, and critically engage with equity in transportation and public health debates. It introduces equity-based strategies to assess and address various public health concerns, including air quality, physical activity, noise pollution, access to healthy food, and mental health and well-being. It could supplement courses on public health, sustainability, social equity, and multimodal planning.

Discipline Applicability

Planning, Transportation Engineering, Public Health, Public Policy, Sustainability, Sociology.

Subtopics

- Transportation-related health issues
 - Air quality
 - Physical activity and active transportation
 - Access to healthy, affordable food
 - Noise pollution
 - Safety and security
 - Mental health and well-being
- Transportation impacts on health equity: concepts, tools, and analytics
 - Health Impact Assessment
 - Health Equity Impact Assessment
 - Planning toolkits for sustainable transportation

Learning Objectives

At the end of this module, students will be able to:

- Describe transportation as a social determinant of health and health equity
- Identify the various health implications of transportation and land use
- Compare the public health effects of transportation decision-making and investments on underserved populations

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module.

American Planning Association. (2016). Health impact assessment toolkit for planners. https://planning-org-uploaded-media.s3.amazonaws.com/publication/download_pdf/Health-Impact-Assessment-Toolkit.pdf

ChangeLabSolutions. (2016). A guide to building healthy streets. https://www.changelabsolutions.org/sites/default/files/Building_Healthy_Streets_FINAL_20160630.pdf

- ChangeLabSolutions. (2019). Long-range planning for health, equity & prosperity: A primer for local government. https://www.changelabsolutions.org/sites/default/files/2020-01/CLS-BG217-Long_Range_Planning_Primer_FINAL_20200115.pdf
- ChangeLabSolutions. (2019). Planning for healthy, equitable communities: How can public health practitioners partner with planners? <https://www.changelabsolutions.org/product/planning-healthy-equitable-communities>
- Centers for Disease Control and Prevention. (2013). A practitioner’s guide for advancing health equity: community strategies for preventing chronic disease. <https://www.cdc.gov/nccddphp/dnpao/health-equity/health-equity-guide/pdf/HealthEquityGuide.pdf>
- Cole, B.L., MacLeod, K.E. and Spriggs, R. (2019). Health impact assessment of transportation projects and policies: living up to aims of advancing population health and health equity?. *Annual review of public health*, 40, 305-318. <https://doi.org/10.1146/annurev-publhealth-040617-013836>
- Coutts, C., & Hahn, M. (2015). Green infrastructure, ecosystem services, and human health. *International journal of environmental research and public health*, 12(8), 9768–9798. <https://doi.org/10.3390/ijerph120809768>
- Dolan, P., Metcalfe, R., Munro, V., & Christensen, M. C. (2008). Valuing lives and life years: anomalies, implications, and an alternative. *Health economics, policy, and law*, 3(Pt 3), 277–300. <https://doi.org/10.1017/S1744133108004507>
- Farrow, F., Rogers, C. and Henderson-Frakes, J. (2020). Toward health and racial equity: Findings and lessons from building healthy communities. <https://www.calendow.org/app/uploads/2021/03/Toward-Health-and-Racial-Equity-FULL-REPORT-.pdf>
- Federal Highway Administration. (n.d.) Health in transportation corridor planning framework. https://www.fhwa.dot.gov/planning/health_in_transportation/planning_framework/the_framework/index.cfm
- Federal highway Administration. (n.d.). Framework for better integrating health into transportation corridor planning: Framework test case studies. https://www.fhwa.dot.gov/planning/health_in_transportation/planning_framework/framework_test_cases/index.cfm
- Frame Works. (n.d.) Framing the foundation of community health. <https://www.frameworksinstitute.org/toolkit/framing-the-foundation-of-community-health/>
- Haber, R. (2010). Health equity impact assessment. A primer. https://www.homelesshub.ca/sites/default/files/Health_Equity_Impact_Assessment_Haber.pdf
- SOPHIA Equity Working Group. (n.d.). How to advance equity through health impact assessments: a planning and evaluation framework by the SOPHIA equity working group. https://humanimpact.org/wp-content/uploads/2016/11/SOPHIA_EquityMetricsV2_2016.11.pdf
- Kent, J.L. and Thompson, S. (2014). The three domains of urban planning for health and well-being. *Journal of planning literature*, 29(3), pp.239-256. <https://doi.org/10.1177%2F0885412214520712>

- Kochtitzky, C.S., Frumkin, H., Rodriguez, R., Dannenberg, A.L., Rayman, J., Rose, K., Gillig, R. and Kanter, T. (2006). Urban planning and public health at CDC. *MMWR supplements*, 55(2), pp.34-38.
<https://www.cdc.gov/mmwr/preview/mmwrhtml/su5502a12.htm>
- Lane, L., Steedly, A., and Danley, C. (2019). Connecting transportation and health: A guide to communication and collaboration. <https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25Task105/NCHRP25-25Task105Guidebook.pdf>
- Locatelli, S.M., Sharp, L.K., Syed, S.T., Bhansari, S. and Gerber, B.S. (2017). Measuring health-related transportation barriers in urban settings. *Journal of applied measurement*, 18(2), p.178.
<https://www.ncbi.nlm.nih.gov/pubmed/28961153>
- Martens, K. and Golub, A. (2018). A fair distribution of accessibility: interpreting civil rights regulations for regional transportation plans. *Journal of planning education and research*.
<https://doi.org/10.1177%2F0739456X18791014>
- Meehan, L.A. and Whitfield, G.P. (2017). Integrating health and transportation in Nashville, Tennessee, USA: From policy to projects. *Journal of transport & health*, 4, pp.325-333.
<https://doi.org/10.1016/j.jth.2017.01.002>
- Meyer, M.D. and Elrahman, O.A. (2019). Chapter 2 – Dimensions of public health affected and influenced by transportation. In transportation and public health: An integrated approach to policy, planning, and implementation. <https://doi.org/10.1016/B978-0-12-816774-8.00002-5>
- Meyer, M.D. and Elrahman, O.A. (2019). Transportation and public health: An integrated approach to policy, planning, and implementation. <https://doi.org/10.1016/C2017-0-00313-0>
- National Association of City Transportation Officials. (2017). Designing for all ages & abilities: contextual guidance for high-comfort bicycle facilities. https://nacto.org/wp-content/uploads/2017/12/NACTO_Designing-for-All-Ages-Abilities.pdf
- Povall, S.L., Haigh, F.A., Abrahams, D. and Scott-Samuel, A. (2014). Health equity impact assessment. *Health promotion international*, 29(4), pp.621-633.
<https://doi.org/10.1093/heapro/dat012>
- Rodgers, K. (2021). Transportation as a determinant of health. Institute of transportation engineers.
<https://www.ite.org/pub/?id=ED7D7C00-F6C8-1C0D-30A4-CF0AE9CD2702>
- Rodriguez, D.A., Lounsbery, M.A. and Sallis, J.F. (2016). The active living research 2015 conference: The science of policy implementation. <https://doi.org/10.1177%2F0013916515615174>
- Sallis, J.F., Linton, L.S., Kraft, M.K., Cutter, C.L., Kerr, J., Weitzel, J., Wilson, A., Spoon, C., Harrison, I.D., Cervero, R. and Patrick, K. (2009). The active living research program: Six years of grantmaking. *American journal of preventive medicine*, 36(2), pp.S10-S21.
<https://doi.org/10.1016/j.amepre.2008.10.007>
- Schiller, P.L., & Kenworthy, J.R. (2017). An Introduction to Sustainable Transportation: Policy, Planning and Implementation (2nd ed.). Routledge. <https://doi.org/10.4324/9781315644486>
- Schilling, J. and Linton, L.S. (2005). The public health roots of zoning: In search of active living's legal genealogy. *American journal of preventive medicine*, 28(2), pp.96-104.
<https://doi.org/10.1016/j.amepre.2004.10.028>

- Schilling, J.M., Giles-Corti, B. and Sallis, J.F. (2009). Connecting active living research and public policy: transdisciplinary research and policy interventions to increase physical activity. *Journal of public health policy*, 30(1), pp.S1-S15. <http://dx.doi.org/10.1057/jphp.2008.59>
- Simpson, S., Mahoney, M., Harris, E., Aldrich, R. and Stewart-Williams, J. (2005). Equity-focused health impact assessment: a tool to assist policy makers in addressing health inequalities. *Environmental impact assessment review*, 25(7-8), pp.772-782. <http://dx.doi.org/10.1016/j.eiar.2005.07.010>
- Smart Growth America. (2021). Dangerous by design. <https://smartgrowthamerica.org/wp-content/uploads/2021/03/Dangerous-By-Design-2021-update.pdf>
- The California Endowment. (2020). Building healthy communities: A decade in review. https://www.calendow.org/app/uploads/2021/04/The_California_Endowment_Decade_In_Review_2010_2020_Executive_Report.pdf
- The Pew Charitable Trusts and the Robert Wood Johnson Foundation. (2020). Do health impact assessments promote equity? Insights on the contributions of HIAs in addressing factors that lead to disparities. <https://www.pewtrusts.org/-/media/assets/2020/03/do-health-impact-assessments-promote-equity.pdf>
- Tumlin, J. (2012). *Sustainable transportation planning: tools for creating vibrant, healthy, and resilient communities* (Vol. 16). John Wiley & Sons.
- Urban Land Institute. (2015). Building healthy places toolkit: Strategies for enhancing health in the built environment. <http://uli.org/wp-content/uploads/ULI-Documents/Building-Healthy-Places-Toolkit.pdf>
- Useche, S.A., Montoro, L., Sanmartin, J. and Alonso, F. (2019). Healthy but risky: A descriptive study on cyclists' encouraging and discouraging factors for using bicycles, habits and safety outcomes. *Transportation research part F: traffic psychology and behaviour*, 62, pp.587-598. <https://doi.org/10.1016/j.trf.2019.02.014>
- Van Wee, B. and Ettema, D. (2016). Travel behaviour and health: A conceptual model and research agenda. *Journal of transport & health*, 3(3), pp.240-248. <https://doi.org/10.1016/j.jth.2016.07.003>
- *Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Videos

- Unnatural Causes. (2008). https://unnaturalcauses.org/video_clips.php

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to describe transportation as a social determinant of health and health equity	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 8 knowledge probe question #1, #2, #3	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to identify the various health implications of transportation and land use	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 8 knowledge probe question #4, #5 After Class: Module 8 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to compare the public health effects of transportation decision-making and investments on underserved populations	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Module 8 knowledge probe question #6	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
Describe transportation as a social determinant of health and health equity	Displays well-developed understanding of transportation as a social determinant of health and health equity	Can describe transportation as a social determinant of health, but is unclear about how it relates to health equity	Does not demonstrate an understanding of transportation as a social determinant of health and health equity
Identify the various health implications of transportation and land use	Has a thorough understanding of the health implications of transportation and land use	Identifies some health implications of transportation and land use	Cannot identify the health implications of transportation and land use
Compare the public health effects of transportation decision-making and investments on underserved populations	Uses deep knowledge of transportation, public health, and equity to draw competent, insightful, and qualified conclusions about the public health effects of transportation decision-making and investments on underserved populations	Can draw some conclusions about the public health effects of transportation decision-making and investments on underserved populations	Conveys little understanding of the public health effects of transportation decision-making and investments on underserved populations

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

Transportation as a social determinant of health and health equity

- No prior knowledge
- Beginner
- Intermediate
- Expert

The health implications of transportation and land use

- No prior knowledge
- Beginner
- Intermediate
- Expert

The health effects of transportation decision-making and investments on undeserved communities

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

Transportation as a social determinant of health and health equity

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

The health implications of transportation and land use

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

The health effects of transportation decision-making and investments on undeserved communities

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Module 9: Equity in Transportation Funding

This module explores the equity implications of select funding mechanisms for transportation. It includes information on public transportation, who pays for transportation, and who benefits from transportation funding.

Discipline Applicability

Planning, Engineering, Transportation Finance and Economics

Subtopics

- Equity Implications of Transportation Funding Mechanisms
- Equity of Transportation Decision-Making and Funding
- The Cost of Transportation for System Users

Learning Objectives

At the end of this module, students will be able to:

- Analyze equity issues as they relate to transportation decision-making and funding.
- Explain the potential equity impacts of different transportation funding mechanisms.

Readings

Use the list of suggested resources to identify one or more required and/or optional readings for this module

Aloui, J. and Johnson, J. (2018). The transportation equity conundrum: 6 ways cities can improve mobility without displacement. Greenbiz. <https://www.greenbiz.com/article/transportation-equity-conundrum-6-ways-cities-can-improve-mobility-without-displacement>

FHWA. (2008). Income-based equity impacts of congestion pricing—A primer. https://ops.fhwa.dot.gov/publications/fhwahop08040/cp_prim5_00.htm

Gwilliams, K. (2017). Transport pricing and accessibility. https://www.brookings.edu/wp-content/uploads/2017/07/pricing-and-accessibility-paper_web.pdf

Iseki, H. (2016). Equity in regional public transit finance: Tradeoffs between social and geographic equity. *Journal of Urban Planning and Development*, 142(4). [https://doi.org/10.1061/\(ASCE\)UP.1943-5444.0000328](https://doi.org/10.1061/(ASCE)UP.1943-5444.0000328)

Litman, T. (2021). Local funding options for public transportation. <https://www.vtpi.org/tranfund.pdf>

Lowe, K., & Grengs, J. (2018). Private donations for public transit: The equity implications of Detroit's public-private streetcar. *Journal of Planning Education and Research*, 0739456X18761237. <https://doi.org/10.1177/0739456X18761237>

Martens, K. (2009). Equity concerns and cost-benefit analysis: Opening the black box. <https://trid.trb.org/view/880739>

Martens, K. (2011). Substance precedes methodology: On cost-benefit analysis and equity. <https://link.springer.com/article/10.1007/s11116-011-9372-7>

- Martens, K. and Di Ciommo, F. (2017). Travel time savings, accessibility gains and equity effects in cost-benefit analysis. https://www.researchgate.net/publication/312255872_Travel_time_savings_accessibility_gains_and_equity_effects_in_cost-benefit_analysis
- Puentes, R. (2004). Improving transportation decision making in low income and minority communities. <https://www.brookings.edu/testimonies/improving-transportation-decision-making-in-low-income-and-minority-communities/>
- Sanchez, T. (2008). An equity analysis of transportation funding. <https://www.reimaginerpe.org/node/2812>
- Sciara, G.-C., & Wachs, M. (2007). Metropolitan transportation funding: Prospects, progress, and practical considerations. *Public Works Management & Policy*, 12(1), 378–394. <https://doi.org/10.1177/1087724X07303987>
- Transportation Research Board. (2011). TRB Special Report 303: Equity of Evolving Transportation Finance Mechanisms. <https://doi.org/10.17226/13240>
- Wachs, M. (2016). Improving efficiency and equity in transportation finance. <https://www.brookings.edu/wp-content/uploads/2016/06/wachstransportation.pdf>
- *Additional resources can be found on the reading list for [Transportation, Race and Equity: A Syllabi Resource List for Faculty](#) by Jennifer Dill (Portland State University), Kendra Levine (University of California, Berkeley), and Jesus Barajas (University of California, Davis).

Videos

- Azem, I. (2011). Ecumenopolis: City without Limits. <https://vimeo.com/493023602>
- NACTO. (2021). Making Federal Funding Work for Cities. <https://nacto.org/event/making-federal-funding-work-for-cities/>
- Wennink, A. and Eby, B. (2020). Best Practices for Incorporating Equity into Performance-Based Processes. <https://www.enotrans.org/event/webinar-best-practices-for-incorporating-equity-into-performance-based-processes/>

Learning Outcomes and Evaluation

Module learning outcomes	Competencies	Suggested Tools	Learning outcomes achieved?*	Notes**
Students are able to analyze equity issues as they relate to transportation decision-making and funding	<input checked="" type="checkbox"/> Knowledge <input type="checkbox"/> Skills <input type="checkbox"/> Values	At the beginning of class: Knowledge probe questions #1 During class: Knowledge probe questions #2	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Students are able to explain the potential equity impacts of proposed transportation funding mechanisms	<input checked="" type="checkbox"/> Knowledge <input checked="" type="checkbox"/> Skills <input checked="" type="checkbox"/> Values	During class: Knowledge probe questions #3 After Class: Module 9 Reflection Paper	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<p><i>*If the learning outcome is not achieved, identify what additional steps are needed to achieve the learning outcome and improve student learning.</i></p> <p><i>**Identify the areas that are difficult for students and the areas that students are excelling. Are there other observations?</i></p>				

Learning Outcome Assessment Rubric

Learning Outcomes	Excellent	Good	Poor
<p>Describe equity issues as they relate to transportation decision-making and funding</p>	<p>Displays well-developed understanding of equity issues in transportation decision-making and funding</p>	<p>Can describe some equity issues related to transportation decision-making and funding</p>	<p>Does not demonstrate an understanding of equity issues as they relate to transportation decision-making and funding</p>
<p>Explain the potential equity impacts of proposed transportation funding mechanisms</p>	<p>Uses deep knowledge of equity and transportation funding to draw competent, insightful, and qualified conclusions about the potential equity impacts of proposed transportation funding mechanisms</p>	<p>Has some understanding of the potential equity impacts of proposed transportation funding mechanisms</p>	<p>Cannot explain the potential equity impacts of proposed transportation funding mechanisms</p>

Module Evaluation

Before Module

Please describe your familiarity with the following topics:

The decline and shift of transportation funding mechanisms

- No prior knowledge
- Beginner
- Intermediate
- Expert

Equity issues in transportation funding

- No prior knowledge
- Beginner
- Intermediate
- Expert

Methods to evaluate the equity impacts of transportation funding mechanisms

- No prior knowledge
- Beginner
- Intermediate
- Expert

After Module

Think about the topics discussed in this module and how familiar you were with the topics before class. Has your understanding of the topic improved?

The decline and shift of transportation funding mechanisms

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Equity issues in transportation funding

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Methods to evaluate the equity impacts of transportation funding mechanisms

- No, it is the same. I know just as much as I knew before class.
- Yes, it improved a little. I understand the topic a little better, but still have a lot of questions.
- Yes, it improved significantly. I understand the topic more, and I am confident in my knowledge.

Activities

Activities included in this curriculum are designed to reinforce lessons and encourage students to “think outside of the box.” The activities in this section include pre-class activities, beginning of class activities, during class activities, and after class activities.

Pre-class activities are assigned before the class session and are used to prepare students for the lecture and prompt in-class discussions. Beginning of class activities are assigned at the start of the class session and are used to engage students throughout the session. During class activities are assigned at key points during the lecture to encourage students to share their thoughts and dive deeper into the topics being presented. After class activities are used to reinforce what was taught in the class session and are also helpful for identifying areas where students need additional support. Many of the suggested activities are developed based on interactive and active learning techniques designed to engage students and provide “feedback on the teaching-learning process as it is happening” (Vanderbilt University, n.d.). The activities follow the template provided below.

Activities Template

Purpose

Describes why the activity is being assigned and the expectations of the activity.

Instructions

Provides detailed instructions and list of materials and data needed to complete the activity.

Instructor Notes

Includes suggested instructions and resources for the instructor to support them in assigning and assessing the activity.

Pre-class Activity

Implicit Bias

Purpose

This activity is designed to help you understand implicit bias and explore how it can affect the interactions between various transportation system users and affects the way practitioners plan for and design transportation. The discussion format provides a platform to share with and learn from your peers and use creative problem solving strategies to address bias in transportation planning.

Instructions

Complete one of the implicit bias quizzes: Project Implicit Website
<https://implicit.harvard.edu/implicit/takeatest.html>

Discuss the following:

- How implicit bias can affect the interactions between transportation system users.
- How implicit bias can affect the way we, as practitioners, plan for and design transportation.

Identify and discuss solutions to address the effects of implicit bias in transportation. Be creative in your approaches to problem-solving and think outside of the box.

Instructor Notes

Students can submit their results anonymously or share with the class.

Depending on the discipline or course learning objectives, you may identify a single quiz or provide a selection of quizzes that all students should take.

Optional Assignment

You can expand this activity by asking students to prepare a short paper (1-2 pages) describing implicit bias in transportation. The paper would include a discussion of the problem, one or more interventions/solutions to address implicit bias in transportation, the pros and cons of their identified interventions/solutions, and the feasibility of their interventions/solutions. Other criteria may be added at the instructor's discretion. Additional in-class discussion may also be useful after the students have researched the topic in more detail.

Beginning of Class Activities

Class summary for course content recall

Purpose

This activity reinforces topics, important points, and key takeaways from the class. It provides an opportunity for you to discuss the topics and create dialogue for problem exploration and solution identification.

Instructions

At the end of class one of you will give a five-minute summary of the key points discussed in the lecture.

Instructor Notes

At the beginning of each class, let students know that one of them will be asked to give a five-minute summary of the key points discussed in the lecture. Explain that proper note taking will assist them if they are called on. Conclude the lecture 10 to 15 minutes before the class period ends to provide adequate time for the lecture summary and questions/discussion.

During Class Activities

Knowledge Probe Questions for In-class Discussion

Purpose

This activity provides an opportunity for discussions at key points throughout the lecture. It allows you to reflect on what you have learned and provides a platform for student-to-student information exchanges. It also provides an opportunity for the lecturer to assess student understanding and determine if additional context/information is needed.

Instructions

Probe questions for each module are included in this section and at key points in the notes of each module PowerPoint. The questions are placed in the PowerPoint where they relate to the topic on the slide or provide an opportunity to introduce a new topic in the following slide(s).

Module 1 Probe Questions

Discuss the following:

1. What do the terms equity, equality, and justice mean to you? How do these terms relate to each other? Describe how each of these concepts relate to transportation. Explain how you arrived at this answer.
2. Which theory best addresses equity as it relates to transportation? Why? How do theories on equity and justice inform our understanding of equity in transportation? Explain the thought process behind your answer.
3. What are the key takeaways from the history of transportation as it relates to equity? Once history is acknowledged, what can transportation professionals do to create a more equitable transportation system in the future?
4. How do different populations, metrics, and definitions of equity affect the results of an equity analysis? Explain how you arrived at this answer.

Module 2 Probe Questions

Discuss the following:

1. How does the way we define communities affect our understanding of equity? How does this translate into community assessments and project development and implementation?

2. Compare the threshold-based method, the population-weighted method, and the community-based method. What are the pros and cons of each method for mapping and analyzing underserved communities?

Module 3 Probe Questions

Discuss the following:

1. In what ways do methods for evaluating travel patterns and behavior affect transportation analysis and decision-making in underserved communities (consider positive and negative impacts)? Please explain your answer.
2. How can bias in travel surveys and big data create inequities when evaluating travel patterns and behavior?
3. What are the limitations of travel surveys? How do these limitations affect underserved populations?
4. What are some strategies that can address equity challenges on travel surveys? Describe what the strategies are and explain how they advance equity.
5. Are there any equity implications for the three categories of big data? How do each of the categories compare with regards to their potential equity impacts?
6. What big data equity challenges do transportation professionals need to consider? How do these challenges affect underserved populations?

Module 4 Probe Questions

Discuss the following:

1. Identify (3 or more) transportation resources. Think about the examples of transportation-related resources you provided; do they benefit some populations more than others? How does the way we distribute transportation resources affect different populations? Explain how you arrived at these answers.
2. How has activism influenced transportation decision-making? Can you think of any examples of activism in transportation? Please describe.

Module 5 Probe Questions

Discuss the following:

1. What are some of the limitations of the methods used to evaluate the distributional equity of investments?
2. Does transportation benefit various population groups differently? How? Can the same transportation system benefit one population group and simultaneously burden another? Explain the thought process behind your answers.
3. What categories, factors, and criteria might transportation professionals include in an equity analysis? Explain how these categories and criteria advance equity.
4. How can the analysis type and inputs affect the outputs and outcomes in transportation? Why is this important for the equity analysis? What considerations should practitioners take into account when conducting an equity analysis?
5. What are some of the limitations of spatial analysis for equity? How can these limitations be addressed? Please describe.

Module 6 Probe Questions

Discuss the following:

1. In what ways does accessibility specifically affect underserved communities? Consider both the short-term and long-term impacts on individuals and on the community (including socio-economic mobility). Explain the thought process behind your answers.
2. What strategies can agencies use to reduce transportation and housing costs for underserved communities?
3. What pertinent questions might transportation professionals ask when assessing transportation affordability in a community? What sources might agency staff use to better understand affordability in a community?
4. In what ways does transportation affect opportunities for social and economic mobility?
5. What strategies can be used to address the need for transit while also mitigating the potential gentrification and displacement of low-income community members?
6. What other strategies can be used to provide access to broadband? How do these strategies improve accessibility needs for underserved populations?
7. What strategies can be used to improve access to opportunity for underserved populations? How do these strategies improve opportunities for social and economic mobility? What are the potential consequences of the strategies identified? Are there any mitigating measures that can improve anticipated outcomes for underserved populations?

Module 7 Probe Questions

Discuss the following:

1. What are the potential benefits of shared mobility? What are some of the potential burdens of shared mobility?
2. What may prevent some people (or population groups) from using shared mobility? Is there a potential for disparities between population groups in access to and use of shared mobility? Please explain your answer.
3. What are some potential inequities related to widespread adoption and deployment of electric vehicles?
4. What are some potential equity issues related to purchase incentive tools to make EVs more affordable? How can the equity issues be mitigated to improve affordability for underserved populations? Are there other strategies to make EV more affordable for low-income households?

Module 8 Probe Questions

Discuss the following:

1. What is the relationship between equity in public health and equity in transportation? Explain how you arrived at your answer.
2. What are some of the transportation-related health issues experienced by underserved populations? Are any of these issues avoidable or preventable? What are some strategies that transportation professionals can use to mitigate transportation-related health inequities?
3. How do the social determinants of health influence health outcomes? How does transportation contribute the social determinants of health and the resulting health outcomes? Please explain your answer.

4. What factors contribute to spatial inequities related to transportation air pollution? What solutions for transportation air pollution can be used to address spatial inequities?
5. What are some ways our response to climate change can be made more equitable?
6. What are some potential barriers to meeting the physical activity recommendations? How do these barriers specifically affect underserved populations?
7. What strategies can be used to improve access to healthy food for underserved communities?

Module 9 Probe Questions

Discuss the following:

1. What are some of the key equity issues that arise in relation to transportation funding mechanisms?
2. How has the erosion of the fuel tax and increased use of tolling and other alternative funding methods impacted equity in transportation?
3. What strategies can transportation practitioners employ to address inequity in transportation funding?
4. What factors should transportation practitioners take into consideration when determining how existing or proposed funding mechanisms affect underserved populations?

Instructor Notes

The PowerPoint presentation identifies key stopping points in the lecture for the probe questions, but, as the instructor, you can determine the best placement for the in-class discussions. These questions are suggestions; instructors may add, remove, or change the prompts to better fit their discipline and/or broader course content.

After Class Activities

Purpose

These after class activities provide an opportunity for you to reflect on the class material and provide your perspectives and/or identify material that you need additional support to understand. Each of these activities are evaluated by the instructor to determine if the learning outcomes were achieved and if material needs to be revisited or reinforced.

Muddiest point paper

Instructions

Write down the most unclear point from the class session.

Instructor Notes

Review responses and address the muddiest points at the next lecture.

Matching Terms

Instructions

You have a list of terms and definitions. Match the term with the correct definition.

Module 1 Matching Terms

Equity

Equality

Justice

Diversity

Inclusion

Recognition, appreciation, and use of the talents and skills of persons of all backgrounds.

Removal of systemic barriers.

Giving each individual or group the same resources and opportunities.

Including the many communities, identities, races, ethnicities, backgrounds, abilities, cultures, and beliefs, including underserved communities.

Recognition that each person has different circumstances and allocating the resources and opportunities needed to reach an equal outcome.

Module 3 Matching Terms

Sampling bias

Coverage bias

Non-response bias

Selection bias

Social desirability bias

Aggregation bias

Group (aggregated) results differ from individual data. It leads to the “ecological fallacy,” which is an inference that the characteristics of the group is representative of the sub-group or the individual.

Members of the population of interest are not in the sampling (e.g., not all households have access to the survey medium).

Households or individuals selected for the survey/data collection do not respond and differ systemically from households or individuals that do respond to the survey/data collection.

The sample selected is not representative of the population or the survey/data collection method influences the outcome of the results.

Sample selection is not adequately randomized.

Underreporting of socially undesirable attitudes and behaviors.

Module 6 Matching Terms

Direct Displacement Exclusionary Displacement Involuntary Displacement

Indirect Displacement

A gentrified neighborhood becomes unaffordable or undesirable for future low-income residents due to increased prices and neighborhood changes.

Unfavorable programs or policies cause the displacement of a demographic or ethnic group.

An interruption of physical or social resources due to increasing retail prices and displacement of social networks.

Displacement of original residents who would prefer to stay in the neighborhood but cannot afford to due to an increase in rental and housing prices.

Lecturer Notes

Conduct an exercise matching the terms and definitions. Review the answers in class and discuss.

Reflection Paper

Module 1 Reflection Paper

Instructions

Write a 200- to 400-word essay describing one theoretical approach to transportation equity and justice discussed in class. Discuss the pros and cons of the theory and its implications for underserved populations.

Lecturer Notes

Students may also write about a related theory that they have identified on their own, the selection may need to be verified by the instructor.

Module 2 Reflection Paper

Instructions

Write a 200- to 400-word essay describing one method to identify and understand the characteristics and travel needs of underserved communities discussed in class. Discuss the pros and cons of the method and its implications for underserved populations.

Lecturer Notes

Students may also write about a related method that they have identified on their own, the selection may need to be verified by the instructor.

Module 3 Reflection Paper

Instructions

Write a 200- to 400-word essay describing one tool and/or method to evaluate travel patterns and behavior in underserved communities discussed in class. Discuss the pros and cons of the tool/method and its implications for underserved populations.

Lecturer Notes

Students may also write about a related tool/method that they have identified on their own, the selection may need to be verified by the instructor.

Module 4 Reflection Paper

Instructions

Review the list of public involvement techniques provided as a [handout](#). Write a 200- to 400-word essay describing one public involvement technique and discuss the pros, cons, and potential outcomes of using the selected technique to engage underserved populations.

Lecturer Notes

Students may also write about a technique that they have identified on their own, the selection may need to be verified by the instructor.

Module 5 Reflection Paper

Instructions

Write a 200- to 400-word essay describing one method to evaluate projects through the lens of equity (qualitative, quantitative, geographic proximity). Discuss the pros and cons of the method and its implications for underserved populations.

Lecturer Notes

Students may also write about a related method that they have identified on their own, the selection may need to be verified by the instructor.

Module 6 Reflection Paper

Instructions

Write a 200- to 400-word essay describing the short- and long-term effects of limited access to opportunity on underserved populations.

Module 7 Reflection Paper

Write a 200- to 400-word essay describing one method to increase access to emerging modes for underserved populations. Discuss the pros and cons of the method and its implications for underserved populations.

Module 8 Reflection Paper

Instructions

Write a 200- to 400-word essay describing one health-related issue associated with transportation and equity (air pollution, greenhouse gas emissions, physical activity, food deserts, noise, traffic injury, access to healthcare). Discuss the associated health outcomes and provide a brief discussion of potential mitigating measures to improve the health issue in underserved communities.

Module 9 Reflection Paper

Instructions

Write a 200- to 400-word essay describing one funding mechanism discussed in class. Discuss the pros and cons of the funding mechanism and its implications for underserved populations.

Lecturer Notes

Students may also write about a related funding mechanism that they have identified on their own, the selection may need to be verified by the instructor.

Additional Active Learning and Class Assessment Techniques

The active learning and class assessment techniques provided in this sections serve as suggestions that can be integrated into class sessions. Additional active learning and class assessment techniques can be accessed on the following websites:

- Interactive Techniques from the University of South Florida: <https://www.usf.edu/atle/documents/handout-interactive-techniques.pdf>
- Active Learning Techniques for the Classroom from Duke University: <https://learninginnovation.duke.edu/resources/art-and-science-of-teaching/active-learning-techniques-classroom/>
- Classroom Assessment Techniques (CATs) from Vanderbilt University: <https://cft.vanderbilt.edu/guides-sub-pages/cats/>
- Ideas for Assessments from George Washington University: <https://instruction.gwu.edu/ideas-assessments>

Assignments

Assignments are detailed work completed by students. The assignments reinforce what is taught in class, encourage students to explore topics beyond what is presented in the class session, and allow students to practice skills used in professional practice. Each assignment develops one or more core competencies and is used to achieve one or more learning outcome.

Suggestions for assignments are contained in the Transportation Equity Workbook that complements this curriculum. Several of the assignments are applicable to more than one module. Table 3 identifies several of the assignments and relevant modules.

Table 3. Modules and Relevant Assignments

Assignments	Module 1: History and Theory of Transportation	Module 2: Identifying Underserved Communities and their Needs	Module 3: Equity in Travel Analysis	Module 4: Involving Underserved Communities	Module 5: Evaluating Plans and Projects	Module 6: Access to Opportunity	Module 7: Equity of Emerging Modes	Module 8: Transportation, Public Health, and Equity	Module 9: Equity in Transportation Funding
Social Justice in Transportation Essay	X								
Equity in Transportation History	X	X		X					
Comparing Equity Components in Transportation Plans	X				X	X			
Commentary on Equity Issues in Transportation	X	X		X	X				
Data Sources for Equity Assessments		X	X		X	X			
Developing a Community Profile		X	X			X			
Assessing Transportation Needs of Underserved Communities		X	X			X	X		
Community Engagement Activity		X		X					

Assignments	Module 1: History and Theory of Transportation	Module 2: Identifying Underserved Communities and their Needs	Module 3: Equity in Travel Analysis	Module 4: Involving Underserved Communities	Module 5: Evaluating Plans and Projects	Module 6: Access to Opportunity	Module 7: Equity of Emerging Modes	Module 8: Transportation, Public Health, and Equity	Module 9: Equity in Transportation Funding
Neighborhood Mapping and Walking Audits		X						X	
Urban Planning Cooperative Game				X		X		X	
Case Studies and Peer Exchange					X			X	
Socio-Economic Mobility Report						X			
Policy Brief on Transportation and Health								X	
Policy Brief on Transportation Funding and Equity									X
<p>“X” identifies modules that are best suited for the assignment based on assignment details, module content, and learning objectives. These are suggestions and the instructor is encouraged to review the assignments to determine which assignments meet their course learning objectives and student needs.</p>									

Handouts

This section includes a set of handouts to supplement lecture materials and assignments. The suggested use for each handout is described in the designated module PowerPoint or activity, but instructors are encouraged to review the handouts and determine where the handouts will be most useful for their course. Handouts in this section include:

- [Inclusive Language Resources](#)
- [Variables to Identify Underserved Communities](#)
- [Public Involvement Techniques](#)
- [Data Items and Sources for Project Screening](#)
- [Health Equity Tools and Data Sources](#)

Inclusive Language Resources

Resource	Website
American Psychological Association Equity, Diversity, and Inclusion Inclusive Language Guidelines	https://www.apa.org/about/apa/equity-diversity-inclusion/language-guidelines.pdf
National Assembly of State Art Agencies Inclusive Language Guide	https://nasaa-arts.org/nasaa_research/inclusive-language-guide/#ability
Linguistic Society of America Guidelines for Inclusive Language	https://www.linguisticsociety.org/resource/guidelines-inclusive-language

Variables to Identify Underserved Communities

Tables in this handout are adapted from Williams et al. (2020) as adapted from Williams and Golub (2017).

Williams, K., Kramer, J., Keita, Y., and Boyd, T. (2020). Transportation equity scorecard – A tool for project screening and prioritization. <https://ctedd.uta.edu/wp-content/uploads/2022/03/CTEDD-019-12-Final-Report-and-User-Guide.pdf>

Equity Dimension	Metric	Comments
Low-Income Communities	Block groups with percentage of households living at or below 185% of poverty line	185% of the poverty line is used to include a broader population of economically disadvantaged persons. At or below the poverty line includes only the very poor.
Zero-Vehicle Households	Block groups with percentage of zero vehicle households more than 1 standard deviation above the countywide average (average = 2%).	
Minorities	Block groups with percentage of minority population more than 1 standard deviation above the countywide average (average = 46.8%).	Census information designates table as only Hispanic or Latino origin by race, but includes all other races and ethnicities.
Elderly	Block groups with percentage of population ≥65 years old more than 1 standard deviation above the countywide average (average = 14.02%).	
Youth	Block groups with percentage of population <18 years old more than 1 standard deviation above the countywide average (average = 21.7%).	
Limited English Proficiency (LEP)	Block groups with percentage of LEP population more than 1 standard deviation above the countywide average (Average = 5.9%).	
Disability	Block groups with percentage of disabled full-time workers in past 12 months more than 1 standard deviation above the countywide average (average = 10.8%).	
Female Head of household or single-parent households		
Households receiving food stamps		

Equity Dimension	Metric	Comments
Households in neighborhoods with low to medium home values*		
Households where the head has no high school education		
Rent-burdened households	Block groups with percentage of households spending more than 50 percent of their household income on housing.	
Transportation related health distressed populations	Areas with moderate or high concentrations of health concerns (asthma, childhood obesity, adult diabetes)	
Communities of Concern	Block groups that contain 2 or more of the above demographic variables	Use of 2 or more variables identifies concentrations of COCs as areas of potentially greatest need.
Data for these variables are typically found in U.S Census Bureau, American Community Survey (ACS), and/or local sources (review local agency websites or contact agency staff for more information).		

Public Involvement Techniques

Advisory groups and task forces

Appreciative inquiry summit

Beneficiary assessment

Charrette

City Walk

Coffee Klatch

Computer-Aided Negotiation

Consensus Building

Consensus conference

Extended reality (XR)

Facilitation

Field trip

Focus groups

Future Search

Groupware

Hotlines

Internet

Interviews

Large group/small group meetings

Meeting, hearings, and workshops

Multiattribute utility analysis

Open house

Open space

Participatory rural appraisal

Participatory technology assessment

Participatory budgeting

Plebiscite

Polls and surveys

Public hearings

Public meetings

Retreat

Samoan circle

SARAR

Task force

Town meeting

Visioning

Workshop

Data Items and Sources for Project Screening

Data items and sources tables in this handout are adapted from Williams et al. (2020).

Williams, K., Kramer, J., Keita, Y., and Boyd, T. (2020). Transportation equity scorecard – A tool for project screening and prioritization. <https://ctedd.uta.edu/wp-content/uploads/2022/03/CTEDD-019-12-Final-Report-and-User-Guide.pdf>

Access to Opportunity

Data Items	Sources
<ul style="list-style-type: none"> • Total employment for each block group • Number of workers by earning categories • Jobs within 45 minutes by auto • Transit to jobs accessibility index • Auto to jobs accessibility index 	Smart Location Database https://www.epa.gov/smartgrowth/smart-location-mapping#SLD
<ul style="list-style-type: none"> • Employment centers and other destinations* (educational facilities, community services, shopping centers, grocery stores, hospitals, etc.) 	United States Census Bureau LEHD Origin-Destination Employment Statistics (LODES) https://lehd.ces.census.gov/data/
<ul style="list-style-type: none"> • Worker characteristics data 	U.S. Bureau of Labor Statistics Employment Projections program https://www.bls.gov/emp/
<ul style="list-style-type: none"> • Occupation and industry data* 	North American Industry Classification System (NAICS) codes https://www.census.gov/naics/
<ul style="list-style-type: none"> • Jobs Proximity Index (access to employment opportunities) 	U.S. Department of Housing and Urban Development https://hudgis-hud.opendata.arcgis.com/datasets/jobs-proximity-index
<ul style="list-style-type: none"> • Public Schools • Private Schools • Colleges and Universities • Child Care Centers • Supplemental Colleges • Truck Driving Schools • Hospitals • Major Sport Venues 	U.S. Department of Homeland Security (Homeland Infrastructure Foundation-Level Data (HIFLD)) https://hifld-geoplatform.opendata.arcgis.com/
*also evaluates health (access to health care and grocery stores)	

Health and Environment

Data Items	Sources
<ul style="list-style-type: none"> Street landscape information 	Local or regional agency (unique to the area)
<ul style="list-style-type: none"> Food access data 	United States Department of Agriculture (USDA) Economic Research Service https://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas
<ul style="list-style-type: none"> Environmental Health Hazard Index* 	U.S. Department of Housing and Urban Development https://hudgis-hud.opendata.arcgis.com/datasets/environmental-health-hazard-index
<ul style="list-style-type: none"> Emissions density* 	Travel demand model (unique to the region)
*also evaluates burdens	

Safety and Emergency Evacuation

Category	Data Items	Sources
Safety	<ul style="list-style-type: none"> Crash data by fatality, severity, and modes 	Local, regional, or state agencies
	<ul style="list-style-type: none"> Safety countermeasures 	U.S. Department of Transportation https://safety.fhwa.dot.gov/provencountermeasures/
Emergency Evacuation	<ul style="list-style-type: none"> National Shelter System Facilities Emergency Medical Service (EMS) Stations Hurricane Evacuation Routes State Emergency Operations Centers (EOC) 	Homeland Infrastructure Foundation-Level Data (HIFLD) https://hifld-geoplatform.opendata.arcgis.com/datasets/

Affordability

Data Items	Sources
<ul style="list-style-type: none"> • H+T Index 	Center for Neighborhood Technology http://htaindex.cnt.org/
<ul style="list-style-type: none"> • Public Housing Buildings • Multifamily Properties Assisted • Low Income Housing Tax Credit Properties • Housing Choice Vouchers by Tract • Low Transportation Cost Index • Location Affordability Index 	U.S. Department of Housing and Urban Development http://hudgis-hud.opendata.arcgis.com/datasets/
<ul style="list-style-type: none"> • Travel time savings and out-of-pocket trip costs (e.g., average transportation cost per household) • Household cost-saving compared to base year • Share of household income 	Travel demand model (unique to the region)

Mobility

Data Items	Sources
<ul style="list-style-type: none"> • Walkability index* 	U.S. Environmental Protection Agency Walkability Index https://catalog.data.gov/dataset/walkability-index
<ul style="list-style-type: none"> • Network density in terms of facility miles of pedestrian-oriented links per square mile (D3apo, NAVSTREETS)* 	Smart Location Database https://www.epa.gov/smartgrowth/smart-location-mapping#SLD
<ul style="list-style-type: none"> • Pedestrian and bicycle network information* • Bus stop locations * • Transit service and network information* 	Local, regional, and transit agencies (unique to the region)
<ul style="list-style-type: none"> • Transit schedule information * • Transit route finding algorithms* • Transit trip duration* • Transit travel time period* 	Open Trip Planner Analyst https://www.opentripplanner.org/
<ul style="list-style-type: none"> • Fixed Guideway Transit Stations • Public Transit Stations • Public Transit Routes • Stations and Transfers • Trails • Amtrak Stations • Railroads 	Homeland Infrastructure Foundation-Level Data (HIFLD) https://hifld-geoplatform.opendata.arcgis.com/datasets/
<ul style="list-style-type: none"> • Origin and destination information • Current and forecasted travel time, speed, and distance • Network volume, capacity, or vehicle miles travel (VMT)* 	Travel demand model (unique to the region)
*also evaluates health and environment and/or access to opportunity	

Burdens

Data Items	Sources
<ul style="list-style-type: none">• Historic trends• Existing resources• Timeline of changing conditions	Historic records and maps Archived plans and studies Community feedback Staff input Maps of current conditions

Health Equity Tools and Data Sources

Tool	Developer	Goal	Measures
City Health Dashboard https://www.cityhealthdashboard.com/	NYU Langone Health, supported by RWJF	Provide communities and city leaders with an array of regularly updated data specific to neighborhood and/or city boundaries	Health Behaviors, Social and Economic Factors, Physical Environment, Health Outcomes, and Clinical Care
Transportation and Health Tool https://www.transportation.gov/transportation-health-tool	USDOT, CDC, APHA	Provide easy access to data for practitioners to understand health impacts of transportation systems	Health, transportation, policy, infrastructure investment
County Health Rankings & Roadmaps https://www.countyhealthrankings.org/	University of Wisconsin Population Health Institute	Help communities to identify opportunities to improve their health	Health outcomes, health factors, clinical care, social & economic factors, physical environment (e.g., air quality, housing, and transit)

Tool	Developer	Goal	Measures
Healthy Community Assessment https://archives.huduser.gov/healthycommunities/	UD's Office of Lead Hazard Control and Healthy Homes	Offers a comprehensive approach for evaluating factors that contribute to community health	Social, physical and environmental indicators that comprise the Healthy Community Index (HCI)
Community Health Assessment https://www.cdc.gov/publichealthgateway/cha/index.html	CDC	Provides information and helps with developing a community health improvement plan by justifying how and where resources should be allocated to best meet community needs	Gateway to multiple resources such as BRFSS, CDC Wonder, County Health Rankings, etc.
Health Economic Assessment Tool https://www.euro.who.int/en/health-topics/environment-and-health/Transport-and-health/activities/guidance-and-tools/health-economic-assessment-tool-heat-for-cycling-and-walking	WHO	Estimate the value of reduced mortality that results from regular walking or cycling.	If x people cycle or walk y distance on most days, what is the economic value of mortality rate improvements?

Tool	Developer	Goal	Measures
<p>HIA's and Other Resources to Advance Health-Informed Decisions</p> <p>A toolkit to promote healthier communities through cross-sector collaboration</p> <p>https://www.pewtrusts.org/en/research-and-analysis/data-visualizations/2015/hia-map?sortBy=relevance&sortOrder=asc&page=1</p>	<p>Pew Charitable Trust</p>	<p>Resources for communities, agencies, and other organizations to improve public health.</p>	<p>A toolkit with numerous resources including health impact assessments, guides, and other research.</p>

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Appendix

Analysis of Planning Syllabi

This appendix includes the summary of the analysis of planning syllabi conducted for the Transportation Equity Curriculum.

Overview

The curriculum will be designed to fill a gap in transportation education as it relates to social equity. Therefore, as a sub-task to the review of resources and curricula, a review and analysis of planning syllabi were conducted. This is a critical first step to evaluate the extent and nature of the gap in transportation education. Findings and conclusions from this analysis will be used to shape the curriculum design and ensure that its content addresses the needs of educators and emerging professionals involved in transportation.

Objectives

1. To understand how planning-related courses, on any topic, introduce questions of social equity.
2. To identify specific readings, assignments, and pedagogical approaches that are relevant to the development of the transportation equity curriculum.

Data and methods

We used two compilations of urban planning and urban studies syllabi to examine current practices of teaching and learning about social equity. The Association of Collegiate Schools of Planning (ACSP)—through its committees and interest groups—has compiled syllabi that address social justice, broadly speaking, including equity (acsp.org).

Similarly, the Urban Affairs Association and the Center for Urban Studies at the University at Buffalo have compiled syllabi focusing on action-oriented research and community development in urban settings and communities of color (theycyberhood.net). Many of these are directly relevant to social justice and equity.

In total, ACSP and Cyber Hood compiled N=120 syllabi. We screened the syllabi to classify them as relevant to the project (or not) based on whether they included content about equity, social justice, social inequalities, race, class, gender, or other identity factors that could generalize or relate to transportation equity. A syllabus was included in the sample even if it had only a small chance of being relevant (i.e., trying to keep as many as possible). Syllabi that were screened out did not highlight equity, such as courses that covered details of other policy subsystems without consideration of equity (e.g., housing policy, food systems policy) and methods courses.

After screening out N=44 syllabi, we included N=76 syllabi in the sample. We did a “deep skim” of N=76, examining their content for resources, assignments, and pedagogy to inform the transportation equity curriculum. We also kept track of specific resources, assignments, activities, and pedagogical methods in our shared google spreadsheet. In addition to compilations of syllabi, this memo includes one syllabus generated through hand searching.

Results

The review and analysis of syllabi were used to identify courses that included transportation equity, courses about other topics that could relate to transportation equity, and courses that do not discuss equity and inequality, but that could and probably should. These courses are described in this section.

Courses that included transportation equity

Harwood (2017, in [ACSP Syllabus Book](#)) designed “Community Engagement in Planning” around a case study of the Red Line extension in Chicago:

Given the lack of policy responsiveness [to the larger pattern of regional divestment in Black urban communities], does transit equity matter? Does it matter in the state of Illinois, and very specifically in northeastern Illinois? Any objective assessment would have to conclude that it hasn’t mattered. The history of transportation planning reveals not only the inequitable outcomes but the punitive effects of transportation planning on the social environments of poor, underserved, minority communities. Instead of sharing in the collateral benefits of regional transportation planning, black communities have suffered the collateral damage of transportation planning. One such area in the region has been the far South Side of Chicago.

Harwood (2017) references Bullard (2005) to propose that engaging in transportation equity and investment is a key pathway to building “economically viable and sustainable communities.” The syllabus focuses on the community engagement aspects of the case study; potentially, there are other aspects of the case that could be analyzed and used in the transportation equity curriculum.

Similarly, Loh (2016, in [ACSP Syllabus Book](#)) used a case study of public transit and transportation equity in Boston in the course, “Environmental Justice, Security, and Sustainability.” This section of the syllabus includes two films (*Equal or Better: The Story of the Silver Line* and *Bus Riders Union*) and several academic and non-academic readings.

Blumenberg (2016, in [ACSP Syllabus Book](#)) was one of two “transportation” syllabi we found that were designed to examine “equity questions associated with urban transportation.” “Transportation and Economic Outcomes” begins by establishing the context of urban spatial structure, urbanization processes, poverty, and the relationship between transportation and access to opportunities. The course then examines elements of the transportation system and their relationship to the broader dynamic of urban inequality.

[Smart \(2018\) “Transportation and Equity”](#) was found through hand searching. This syllabus also focuses on transportation equity. The course “is a research-oriented course for graduate students, focusing on the ways in which transportation decisions, infrastructures, policies, or transportation-related issues (such as urban sprawl) intersect with concerns about social justice/equity/fairness.” Students select a specific topic for empirical research or synthesis and draft a scholarly publication related to that topic, in addition to discussions in weekly lectures of high-quality scholarly readings on a list of equity topics.

Courses about other topics that could relate to transportation equity

Although few syllabi in the sample focused specifically on the transportation system or transportation equity, several others offer insight into how we can teach and learn about transportation equity. The design of Blumenberg (2016) is an example of how the fields of planning, public policy, and urban studies understand equity: The broad context of urbanization and uneven economic development is a key mechanism through which oppression, specifically racialized oppression, occurs. Specific sectors such as housing and transportation play a role in determining these spatial processes. Responses include community development, community organizing, policy, and design. There is academic debate about

the underlying mechanisms that cause urban social problems as well as the best ways to change the system to improve equity outcomes.

The implication for the transportation equity syllabus is that teaching and learning about transportation equity would likely involve a mix of:

- the “big picture” urban studies arguments,
- sector-specific content knowledge for people who specialize in transportation, and
- a set of methods and skills that people can use to directly address inequity through their transportation planning and engineering practices.

The sections below highlight material from syllabi that complement the transportation focus of the equity curriculum.

Housing

Processes and outcomes of racial segregation are at the core of syllabi about housing and housing is central to questions of accessibility and transportation.

- [Anacker, 2015](#): Introduction to Housing Policy. The course description says, “Special attention will be paid to the recent house price and foreclosure crisis as well as inequality,” but the learning outcomes do not carry the theme of inequality explicitly.

The course content elevates housing finance, including taxes. One of the arguments in housing policy courses is that public and private finance structures in housing practically determine built form and social outcomes.

This course does not elevate the spatial aspects of housing that would be important for transportation equity. The main assignment is a final paper and presentation based on original fieldwork (site visits or expert interviews).

- [Siverman, 2020](#): Housing and Community Development includes a planning simulation in-class activity. The syllabus does not include details about the assignment.

Labor markets, labor economics

Courses about the processes and equity outcomes of labor markets complement ideas about accessibility that were raised in the housing syllabi. These courses introduce the topic of spatial mismatch. They also include theory-based debates about the underlying reasons for inequality in cities and regions.

- [Fasenfest, 2005](#): The course, “Labor Market Analysis” explains that it explores “classical/neo-classical models of economic activities” along with “two underlying premises that offer competing perspectives that will become the basis for [the course].” The course presents the traditional models and their assumptions and then critiques them using other theories that “begin with the assumption that social structures and institutions constrain individual decisions and restrict the range of outcomes” and that are “theorized as forces that distort markets in the consensus perspective while are seen as core forces creating markets in this conflict perspective”, i.e., Marxist theory. In other words, in addition to discussing technical aspects of equity in the transportation equity curriculum, one could present related economic and political economy theory about the reasons for different equity outcomes. This course describes it well. See also [Fasenfest, 2006](#): Sociology of Work.

Food systems

The sample included several syllabi about food systems policy and planning. It is relevant to transportation equity because it involves access to opportunities (e.g., food deserts) and may involve useful methods for assessing equity.

- [Born, 2009](#): “Urban Planning and the Food System” asks students to facilitate class discussion and the syllabus outlines various structured discussion formats that students may use (“Techniques for Planning a Discussion”).
- [Born, 2009](#) and [Denckla Cobb and Beatley, 2009](#): “Healthy Communities, Healthy Food Systems” both gesture toward the significance of global economic systems that produce and distribute food and their interaction with policy and local outcomes. It seems that in certain applications there will be a global dimension of transportation equity.
- [Denckla Cobb and Beatley, 2009](#) includes a team project assignment designed to assess a regional food system. Students develop and apply benchmarks based on literature and secondary data and then develop visual representations of their findings.
- [Denckla Cobb \(no date\)](#) includes an elaborate project that involves mapping, food deserts, and even access/transportation.

Urban theory, planning theory, urban policy, social policy, urban politics

Most of the syllabi in this sample did not focus on equity or social justice within a specific sector of infrastructure or policy (e.g., housing, transportation). Instead, most syllabi argued that the equity and social justice problems in society (e.g., housing, segregation, finance, labor) are the product of the complex, historical interactions of multiple sectors and processes. These syllabi also elevated the Civil Rights Movement and other types of resistance and social change as areas of study. These courses draw on various social science theories and methods to ask and answer fundamental questions of governance, citizenship, who belongs in the city, who makes decisions about the future of people and neighborhoods. Taken together, they provide options for theoretical frameworks for teaching and learning about transportation equity. They also include interesting assignments and readings that could be useful resources for the curriculum.

- [Green, 2012](#): “Urban Development” includes a framing article about liberal political theory and mobility (Imbroscio, 2011), discussing the limits of solving social problems by “shuffling people throughout metropolitan space.”
- [Lake, 2017](#): “Social Justice in Planning and Public Policy”. Similar to other syllabi in this sample, this one centers on social justice. It could be useful for the transportation equity curriculum to define concepts like equity and justice and compare them.
- [Meagher, 2008](#): “Philosophy and the City” asks students to do a walking tour/podcast reflection—“philosophical walking tours.”
- [Owens, 2009](#): “Atlanta” asks students to read and keep up with the local paper.
- [Umemoto, no date](#): “Cultural Diversity in Planning” is a foundational course on questions of identity formation as they relate to place. This syllabus would complement resources about cultural competency as it relates to transportation equity. It includes readings from David Harvey’s “Right to the City,” which is a heavy theory reading, but also foundational because it claims that inclusion and equity are actually practical questions of infrastructure and public decision-making. In other words, it makes the case that transportation equity is a critical part of social justice.

- [Bockmeyer, 2007](#): “Comparative Urban Political Systems” asks questions about the role of politics, governance, and service provision in urbanization and social outcomes of urbanization. This syllabus includes a reading by Margaret Weir that could not be located, but [there is another article by Weir](#) that frames the question of inequality as a problem of spatial urban politics, which is helpful. This syllabus includes a unique section, “Who are urban citizens? Immigrants and participation by non-citizen residents.” A more current reading from an author on the course’s reading list discusses neighborhood features and walking environments as important for civic participation among immigrants from Mexico and India in Philadelphia and Atlanta ([Okamoto, et al., 2020](#)).
- [Rast, 2005](#): “Urban Political Process” asks students to write a research paper with a focus on a historical period. This seems potentially useful for the transportation equity curriculum.
- Questions of urban and regional governance would be relevant to understanding root causes of transportation inequities (see Thomas, 2018 in the ACSP Syllabus Book).
- [Bessel, no date](#): “Urban Poverty” asserts that the US is a wealthy nation with a high per-capita income, yet a growing poverty problem, as indicated by metrics such as income and access to health care. The course considers the theories of poverty, lived experience of poverty, and how these experiences are shaped by identity factors such as race, ethnicity, gender, and age. But poverty, conceptually, is not the same as equity. This syllabus includes [an excellent reading from bell hooks, a chapter from *Where We Stand: Class Matters*](#). Intersectional exploration of race, class, and gender. These readings by bell hooks are accessible and profound and could be a helpful way to include more theoretical content in the transportation equity curriculum.
- [Dreier, 2005](#): “Urban Policy and Politics” requires students to either write a policy memo OR *do community engagement* with (1) one of the LA mayoral campaigns or (2) the inclusionary zoning campaign. This course also includes several movies about politics.
- [Galster, 2004](#): “Neighborhood Decline and Revitalization” sets up a framework for analyzing neighborhood change with six core principles, including the Principle of Inequity: that the costs of urbanization processes are disproportionately borne by lower socioeconomic status residents and property owners. Transportation is part of the system of urbanization processes. Similar arguments are made by [Garschick Kleit, 2008](#): “Inequality in the Metropolitan Region,” which is a course that includes a field trip.
- [Jargowsky, 2019](#): “Inequality and Segregation” focuses on income inequality and residential segregation.
- [Leroux, 2007](#): “Public Policy and Urban Administration” is interesting because it takes the next logical step in the discussion about urbanization processes. Given the disparities in urbanization, what can and should a local government do to improve equity outcomes through the provision of services. This is a helpful framework for transportation. Also, local governments provide services, but we need to deal with problems of regions and intergovernmental relationships too. Transportation has a strong vertical, intergovernmental framework, for instance.
- [McGovern, 2019](#): “Urban Policy” includes “newspaper reading” as a class exercise/assignment. The class also includes two field trips.

Community development, community planning, public participation

Syllabi about community development focus on how to create more equitable policies, plans, and designs through the actions of professionals and community members. Community development

courses sometimes use transportation-related cases, but the courses are also concerned with gentrification, affordable housing, and other issues.

Courses on community organizing imply that a transportation equity curriculum would include methods for equity analysis as well as actions that could be taken through planning, policy, design, and organizing. For example, see:

- [Dreier, 2004](#): The course, “Community Organizing and Leadership / Community Internship” argues that the outcome of an equity analysis would be organizing, leadership, and even activism around the issues at hand.

Community development courses include several examples of neighborhood assessment assignments, fieldwork, and other methods of analysis and engagement. These courses might overlap with the teaching and learning about Community Impact Assessment in transportation. For example, see:

- [Patterson, 2014](#): The course, “Community Social Work” is a community development course with a foundation in social work practice. Assignments include attending community meetings and doing a neighborhood assessment.
- Abramson (2016; [ACSP Syllabus Book](#)) includes a Field Research assignment. Abramson includes several weeks of preparation for “mapping” communities, which could be relevant to the Transportation Equity Curriculum
- Lung-Amam (2016, [ACSP Syllabus Book](#)) has designed an entire course around story mapping, which includes various neighborhood and community mapping techniques.
- Assignment from González (2017, in [ACSP Syllabus Book](#)) includes an assignment to explore a community and identify/describe community characteristics through a community profile.
- Pfeiffer (no date, in [ACSP Syllabus Book](#)) includes an “Event Reflection” assignment and a “Technique Presentation” assignment in which students present for 10-15 minutes about a public engagement technique. Something like this could be adapted for a variety of transportation equity topics or public participation methods.
- González (2017, in [ACSP Syllabus Book](#)) includes a short and practical reading about community-based participatory research ([Burns et al., 2011](#)).

Environmental justice, just sustainability

Environmental justice is interrelated with the transportation equity curriculum. One of the syllabi that did include a transportation focus (Loh, 2016) was an environmental justice course. Environmental justice modules in the transportation equity curriculum could draw upon the following syllabi.

- González (2017, in [ACSP Syllabus Book](#)) includes EJ and provides an interesting primary source, the [Principles of Environmental Justice](#) that were agreed upon by delegates to the 1991 First National People of Color Environmental Leadership Summit.
- Kennedy (2016, in [ACSP Syllabus Book](#)) has a section on EJ with readings and methods that we could assess more carefully for an EJ component of the curriculum.

Methods, skills

The community development syllabi teach methods of activism and organizing. They also teach various qualitative methods of mapping. Quantitative courses rarely focused on equity analysis or methods of intervention. Silverman (2021) included an interesting skill: recognizing and analyzing microaggressions.

- [Silverman, 2021](#): “Planning Techniques in Action” includes an assignment in which students identify and analyze microaggressions in planning discourse.

Urban design

- Simpson (2018, ACSP Syllabus Book) “Community Participation, Design, and Planning” includes several interesting community design resources that we should review and consider including in the spreadsheet. It appears to be a studio course.

Policing and politics

- [Owens, 2018](#): “Policing and Politics” includes a section on pedestrian and vehicle stops as politically-sanctioned racialized policing practices.

Public finance

- [Silverman, 2010](#): “Local Government Finance & Budgeting” should be useful, but it does not target questions of transportation. Transportation equity was addressed in Marty Wachs’s “Transportation Finance” course. Content related to finance would be useful for the transportation equity curriculum.

Economic development/tourism

- [Cole, no date](#): “The Tourism Studio” explores the “costs and benefits” of tourism in a corridor (i.e., Route 16). The syllabus describes the studio pedagogy. A transportation equity studio would be a potential format for an in-depth experience.

Teaching philosophy

- Lung-Amam (2016, in [ACSP Syllabus Book](#)) includes a statement about teaching philosophy at the end of the syllabus, which was unique and potentially a way to communicate about transportation equity as a value.

Courses that do not discuss equity and inequality, but that could and probably should.

We note that syllabi for methods and research design courses ask students to learn research ethics, but none offered specific practices or methods about equity analysis. Public health courses about risk analysis and risk mapping would be another example of the possibility to include methods.

- [Anacker, 2015](#): Policy and Program Evaluation. This course discusses performance measurement, measurement of program effects, assessing impacts, and measuring efficiency but it does not use the language of equity or inequality. Yet, a course like this could include a critical discussion of equity-related program evaluation and performance measurement.

Discussion

Discussion points from the syllabi review include the following:

- Four syllabi from the search included a focus on transportation equity. Two of these were courses designed around transportation equity (Blumenberg, 2016; Smart, 2018). One was

designed around a transit equity case study in Chicago (Harwood, 2017). A fourth included in-depth case study material about a transit equity case in Boston (Loh, 2016).

- Many courses have an explicit interest in equity, equality, and social justice, but few start with basic definitions of equity or a structured presentation of questions of equity, equality, and justice.
- The courses that identify inequities in housing, community development, governance, economic development, labor markets, food systems, tourism, and other sectors do not necessarily dwell on the role of transportation. But it seems that, from a transportation perspective, thinking through equity in transportation investments means understanding the underlying spatial inequalities that *could* be addressed with transportation service, design, infrastructure, etc. and those that might best be address through other strategies. Essentially, there is an “urban studies” perspective on equity and a transportation systems perspective that applies the tools of transportation planning, policy, and design to address underlying mechanisms that create inequality. Insight into the forces that influence inequity in land use/location decisions is critical to understanding how best to resolve access to opportunity issues. For example, why are grocery stores not located in some areas, but prevalent in others? Transportation and spatial equity are closely interrelated.
- Many topics represent useful applications or case studies for an equity analysis: food systems, public transit expansion, tourism, spatial mismatch.
- Questions of public finance, public services provision decisions, and policy analysis are closer to what we find in equity practices and analyses in the transportation sector (e.g., in a Transportation Policy class, or a Public Transit class).
- There are some fundamental political science, economics, and political economy readings that frame the role of markets, states, individuals, and built environments that are relevant as background readings.
- Themes from our advisory group meeting appear in these syllabi: intergenerational equity, governance (e.g., regional/local tensions and finance), historical processes of urbanization, displacement and gentrification, and discourse. The advisory group recognizes that solutions might not always be in the transportation arena, and this indicates the curriculum might include materials that train students to work across sectors/disciplines.

Conclusions

Based on this analysis of syllabi a possible outline of the transportation equity syllabus would include:

- the “big picture” urban studies arguments
- sector-specific content knowledge for people who specialize in transportation, including integrated land use, transportation, and telecommunications strategies
- a set of methods and skills that people can use to directly address inequity through their transportation planning and engineering practices

We have many other resources about transportation equity to examine. We note that they were mostly absent from the syllabi. Again, this indicates a true need for the transportation equity curriculum to bundle resources that make transportation equity topics more accessible for instructors. The next step in the analysis will be to analyze the patterns we see in all our resource data: what is covered, what are the gaps, what instruction are students getting, and what are the priorities for the transportation equity curriculum.

