Prerequisites: Prereq for DUSP students: GIS (11.205 or equivalent), and prior design degree or UD skills (11.328J / 4.240J or equivalent)

Practicum Partners: HeatReady Phoenix, Office of Heat Response & Mitigation, Urban Tree Program, City of Phoenix; and Toyota Mobility Foundation.

Rising Phoenix:

Intergenerational Housing + Autonomous Universal Access in America's Hottest City

This joint urban studio will focus on one of the most urgent climate, environmental, and urban challenges we face today: heat and urban growth. Combining research and design, the studio presents a pedagogical model that brings together designers - SMArchS Urbanism (ARCH) and planners (DUSP students) to work together around a shared urban challenge where professional lines are blurred.

In the US, the population continues to relocate to the sunbelt states and Phoenix is one of the fastest-growing metros in the country. This influx of new people during recent extreme droughts has pushed water resources and heat impacts to their limits. Phoenix is now the hottest city in the US with months of average temperatures exceeding 100 degrees Fahrenheit. For those who still live in the urban core, the lack of a shaded landscape and abundance of heat-absorptive building materials has produced dangerous living conditions.

The City of Phoenix, and its Office of Heat Response and Mitigation, have asked us to consider three wicked problems facing sunbelt cities as they continue to rapidly grow: affordable infill housing, heat island effects, and better access to multiple modes of transportation. Our studio will focus on heat mitigation and examine the South Central Village of Phoenix. The goal is to create a new set of block and streetscape typologies to reimagine intergenerational housing and universal access to autonomous mobility to create "a cooler," safer, and healthier living environment in the future and how these solutions can be applied to other urban areas as the world heats up.

Students will conduct group planning research as well as site analysis and urban design to comprehensively innovate around the nexus of urban heat--intergenerational housing--autonomous mobility and universal access design.

General Structure of the Modular Studio

The joint urban design studio will be offered as 2 modules beginning in Fall 2023. The first module (6 weeks) focuses on 'design research' by revealing unforeseen planning and design opportunities through analytical representation and mapping. In mid-studio, module one and two overlap with a trip to Phoenix (Oct 8-10, all expenses paid for all students) and includes meetings with city 'heat and planning' officials, community groups, and site visits, all culminating in the collaborative task of learning to write a real "design brief" for the City. The design brief will translate the research data and understandings into objectives, principles, and guidelines for design on the urban, landscape, and architectural scale. The second module (8 weeks) advances research insights to deliver urban design proposals to the City of Phoenix, that focus on heat mitigation, and intergenerational housing, combined with universal access to autonomous mobility. The new modular system allows students a more comprehensive understanding and practice of the various analytic and creative aspects of the urban project, through a collaborative process that merges planners and urban designers.

Justice and Equity Concerns

The project will address justice ideas through the inclusion of universal housing and universal access concepts, as well as affordable housing and the development of specialized codes for aging-in-place and barrier-free living. Moreover, the development goals we are addressing will eliminate the household need for the private automobile, garage, and driveway saving households upwards of \$400/month on transportation to be used elsewhere in the household budget. South Central Phoenix is overwhelmingly represented by lower-income Latino and other minority neighborhoods.

COURSE CALENDAR

WEEK	DATE	DAY	FORMAT	
0	Sept 7	R	Introduction	
1	Sept 12	т	GIS Workshop 1-Introduction	
	Sept 14	R	GIS Workshop 2-Vector + Workshop1 Pin-up (last hour) (AB out)	
2	Sept 19	т	GIS Workshop 2-Vector: Working Session	
	Sept 21	R	GIS Workshop 3-Raster + Workshop2 Pin-up "Heat Scales" presentation by Eduardo, Sarah and Nada at 4pm	Research
3	Sept 26	т	GIS Workshop 3-Raster: Working Session	
	Sept 28	R	GIS Workshop 4-Mapping + Workshop3 Pin-up (last hour)	
4	Oct 3	т	GIS Workshop 4-Mapping: Working Session Lecture: Frey Gruppe (tentative) 1.5 hours	
	Oct 5	R	Pin-up for Research and Analytical Mapping	
	Oct 8	Sun	Arrival	
	Oct 9	Μ	(Indigenous Peoples' Day — holiday) Morning-, 9-11 am- Taliesin West Afternoon- walk the site Evening Dinner	Trip + Design Brief

5	Oct 10	Т	(Student Holiday) Meetings with city 'heat and planning' officials	
	Oct 12	R	Design Brief discussion (AB out)	
6	Oct 17	т	Design Brief discussion	Design
	Oct 19	R	Design Brief-Research & Analytical Integration Pin-up/ review	Brief
7	Oct 24	т	William's mobility/micro-mobility/ disability ("Curb 2 Kitchen") lecture (confirmed)	
	Oct 26	R	Desk crits (RS out) RS will conduct makeup class desk crits Wed. Oct 25	
8	Oct 31	т	Desk crits (RS out - critics over Zoom)	Design
	Nov 2	R	Desk crits (RS out) RS will conduct makeup class desk crits Mon. Nov 6	rojeci
9	Nov 7	т	Peer desk crits	
	Nov 9	R	Desk crits	
10	Nov 14	т	Desk crits	
	Nov 16	R	Post-design analysis (shadow/heat) workshop	
11	Nov 21	Т	MID REVIEW (William coming in)	
	Nov 23	R	Thanksgiving Holiday	
12	Nov 28	Т	Desk crits	Design

	Nov 30	R	Pin-up	Project
13	Dec 5	т	Desk crits	
	Dec 7	R	FINAL REVIEW	

Site Description:

Last semester, we looked into Phoenix's "inner loop" area. What we term "inner loop" is a 9.3 square miles rectangle site enclosed by I-10 and I-17, located inside the central city village, one of fifteen villages in Phoenix, AZ. The central city village had 63020 population (20440 households) in 2015, which is estimated to grow to 104250 by 2030.¹ More than 50% of the central city village population (roughly 35000) live in 26 neighborhoods/districts of the inner loop.²

During this semester's studio, our attention will move away from the previously emphasized "inner loop" or the north segment of the south-central corridor and shift towards the southern section – a tract of land spans across both the central city village and the south mountain village, which is been referred to as the south central village area by the city. Inside this area, the south central village core, located at the intersection of W. Broadway Rd and S. Central Ave, is prioritized for the near-term development. It will serve as the focal point of our design endeavors throughout the studio duration.

¹ The City of Phoenix (2015). Central City Village Character Plan.

² U.S. Census Bureau. 2014-2018 American Community Survey 5-year Estimates.





The South Central Village Core

The South Area embodies a dynamic and interconnected ecosystem, emphasizing the empowerment of families, and youth, and safeguarding the most marginalized groups. There is a need to motivate forthcoming generations to establish their lives and careers flourishing within this locale. Enriched by its profound traditions, the community stands as a platform to commemorate and exchange history, heritage, and the mosaic of cultures with all those who come to visit. The South area is committed to fostering growth that avoids displacing current residents and businesses. This growth strategy aims to carefully nurture development, respecting the area's existing character in a strategic and gradual manner. The objective is to seamlessly integrate appropriately scaled housing and land usage within established neighborhoods and commercial zones. This approach aligns with the community's envisioned future while maintaining the unique identity of the region.⁶

The South Central Village Core, is identified as a critical focal point for new development in our city. While currently designated as a village core solely in planning documents, the realization of a vibrant and flourishing village core necessitates substantial design efforts and strategic investments in this locale. This area will have a light-rail stop with the new extension, which is set to be completed in 2025. The attached map shows the vacant lots that have been identified as housing and open space development and are owned by the city:

- 1. Former Ed Pastor bus station will stay in the public transportation department and service community as a public amenity. Various programs can be imagined for this place.
- The place will become the center of the South Central Village core with a new light rail stop, which will bring huge redevelopment opportunities.
- 3. The existing park could be redesigned to react to the new developments.
- 4. City-owned properties will be redeveloped as new housing.



Drosscape and Other General Landscape Thoughts on Urban Cores:

The natural process of the city is not unlike that of living organisms, whose hard parts, from the bones and shells of terrestrial vertebrates and marine invertebrates to the iron and other elements and compounds precipitated by cells, originated in the expelling and/or managing of wastes. The economies that provide the energy and materials for the growth of cities, such as manufacturing and housing, are less things than processes. And, as is true for organisms, the faster they grow or shrink, the more waste they produce. This is a natural process that can be ignored, maligned, or embraced, but never stopped.

Cities are not static structures, but active arenas marked by continuous energy flows and transformations of which landscapes and buildings and other hard parts are not permanent structures but transitional manifestations. Like a biological organism, the urbanized landscape is an open system, whose planned complexity always entails unplanned drossscape in accord with the dictates of thermodynamics. To expect a city to function without waste (such as in a cradle-to-cradle approach), which represents the in situ or exported excess not only of its growth but also of its maintenance, is as naive as expecting an animal to thrive in a sensory deprivation tank. The challenge for designers is thus not to achieve drossless urbanization but to integrate inevitable dross into more flexible aesthetic and useful design strategies, even if only temporary.

US city cores have been a hotbed of entropic activity over the past half-century of deindustrialization, boom times and bust recessions, and most recently the Covid pandemic and work-from-home phenomenon, which has devastated office space industries in city centers. Most urban cores contain large swaths of underutilized paving, brownfields, vacant buildings, drainage channels, and half-empty office towers that are now scattered throughout city core zones with no easy conversion to other uses. Gentrification, historic redlining, poor transportation systems, crime, underfunded schools, and other factors have also led to gross inequities for working-class people who still manage to live in urban cores. Compounding these trends are the terrible effects of climate change, including extreme heat, flooding, drought, and rapidly deteriorating air quality. Taken together, designers who work on city cores are increasingly asked to become magicians or miracle makers, or the agents of omnipotent remediation—to intervene with silver-bullet projects that can alleviate wicked problems inherited from a century+ of injustices embedded in urban cores today.

Our studio is tasked with the very difficult goal of designing "cooling" infrastructure (whether through architectural or landscape mediums) and providing housing solutions for the South Central Village Core of Phoenix.

Heat

Rapid growth, an abundance of paved surfaces, and reflective building materials have made Phoenix's heat island effect an extreme public health crisis. Global warming will likely make our site increasingly

hotter.³ In 2020 summer, with 53 days hitting 110 F or higher, record-high heat-associated fatalities were reported.⁴ The inner loop site has approximately 30% impervious surfaces and a low ratio of tree coverage,⁵ suffering the most from the increasing temperature.

Phoenix's Climate Action Plan 2021 enlists significant climate actions and one of them states-

"Become a top tier Heat-Ready City by 2025—implementing the Tree and Shade Master Plan by 2030 and building a network of 200 "cool corridors" by 2050"



³ Brazel, A.J. (2007). Urban Heat Island Affects Phoenix All Year-Round. ASU Global Institute of Sustainability and Innovation.

https://sustainability-innovation.asu.edu/news/archive/urban-heat-island-affects-phoenix-all-year round/#:~:text=It's%20the%20urban%20heat%20island,farther%20into%20the%20desert%20vall ey. || Ryback K. (2021). The Urban Heat Island Effect Could Be Making Phoenix Hotter, Studies Show. The Sustainability Review.

⁴ James, I. (2021). Heat Killed A Record Number Of People In Arizona Last Year, 'A Staggering Increase'. Azcentral.

https://www.azcentral.com/story/news/local/arizona-environment/2021/01/31/heat-killed-record-nu mber-people-arizona-last-year/4294654001/

⁵ Middel, A., Brazel, A. J., Kaplan, S., & Myint, S. W. (2012). Daytime Cooling Efficiency And Diurnal Energy Balance In Phoenix, Arizona, USA. *Climate Research*, *54*(1), 21-34. || The City of Phoenix (2022). South Central Transit Oriented Development Community Plan.

(Source: ASU, https://research.asu.edu/too-hot-handle)⁶

Design proposals

The second half of the studio (module II) will be devoted to developing design proposals based on the design briefs and sites provided by the city. The design work will be done in groups and will seek to combine the design of buildings, urban spaces, landscapes, and infrastructure into integrated proposals that offer a comprehensive and holistic vision of future life in this urban environment. The primary objectives of these proposed designs would be to combine heat mitigation approaches and strategies with new models of housing - specifically intergenerational housing types, with infrastructure for autonomous universal access mobility.

Intergenerational Housing

Intergenerational housing is a housing concept that encourages people from multiple generations to live together in the same residential housing complex. This can include older adults (seniors), middle-aged adults, and younger generations, such as families with children. The goal of intergenerational housing is to design a diverse and inclusive living environment where people of different ages can interact, share experiences, and support each other in daily life.

Benefits of intergenerational housing include improved emotional well-being, social interaction, collective culture and knowledge sharing, bridging of generational gaps, and reduced ageism.

The design of Intergenerational housing is seen here to align with city initiatives, as the "Housing Phoenix" plan - -which aims to create or preserve 50,000 homes by 2030 and increase the overall supply of the market, workforce, and affordable housing through various policy implementation for "creating a stronger and more vibrant phoenix through increased housing options for all".

Automated Vehicles And Infrastructure Of Universal Access

Autonomous vehicles are self-aware, self driving, and rely on sensors, actuators, algorithms, and machine learning systems. They create and maintain a map of their surroundings based on a variety of sensors situated in different parts of the vehicle.

⁶ https://research.asu.edu/too-hot-handle

Universal access automated driving systems could increase mobility for seniors and people with disabilities. Prof. Alan Berger has been working with the Toyota Mobility Foundation (TMF), which is focused on how autonomous mobility (including micro mobility and delivery) can seamlessly transition to serve the disabled, elderly, aging in place population, across multiple land use configurations. The work evaluates real-world typologies and creates guidelines for future land use and new Optimized Suburban Units (OSUs).

ASSIGNMENTS

Studio Schedule for Module 1:

Assignment 1: (4+ weeks)

Sept. 7 – Oct. 5 with pin up on Oct. 5

Module I Research and Analytical Mapping of the South Central Village Core

Assignment 2 (2 weeks)

Oct. 7- Oct. 19 Design Brief with pin up on Oct. 19 (Oct. 8- Oct. 10 Site Visit) Envisioning the Project and Drafting of a Schematic Design Brief

Module 1 Assignments:

Module 1 of the studio will consist of two assignments. Assignment 1 will consist of research on South Central Village Core and analytical mapping of its conditions. Assignment 2 will ask groups to synthesize the research and envision potential design interventions for the site and prepare design briefs to be used for the second half of the studio that develop a vision plan for the future of the South Central Village Core and propose the conditions for a new 60-unit housing cluster.

Assignment 1: (4+ weeks)

Sept. 7 - Oct. 5 with pin up on Oct. 5

Module I Research and Analytical Mapping of the South Central Village Core

(produce 3 mappings: one district scale mapping per group, plus 2 neighborhood scale-to-block scale per group)

Interdisciplinary teams will be assigned one of the topics listed below to map, analyze, and reveal the current state of *Infrastructure, Typological, Socio-Demographic, and Environment and Landscape* conditions within the South Central Village Core. This exercise is intended to expose students to both the general issues and trends facing our site's neighborhoods today, as well as to ground later design proposals in quantitative data and mapping.

Team 1: The Infrastructural:

Transportation networks, transit lines and stops, rail lines, networks of particular land use types (such as warehouse districts, etc.), water and drainage lines or systems, hierarchy of roads, energy, green infrastructures, shading and cooling projects underway, neighborhoods scale changes taking place (such as gentrification or large change over time), etc.

Team 2: The Formal-Typological:

Typologies (housing, office, retail, etc.), real-estate values, new construction permits and applications, number of bedrooms, big-box development, malls, storage and logistics, foreclosure numbers, architectural styles and typical floor plans, elevations, materials, building/development process over time, etc.

Team 3: The Social-Demographic:

Location of Administrative / Jurisdictional Boundaries, Population Densities, Historical Redlining, Developments and Land Use Change projections, Real Estate Values, FEMA

Flood Insurance Maps, Age groups shifts and trends, Aging and millennial concentrations, household incomes, race and ethnicity, immigration, health-indices, per capita measurements, etc.

Team 4: The Environmental and Landscape:

Heat and Shade measurements, percentages of pervious/impervious surfaces, air pollution, soil quality, tree plantings and other landscape surfaces, park distribution, trails, topography, watersheds, prevailing winds, atmospherics, air pollution, noise pollution, weather patterns, etc.

Many insights about the condition of our site and its various networks and infrastructures, and how they came to be over time, will emerge from this assignment. As a result, each team will be charged with suggesting two potential design projects that can emerge from the research and mappings: **1**) at the landscape infrastructural scale, across the whole the South Central Village Core and surrounding areas **2**) an intervention related to the condition of housing at the neighborhood scale or the block scale.

This leads to assignment 2, where you will be developing a **design brief** using all of the groups' mapping insights for developing a vision plan for the future of the South Central Village Core, and propose the conditions for a new 60-unit housing cluster.

Studio Schedule for Module 2:

Mid review: Nov. 21 Final Review: Dec. 7

Module 2: Design work

Our initial phase involves the selection of 3-4 sites provided by the city. The design work will encompass a study of precedents and case studies, particularly focusing on

emerging housing types and the operational features of Autonomous Vehicles (AVs) within these contexts.

To facilitate the design process, the studio will be organized into 3-6 design groups. Our design work will integrate elements of landscape, urban space, infrastructure, and buildings. We will approach interventions across three scales: from the city and neighborhood level down to the urban block and street scale, and finally, to the building or 'object' scale. We will emphasize on creating typologies and models of living rather than singular, one-of-a-kind structures.

While Universal Access AV technology will play a central role in our design project, we also encourage students to propose other technologies that can effectively address the specific design challenges at hand.



Rapidly expanded Waymo robotaxi service scope overlaps with the south central village core

Assignment 2 (2 weeks)

Oct. 7- Oct. 10 Site Visit

Oct. 7- Oct. 19 Design Brief with pin up on Oct. 19

Envisioning the Project and Drafting of a Schematic Design Brief + Site Visit

For this assignment, your team will choose one design intervention after consultation with the professors and develop a detailed design brief that analyzes and frames the challenges your mapping phase discovered and moves towards projective design recommendations.

A design brief is the written document that a business client (private or public entity or developer) uses to communicate with its design team about what is necessary for a successful project. In your professional career, you will likely encounter either design briefs or similar requests-for-proposal (RFPs). Programmatic components and relationships, scale and size of desired buildings will be based on selected case studies.

This design brief should be approximately 2000 words. It should also include graphic material (mappings, plans, precedent photographs, etc.) to back up your ideas as appropriate. All references should be cited. It should include the following components:

Section I. Summarize the need

This section should define what the **need** is, why it is important, and where it is most pressing in the South Central Village Core(i.e., based on typology and location). It should also identify potential issues and stakeholders. This section should include graphics and metrics, to locate, identify, and show the areas of boundary of concern.

Section II: Define the challenges

This section should describe what has prevented your project proposal from being realized up to this point. It should also outline the **major barriers, obstacles, and/or risks** associated with design responses to the need. These obstacles/risks should be broadly described: environmental to political, economic to legal, technical to processual. The challenges lucidly argue how the project can clear the obstacles and risks.

Section III: Identify 2-3 "positive" and "negative" models

This section should identify 2-3 current or historical design responses to the need. It should analyze the factors that allowed each of the design responses to be successful or unsuccessful. The goal of this section is to extract lessons from **case studies** that can guide the design team and help them build on "best practices" and steer clear of pitfalls. The case studies can be drawn from historical models, previous competitions, etc.

Section IV: Define success criteria and make design recommendations

This section should outline the **desired outcomes for design responses**. It should specify success criteria, or what potential design responses absolutely must accomplish in order to be considered successful. This section also should start to make projective design recommendations. In particular, it should specify potential programs, building typologies, tenure models, financing strategies, policy changes, etc. Finally, it should define performance measures, to prepare the design team to deliver against hard and soft goals (i.e., creating shade, reducing temperature, building X affordable dwelling units per Y people, etc.).

EVALUATION & GRADING

The final grades will represent the balance of attendance, participation, engagement in class discussions, incorporating feedback, completion of assignments, individual growth over the semester, and quality of work produced in the studio, with an emphasis on clarity and originality.

Module 1:

In addition to the paragraph above, for those students taking only Module 1 a separate grade will be given based on the following criteria.

Assignment 1 – 60% Assignment 2 – 40%

STUDIO CULTURE AND ABSENCE POLICY

Work in the studio will be built sequentially. Therefore, your commitment to incremental development on a daily basis is of paramount importance. Charrettes before reviews will not suffice. The demanding nature and pace of this studio course necessitate your regular attendance and require that deadlines are consistently met. In addition to lowering your grade, late work will prevent you from following the overall structure of the course. Magnification of your development as a designer is made possible by the collective nature of the studio. Group reviews are collective for a reason, as each of you has something to gain from your peers. Therefore, attendance for the duration of all formal reviews is mandatory. Greater than two absences from the studio without a medical excuse supported by a doctor's note or verifiable personal emergency could result in a grade reduction.

ACADEMIC INTEGRITY

Massachusetts Institute of Technology students are here because of their demonstrated intellectual ability and because of their potential to make a significant contribution to human thought and knowledge. At MIT, students will be given unusual opportunities to do research and undertake scholarships that will advance knowledge in different fields of study. Students will also face many challenges. It is important for MIT students to become familiar with the Institute's policies regarding academic integrity, which is available in <u>Academic Integrity at MIT: A Handbook for Students.</u>