Healthy Living in the Built Environment in Light of *Feng-shui*

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Abstract

This paper explores a synthesis design approach to enhance healthy living, integrating the author's feng-shui research and consultation with her architecture teaching. Feng-shui is an ancient Chinese practice to harmonize people with their environment. In light of feng-shui, this approach emphasizes comprehensive analyses with various scales, from the natural landscape, climate impact, and urban/landscape design to architecture and interior design. Introducing systems philosophy and scientific knowledge and conducting field investigations, the course helps undergraduate students understand that enhancing healthy living should be the primary goal for architectural design. Healthy living includes both physical and mental aspects. Homesites in areas prone to natural hazards could lead to injury, illness, and fatalities. Inadequate ventilation can foster indoor pollutants, radon, bacteria, and viruses. Inappropriate spatial designs can cause physical and mental illness. This interdisciplinary approach to architectural design serves to help students improve both their living conditions and design skills. The isolation of design disciplines cannot resolve the health issues affected by the built environment. To enhance healthy living and well-being in a built environment, designers must analyze impacts from the entire system, including Sky with climate, Earth with landforms and water, and People from individuals to their society. Ultimately, this design approach helps students develop systems thinking, a fundamental worldview in the contemporary world.

Keywords: Healthy living, Systems thinking, interdisciplinary teaching, Site selection, Spatial design, Feng-shui

1. Introduction

The pandemic has increased students' demands to learn more about healthy living in their homes. Boulder is an expensive college town where every square foot can be rented. This reality has put many students in undesirable living conditions because of a housing shortage and exorbitant rent prices. These experiences have made students recognize that a house should promote good health, safety, and well-being. However, this primary goal has often been ignored in architectural education, which emphasizes aesthetic design and gives little consideration to the well-being of people who will inhabit the space. Such a design often appears meaningless. Ian McHarg states, "The measure of architecture is its ability to enhance human health and well-being" [12].

This paper explores a synthesis design approach to enhance healthy living. This approach integrates the author's *feng-shui* research and consultation with her teaching of a theory and method course. The author is an architecture and environmental design professor at an undergraduate program in Colorado. *Feng-shui* is an ancient practice to harmonize people with their environment. This course introduces *feng-shui* as a clue and emphasizes comprehensive analyses of the surrounding natural landscape, climate, urban /landscape design, architecture, and interior design.

The course method includes the following components:

- Lectures and literature studies, including scientific knowledge and *feng-shui* practice on healthy living in the built environment and systems philosophy.
- Field investigations. Field lectures and observations can provide first-hand knowledge to examine theories. The most effective way to learn *feng-shui* is to hike for thousands of miles alongside studying literature [24].
- Class discussions. Students discussed the evaluation criteria by comparing scientific knowledge with *feng-shui* practice on healthy residential living.
- Final presentations and consultations. Students present the evaluations of their residence design. The author provides *feng-shui* consultations with scientific knowledge on each student's living conditions and recommends suggestions to resolve the problems.

2. Feng-shui: An Ancient Model Enhancing Healthy Living

According to the I Ching (易经), a book of Chinese wisdom written 3000 years ago, the ancient Chinese people developed the concept of Taiji (太).

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Taiji codifies the Chinese idea of a system from the universe to the human scale. The Taiji concept espouses that the world is a whole, representing oneness and duality. In the world, all things are interconnected, integrated, and interdependent. The ancient Chinese sage, Lao Zi, suggested that pursuing balance in the world should be a goal for life.

The Taiji system comprises the yin part, negative and dark, and the yang part, positive and light. In yin, there is yang, and in yang, there is yin. Yin and yang form the dynamic universe, in which everything is interconnected, integrated, and interdependent.

Feng-shui applies the theories of *qi*, or vital energy, *yin* and *yang*, and the five elements, which manifest through the form of the physical world. A favorable *feng-shui* site should be located where *qi* accumulates, like an acupuncture point crucial for human health [24]. A place with good *qi* must have adequate sunlight, fresh air, and decent moisture, creating a delightful environment.

The primary goal of *feng-shui* is to attract good fortune for safe and healthy living and avoid disaster. Based on the systematic concept and experience from thousands of years, *feng-shui* has developed into an art of living in harmony with nature. People pursue happiness, health, peace, and prosperity, by being at the right time, in a suitable place, and with harmonious people (see Figure 1).

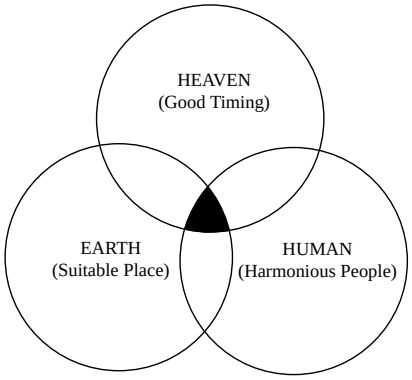

Figure 1. Diagram representing the feng-shui concept of living in harmony

With respect for and fear of nature's power, *feng-shui* also has criteria to restrain human greed in exploiting natural resources. In *feng-shui* practice, the environment comprises physical and spiritual factors involving geography, geology, ecology, astronomy, climate, environmental psychology, and criminology.

The traditional *feng-shui* practice encompasses a comprehensive analysis with field investigations of the site and home, judging orientations with a *feng-shui* compass, and referencing literature documents. The compass measures the magnetic field and the cardinal directions and contains the words on the dial corresponding to the *feng-shui* criteria. *Feng-shui* practice includes two branches: the yin house *feng-shui* and the yang house *feng-shui*. The yin house *feng-shui* examines landscape surroundings on various scales from mountains, hills, water, site, and orientation for homesites and graveyards [24]. The yang house *feng-shui* involves the town, city, houses, and interior design [23]. At every level, the *feng-shui* practice emphasizes attracting good *qi* - vital energy and averting evil power.

3. Evaluating the Built Environment

Feng-shui is an ancient systematic model for environmental design and can be utilized as a clue to developing a paradigm of healthy living. Inspired by *feng-shui*, the diagram in Figure 2 illustrates the structure of the built environment system. The author draws this diagram on the whiteboard in each class and uses it as a guide during individual student desk critiques. Thus, this diagram helps students establish the systems concept of the built environment. Comparing *feng-shui* criteria with scientific knowledge, students evaluate their residences from a large scale to a small scale, beginning with the natural landscape and urban setting, landscape design and the built architecture, and ending with the interior spaces and the furniture placement. This approach exemplifies systems philosophy and explores "wholeness" to find principles applied in the entire sys m. It differs from the conventional analytical method of dividing a system into pieces and examining the details [10].

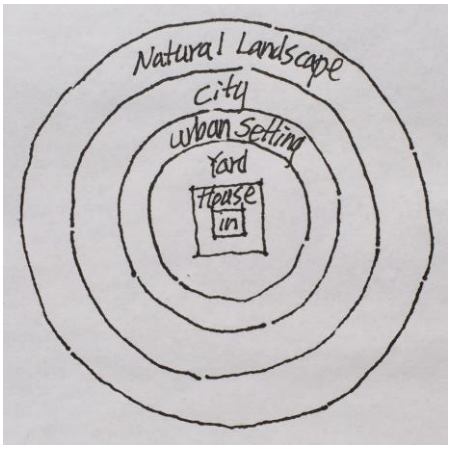

Figure 2. Diagram of the built environment system

Following the system concept diagram in Figure 2, designers must consider the interaction and impacts of all elements in the built environment system to promote healthy living. This system contains various nesting spaces of sub-systems. Every large sub-system affects the small ones, and the small sub-systems also influence the large ones. Moreover, the built environment system expands up to Sky with climate, and down to Earth with mountains and water.

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The built environment system impacts residents' safety and health, from the macro level, including climate and planetary movements, mountains, and water, buildings, to the micro level, including bacteria growing. In turn, People play a significant role in this built environment. Human activity also affects the built environment, such as human ignition to cause vast wildfires and pollution, loss of homes, fatalities, and illness (see Figure 3).

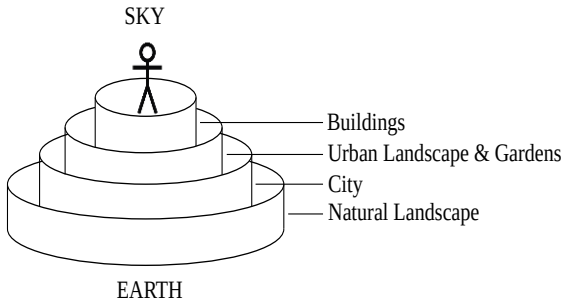

Figure 3. The built environment system contains nesting spaces in which people are included

3. 1. Landscape Analysis with Field Investigations

Following the diagrams of the built environment system in Figures 2 and 3), students first evaluate the surrounding natural landscape, including mountains, hills, water, and orientation, because larger-scale considerations are crucial for avoiding future failures [20]. Introducing the Western landscape analysis method provides undergraduate students with a knowledge base to compare with *feng-shui.* The class field observations have been conducted at Mesa Trail, Boulder, since this area contains a favorable *feng-shui* site. According to *feng-shui*, an ideal homesite is in a U-shaped containment enfolded by hills, with a slope to the south, where mountain peaks are in the distance. A meandering river passes through the east or south of the site. In the north, tall hills fence off cold winds. Thus, vital energy accumulates in such a site [24].

3.1.1 Evaluation of surrounding mountains and water. Mountainous areas possess risks of natural hazards. Mountain peaks with steep slopes, which *feng-shui* calls the "fire mountains," could frequently cause fires [24]. High land over 8000 ft often triggers lightning strikes, which is a source to ignite wildfires. Forests provide the fuel for wildfires that spread with powerful windstorms. In *feng-shui*, canyons with steep slopes and narrow channels, full of broken cliffs and rocks, are called the "violent dragon." A mountain peak with a concave basin is called the "sick dragon." Those landforms could bring a deadly disaster, such as debris flow.

Debris flow is one of the most dangerous natural hazards. The media often refer to debris flows as landslides, rockslides, mudslides, or flash floods. Debris flow results from heavy rainfall combined with vast amounts of debris. Unstable rocks on slopes often feed debris directly into steep channels, triggering debris flow [3]. Debris flow initiates at higher elevations and gains speed and power while descending [9]. A debris flow can originate in the mountains several miles from its impact area. The wildfire-scarred zones make the downhill areas vulnerable to the postfire debris flows.

According to *feng-shui*, a home should be on raised land that provides vital energy, fresh air, and proper drainage. A "dragon vein," referring to a hill ridge, could be an ideal home site. Behind a house, the "dragon whiskers," referring to the gullies, can mitigate water away from the site [24]. An individual hill with a strong bedrock foundation is considered to be a "turtleback" [25]. A "turtleback" hill over 40 feet higher from its surroundings could provide an excellent drainage system and endure debris flow attacks. Debris flow can go up to 30 feet [9]. Thus, such a "turtleback" hill could provide a place for refuge or evacuation.

To better understand the landscape patterns of areas prone to natural hazards, the class has investigated a high-impact area of the 2013 debris flow, Chapel on the Rock, Allenspark, CO. This debris flow originated from Mt. Meeker, five miles away. Mt. Meeker can be classified as a "sick dragon" with a concave basin. For undergraduate students, field investigation is an efficient way to learn *feng-shui* and natural hazards. First-hand knowledge helps students to understand that larger-scale considerations are significant in avoiding natural hazards. Students presented eagerness and curiosity in field observations.

A narrow canyon with a steep slope and creeks can trigger debris flow [17]. Especially, a dry wash pointing straight toward a house, called a "hidden arrow," a debris flow track, could cause vast destruction [25]. The field investigations demonstrated that the heavily impacted areas of the 2013 Colorado floods all involved attacks of a "hidden arrow" from debris flow or engulfing flood. The confluence area could receive high flood impacts, particularly outside of a curve flow [25]. A site with even level grading could prompt flooding.

Such landform patterns can lead to hazards reoccurring during heavy rainfall. A typical example is Buckhorn Canyon, Larimer County, CO. Two years after the massive Cameron Peak Fire, some houses were damaged over and over by six flash floods in 2021, and the heaviest flash floods in July 2022. The 2022 flash flooding killed two people, destroyed a home, and damaged roads and bridges [11].

The field investigations indicate that the high-impact areas correspond to the negative *feng-shui* criteria while the surviving areas correspond to the favorable criteria. Thus, *feng-shui* can provide a clue

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to identifying landscape patterns of areas susceptible to debris flow, emphasizing spatial characteristics and relationships among landscape elements.

3.1.2 Hazard impacts on human health. Homes in areas prone to natural hazards could result in injury, illness, and even fatalities. Research evidence indicates that windstorm impacts on health include infections and insect bites [8]. Some seniors have claimed experiences of facial paralysis or loss of vision for an entire month after yardwork during a windstorm. Avoiding cold winds is a primary strategy of *feng-shui* practice [24]. Floods and debris flow could destroy properties and cause fatalities. Floods can damage the infrastructure and drainage system, polluting the surface and groundwater. Flooded buildings can lead to the growth of mold and mildew. Research has indicated an increased risk of disease outbreaks in a post-flood period, such as hepatitis E, gastrointestinal disease, and leptospirosis [1].

Moreover, wildfires can have substantial impacts on human health. Burned trees release large amounts of carbon dioxide and can no longer filter pollutants or produce oxygen. Inhalation of smoke and ash from large wildfires creates serious health threats for the elderly, the ill, and those with heart or respiratory conditions [2]. Extended recovery periods on burned slopes leave them vulnerable to debris flow disasters. Due to the fire impacts on human health and consequences on ecological balance, fires near residences should be extinguished immediately.

3.2. Evaluating urban settings

Post-analyzation of the large-scale landscape, students evaluate living conditions relevant to urban settings. According to *feng-shui*, house design significantly affects residents' health and well-being [23]. The house design practice called the yang house *feng-shui* focuses on designing for living people, containing two sections the "external issues" and the "internal issues." The "external issues" correspond to the contemporary urban and landscape design, and the "internal issues" align with architecture and interior design. The *feng-shui* criteria provide references for students' evaluations.

Feng-shui recommends a homesite on the south, southeast, or east slope, to receive adequate sunlight and avoid cold winds. In the front of a house, an open space with gentle slopes should have no tall obstructions of hills or buildings blocking sunlight and fresh air. A home should sit on a spot higher than the surroundings, which can avoid flooding [24]. Underground water passing through a house could cause sickness and trepidation [22]. Research indicates that homes on wet and low land could cause rheumatic diseases [15].

According to *feng-shui*, a road or a bridge pointing directly towards a house would trigger negative energy for the inhabitants [23]. A home outside a curved road is also unfavorable, increasing the risk of driving into the house. Research indicates road noise entering through bedroom windows could increase cardiovascular and hypertension risk [4]. In addition, residing close to a transmission tower would cause harm to residents. The author's investigations indicate that several seniors living near a high-voltage transmission tower have died from cancer. Thus, houses located on such a site could cause a challenge for resale.

3.3. Evaluating landscape design

Landscape design can also affect the healthy living. *Feng-shui* recommends the house gate in favorable positions -- the east, south, or southeast of a residence. Research demonstrates that people living in the forest have lower heart rates, and the fresh air promotes lung health [16]. On the other hand, some trees can cause pollen allergies during the spring [19]. *Feng-shui* also warns people that a pool or pond in front of a house could lead to the loss of a child, and a pool or pond set on the west could cause eye disease [23]. Extended exposure to water reflection could cause eye cataracts, which people living by an ocean have experienced. Scientific studies indicate that uncomfortable glare, direct light, high illumination, and high-contrast conditions can cause visual illness, including strain, irritation, and blurred vision [4].

To improve home *feng-shui* quality and promote well-being, the author helped a client redesign her property entrance in 1994. Adding an earth mound between the house and a bustling city street in the north would accumulate positive energy, avoid negative energy attacks, and create more privacy for the homeowner. The mound and vegetation planted by the client blocked some noise and car exhaust pollution. The natural “fence” not only made the property look more attractive and peaceful but also protected the lot’s entry and prevented human encroachment.

More than 25 years later, this landscape buffer recently blocked a car involved in a traffic accident from careening onto the property, which avoided two potential tragedies. Without this landscape barrier, the automobile would directly crash into a bedroom where the owner was sleeping. The mound stopped the car's acceleration and kept it from rolling over, fortunately saving the driver and owner from serious harm. This *feng-shui* landscape design not only has a profound effect on the residents' well-being in the present when built up but also continues to provide health protections and aesthetic benefits decades later.

3.4 Evaluating house design for healthy living

The next step following analyzing the "external issues" of urban surroundings is to evaluate the *feng-*

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shui quality on the "internal issues" of house design. Students provide plans, sections, and photographs of their residences. Public health studies on hazards in residences identified that the primary health risks are hygrothermal conditions, radon, falls, dust mites, tobacco smoke, and fires [13]. Furthermore, it is imperative to research the spatial factors of each house's orientation, position, and form and their impacts on human health.

3.4.1. House form and plan layout. The house form could affect the residents' health. A house that is "a room inside another room" could be prone to severe illness, even death [23]. Several seniors living in a house with such a form have been diagnosed with cancer due to poor air circulation and radon accumulation. A triangular shape in the plan and section could make occupants confused, anxious, and stressed. During the Denver Art Museum opening ceremony, a senior lady fell, which could have been caused by dizziness from experiencing a series of triangular spaces. Studies suggest that the brain harbors visual sensitivities to psychological dimensions of coherence, fascination, hominess, and comfort in architectural interior space [5].

Feng-shui suggests exterior doors and windows face southeast, south, and east, but not northeast. A mirror on the wall opposite an entrance could deter negative energy from entering the house. The main entrance should not align with the exit or a window to prevent vital energy dispersing [23]. On the other hand, adequate ventilation is crucial. People working in a confined office without windows can frequently catch the flu. Thus, keeping windows open is an important strategy to mitigate virus propagation during the pandemic. Moreover, keeping a house clean and hygienic is crucial. Research indicates that dust is storage for various harmful agents, including viruses, bacteria, chemicals, allergens, dander, fabric fibers, and paint flakes with lead [4].

Learning through real-world examples is efficient and effective for undergraduate students to grasp a theory. Traditional Chinese courtyard houses provide an excellent example of learning *feng-shui*. Beijing courtyard houses take on symmetric forms. A small entrance and meandering path throughout the house would help maintain vital energy and prevent potential attacks. On the other hand, the house has large windows open to the central yard, with adequate ventilation and sunlight. To maintain privacy and prevent potential criminal attacks, the exterior walls of traditional courtyard houses have no windows.

The sharp edges of walls could injure people's shoulders, which is often an experience for undergraduate students who move fast. Thus, the edges of the walls should be curved. Some paints on walls, floors, or furniture may contain VOCs (volatile organic compounds). VOCs can cause breathing difficulty, nausea, and damage to the central nervous system and other organs, even causing cancer [6]. A water leak or flood in a house can cause mold and mildew on walls and floors, as both can cause health problems with prolonged exposure. Scientific research demonstrates that over one-fifth of asthma cases are attributable to residential dampness and mold [4].

Feng-shui states the position of an oven could determine the inhabitants' health and good fortune [23] Scientific research demonstrates that cooking fumes containing carcinogenic compounds could increase the risk of respiratory cancer [21]. Therefore, the kitchen should have adequate ventilation. The bedroom doors should be closed to prevent the cooking fumes from entering the bedrooms during cooking.

3.4.2. Section design. According to *feng-shui*, a perpendicular beam above a bed could provoke headaches and illness [18]. A bed at the lower point of a sloped roof would stress the resident, which is often experienced by college students who live in such a condition because of cheap rent. A skylight that invites light into a house could be delightful; however, its placement above a bed can increase stress from insecurity. A high ceiling over 12 feet in a bedroom could cause sleep difficulty, while a ceiling lower than 8 feet could provoke nightmares.

Stairs are critical elements that can cause health issues. A beam placed too low above a stair can cause a head injury, which is often the case with student rentals. The landlord often set up a soft material covering the beam to avoid a potential lawsuit. But this modification does not reduce the daily stress of student tenants. Entrances of a stair and a bedroom should not be parallel since mistakenly entering a stairwell as a bedroom can cause a falling accident. With split levels, one step built in any place can increase the risk of injury. Conflicting information from adjacent design elements can heighten stress [7].

People should avoid inhabiting a basement as a living place since heavily polluted air and radon often deposit in basements. Unfortunately, many students live in basements because of affordable rent. Scientific research demonstrates that radon is a radioactive gas occurring from uranium decay. Radon can enter homes and be inhaled by residents. Residential radon significantly contributes to lung cancer among the residents [14]. Exercising in a basement fitness area could make people inhale high amounts of radon. If people inhabit a basement, they should have adequate ventilation by frequently opening windows and using a fan.

3.4.3. Furniture arrangement. People spend one-third of life in bed. According to *feng-shui*, the orientation and position of a bed can highly affect mental and physical health. Bed placement should avoid direct vision from the door to maintain privacy.

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A mirror is placed to provide a reflective view of the entry door [18]. Students often place their beds against a window for fresh air and experience reoccurring headaches. A bed next to a large window could increase the risk of flu and other illnesses. When working at a desk, the human back should not face toward a door to remain secure, nor face toward a window to avoid illness. Also, for safety, people should not place their desks directly towards a window facing the street. Some *feng-shui* advice recommends hanging crystal balls over the entrance to attract good luck. However, objects placed above the head can cause stress.

4. Presentations and consultations

During the final presentation, students present their work on evaluating their residences with a filled matrix. The professor designed this matrix table for students to assess their residences' *feng-shui* and healthy living qualities (see Table 1).

Table 1. A matrix to evaluate *feng-shui* qualities and healthy living in residences

Environmental Design	*Feng-shui* Criteria For Healthy Living	Scientific Study Support		Student's Residence *location:*			
		Yes	No	Positive	Negative	Experience in Healthy living	How to Improve
Natural Landscape	Mountains						
	Hills						
	Water						
	Site & Views						
	Orientation						
Urban Design	Neighborhood						
	Road & Bridge						
	Trees						
	Pool						
	Rocks						
	Gate						
Architecture	Plan layout						
	Doors & Windows						
	Walls & Floors						
	Kitchen						
	Beams & Celling						
	Stairs						
	Basement						
Interior Design	Beds & Desks						
	Decorations						

The matrix in Table 1 compares *feng-shui* criteria with the principles of contemporary environmental design. Using *feng-shui* criteria as references, students evaluate their living environment with the matrix from natural surroundings, urban settings, gardens, and architecture to interior design and furniture arrangement. This table also investigates students living experiences in their residences and asks students to provide potential resolutions to improve their living conditions. This table matrix also lists the comparison of *feng-shui* criteria with scientific knowledge to help students gain insight into the essential *feng-shui* concepts and develop their critical thinking on learning from a traditional approach to healthy living.

In class discussions, students bring out significant issues relevant to healthy living. The author provides *feng-shui* consultation for each student, drawing upon scientific knowledge and recommending possible resolutions to improve student living conditions. Students' discussions with sharing experiences enhance their understanding of *feng-shui* and inspire new design ideas for healthy living. Students are enthusiastic and interested in learning this synthesis design approach. Finally, students conclude that *feng-shui* is an ancient systematic approach to the built environmental design rather than mythology. They have been eager to apply these integrative concepts in their future designs.

5. Conclusion

The undergraduate course explores a synthesis approach to designing houses to enhance healthy living by comparing the *feng-shui* principles with scientific knowledge. Homes in areas prone to natural hazards could result in injury, illness, and even fatalities. A house designed with abundant sunlight and adequate ventilation can prevent viruses, bacteria, mildew, radon, and pollutants. Furthermore, the spatial aspects of orientation, position, and forms are imperative for enhancing healthy living.

Creating a built environment that promotes healthy living should be a primary goal for designers. To improve architectural education, the author suggests introducing systems philosophy and the knowledge of natural hazards and healthy living into curriculums. In addition, field investigations would benefit teaching theory courses because students can use first-hand experience while examining a theory. Many undergraduate students love field trips; most are energetic hikers, nature lovers, and quick learners through keen observation. Experiential learning demonstrates great value in undergraduate education.

Feng-shui integrates house design with a comprehensive analysis of its natural environment, urban surroundings, landscape design, and interior design. The primary difference between *feng-shui* practice and conventional architectural design is that *feng-shui* deals with the environment as a whole system. In contrast, conventional professionals isolate themselves from one another. A single design major cannot resolve the healthy living issues affected by the built environment. Inspired by *feng-shui*, this course explores a synthesized approach to healthy living, integrating planning and design disciplines.

Furthermore, the built environment system expands its scope up to Sky with climate, down to Earth with various landforms and water, and to People, from individuals to their society. As Ervin Laszlo states, a synthesis model is needed since the universe appears as an interconnected system of nature [10]. Insight into *feng-shui* practice with the comparison of scientific knowledge helps students understand the vernacular method's values for healthy living, making them better designers in the future. Ultimately, this course boosts students' critical

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thinking with a systematic perspective, developing a fundamental worldview in the contemporary world.

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