



carbon ▶ cost ▶ community ▶ climate

Climate Crisis Responsive Design integration into Undergraduate Architecture Curriculum of VTU (Karnataka) – 2021 Syllabus Pattern

February 2023

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1.0 Introduction

The Fairconditioning Program's Academic Curricula Integration Program (start in 2015) identified the vitality for Architecture academia to respond to: a) the collective planetary emergency of which human habitats are a significant cause, and also affected by the ecological destruction wrought by it, and b) be inclusive to the needs of the living spaces of the urban marginalized who are inhabitants of living spaces compromised by social, political, and economic injustice. The current Architecture curriculum builds capabilities in an Architect to cater to the affluent elite and build grand structures ignoring the responsibility to also cater to the informal settlements. The advocacy effort with the Board of Studies (BOS) of Architecture College was initiated with this objective of rectifying and nourishing the Architecture education to ensure the Architect professionals are equipped with knowledge, skills, and empathy to address issues related to climate-crisis response design and the housing related predicaments of informal settlements in India's urban regions.

2.0 Engagement with Academia BOS

The engagement with Architecture colleges began with the need and assessing the potential of integrating informal housing perspectives in architecture education. Previous year curriculum of Visvesvaraya Technological University (VTU) and Savitri Bhai Phule University (SBPU) were studied and analysed for the gaps. A position paper was presented to the VTU BOS members with the recommendations to initiate engagement with the Board of Studies and gather their perspectives.

2.1 Key Insights - Position Paper

- **Exclusion of Informal housing perspectives:** The architecture curriculum demonstrates a lack of foundational support for developing the sensibilities, motivation, and skills of architects to address design-related issues of informal architecture. Elite profession, minimal responsibility of larger issues of Built environment, limitation to formal commissioned projects.
- **Arriving abruptly at (Informal) Housing design:** The housing studio in the 3rd-4th years includes informal housing or settlement design for low-income groups. The complex nature of informal housing can be overwhelmingly complicated for students to grasp as well as design in one semester. This is on account of the abrupt introduction to Informal housing without any introduction in previous semesters. Additionally, site visits are either absent or designed as a separate elective.
- **Missing narrative of Affordable housing policy and environmental science:** Subjects with respect to affordable housing and environmental science exist, but are limited to theory and are rarely engaged with through practical experience.
- **Retrofitting/reuse/incremental characteristics of the built environment:** Building Retrofitting and Building Mid-Life Cycle Interventions are the need of the hour as we try to embrace sustainability. These aspects are however untouched in undergraduate architecture education. Integration of incremental housing as a potential way to address that
- **Socio-environmental Impact of Architecture:** Knowledge of the urban heat island effect, building energy analysis, life cycle assessment of a building, etc. are vital climate crisis

battling tools. While these issues and aspects of the building design are addressed during masters, these aspects are fundamental to architecture design and need to be integrated and introduced early on as an acknowledgement of the climate injustice prevailing on our only planet.

The recommendations in the position paper on sustainable architecture and informal housing perspectives elicited positive response and aligned the BOS members for inclusion of topics related to the informal settlement and climate responsive design perspectives in the curriculum.

3.0 Curriculum Content Updates

The VTU curriculum was updated to seamlessly integrate topics on thermal comfort, heat transfer, passive design, climatology, sustainable cooling design and climate justice. The topics has been integrated horizontally across all the semesters and across all the subjects spanning 5 years of the course. Reference material for the new theory concepts, Activities and Project deliverables has been included on the topics for a student to immerse with their head, hand and heart. Current modules in space design, building materials, and history has been extended to include study of informal settlement and connect to their issues empathetically. Pedagogy Manual which describes 160 plus activities of various types, has been developed to handhold the faculty to deliver class lectures on these new topics included in the curriculum. In addition, Physical teaching aids has been designed and its development is in progress.

The updates to curriculum were well-received from the Board of Studies of Visvesvaraya Technological University during the review process and the updated curriculum has been implemented for the 2022 batch onwards.

Sl.No	Semester	Course	Content Updated
1	Year 1, Sem 1	21ARC11, Architectural Design 1, Module 1	Acquiring understanding of Architecture’s connection with Climate change alongside with other disciplines of knowledge: Science & Technology, Mathematics, Philosophy, Religion, Sociology, Psychology, Ecology.
2	Year 1, Sem I	21ARC11, Architectural Design 1, Module 5	Acquiring the design perspectives for informal settlements included alongside formal built spaces. An activity based learning - Spatial analysis of area requirements, movement and circulation diagrams for informal settlement houses has been described to support learning design perspective for informal settlements.

3	Year 1, Sem I	21ARC12, Materials and Methods in Building Construction-I, Activity Based Learning	Acquiring knowledge about the vernacular materials and their connections to climatic zones and their thermal properties through an activity based learning has been included.
4	Year 1, Sem II	21ARC21, Architectural Design II, Course Objective	Updated course objectives to be inclusive of informal housing perspectives across the modules.
5	Year 1, Sem II	21ARC21, Architectural Design II, Module 2	<p>Thermal Comfort is added as a parameter to study the relationship between human body and the built environment in addition to existing parameters usage and spatial understanding.</p> <p>Spatial Context will be studied for built environment in informal spaces in addition to the formal spaces.</p> <p>Acquiring an understanding on the social attitudes to Built-form in informal spaces.</p>
6	Year 1, Sem II	21ARC21, Architectural Design II, Module 5	<p>House in informal settlement has been included in the design process to test the learning of the semester using a multifunctional program to incorporate “nature of space”, “poetics of space” and “physical constraints” , alongside a Guest House, Farm house, Villa, Container house, Courtyard house, Tree house.</p> <p>Learning about analogy of space, function, modern and vernacular materials used by a comparative analysis of a formal design house and an informal house.</p>
7	Year 1, Sem II	21ENG27, Site Surveying and Analysis, Module 5	Climate and micro climate has been added as site factors to be observed during the site survey alongside topography, hydrology, soils, landforms, vegetation

8	Year 1, Sem II	21ARC22, Materials and Methods in Building Construction-II, Module 3	Acquiring an understanding on the thermal properties of RCC and impact on the life cycle of a building.
9	Year 2, Sem 3	21ARC31, Architecture Design III	<p>Spacemaking to a place has been updated to include informal spaces along with formal spaces.</p> <p>The Experience section has been updated to include informal social spaces, settlements, public architecture has been included to acquire an understanding of the interactions and interface between the formal and informal spaces that constitute the built spaces.</p> <p>The Exploration section has additional parameters to study a place and how it is perceived including exposure of walls, roofs, windows to the sun),, direction of winds and breeze, local ecology (animal and plant life), relationships with local water bodies and groundwater.</p> <p>Activity Based learning has been included to derive sense of place and space for an informal space alongside of a formal space. The activity involves a field study of an informal settlement / koliwadi / informal public place (including any kind of informal architecture like dhaba, chowk under a tree etc.) to understand the sense, essence (both tangible and intangible) and identify organic growth, health impacts in such livable spaces.</p>
10	Year 2, Sem 3	21ARC32, Materials and Methods in Building Construction III, Module 1	Qualitative understanding of RCC's basic thermal properties such as conduction, insulation, thermal mass and the material's appropriateness and/or demerits for hot climates.
11	Year 2, Sem 3	21ARC32, Materials and Methods in Building Construction III, Module 2	Understanding of qualitative influence of domes and vaults on building's interaction with solar heat and ventilation.

12	Year 2, Sem 3	21ARC32, Materials and Methods in Building Construction III, Module 3	Study of low embodied (grey) energy and sustainable flooring has been added alongside other types of flooring.
13	Year 2, Sem 3	21ARC32, Materials and Methods in Building Construction III, Module 4	Material study of external reflective paints, natural paints has been included in addition to the other types of plastering and paints.
14	Year 2, Sem 3	21ARC32, Materials and Methods in Building Construction III, Module 5	Study of alternative roofing like earthen-pot roof, 'Guna' roof (burnt clay vaulted roof), GI/tin sheet roofing, cement corrugated sheets has been included alongside Jack Arch, Madras terrace, stone slab roofing.
15	Year 2, Sem 3	21ARC32, Materials and Methods in Building Construction III, Module 5	3 activities has been added in the Activity Based learning to focus on a) vernacular and contemporary use of natural paints b) study of technical construction materials and methods in formal and informal settlements c) influence of roofing materials on the temperature of a built space.
16	Year 2, Sem 3	21ARC33, Climatology, Module 1	<p>Large additions has been made in this course encompassing learnings on informal spaces and climate responsive design factors and has been supported with 10 plus activities in the same context.</p> <p>Study of the effect of landscape on formal and informal areas, highlighting the need and importance of landscape (or green cover) in most urban locations has been included.</p> <p>New chapters has been included on a) Interrelation between the human built environment and the natural environment highlighting the historical trajectory of environmental degradation and climate change as a function of humankind's architectural and industrial interventions.</p> <p>b) Introduction to the current Climate crisis and targets- Documentation of changes in climate, environmental conditions over time and their ramifications on the built environment</p>

			<p>and the roles and responsibilities of the profession of architecture.</p> <p>Thermal Comfort chapter has been updated to acquire basic understanding of psychrometric chart and related parameters(dry-bulb temperature, wet-bulb temperature, absolute humidity, relative humidity, enthalpy, specific volume), psychrometric basis of human thermal comfort, thermal comfort factors (including mean radiant temperature and air speed), Indian Model of Adaptive Comfort (IMAC) and comparison with global thermal comfort models.</p>
17	Year 2, Sem 3	21ARC33, Climatology, Module 2	<p>New additions in this module has been made to acquire understanding on uses of psychrometric chart for climate analysis and study of thermal properties of different materials used in construction such as Mud, Wood, Bamboo, RCC, Steel, Glass, GI, Tin, etc and relating it to Thermal Stress. Assessment of passive cooling possibilities and natural night-sky radiation of roofing materials and retrofitted radiant-barrier materials. Assessing and applying the principles of Thermal comfort in a formal residence and an informal residence and gathering insights has been facilitated through an activity.</p>
18	Year 2, Sem 3	21ARC33, Climatology, Module 3	<p>The periodic heat flow concepts have been detailed to acquire an understanding on conduction, convection and radiation and supported with activities to demonstrate the experiential process of heat transfer through these processes.</p>
19	Year 2, Sem 3	21ARC33, Climatology, Module 4	<p>A new chapter has been introduced with passive techniques of cooling such as evaporative cooling (including basic assessment of its cooling potential using the psychrometric chart for various climatic zones), earth tubing, wind scoops, roof ponds, shaded courtyards and supported with activities to understand a) evaporative cooling, b)to</p>

			realize that a room cooled by a split air conditioner has a much inferior air quality as compared to a room cooled by an evaporative cooler c)to realize that air conditioning is not the only way to cool modern buildings.
20	Year 2, Sem 3	21ARC33, Climatology, Module 5	Case Studies for Climatic Design considerations for informal settlement like Dharavi has been included. Climate design consideration topic has been updated to include the role of Architectural design and design tools to build climate resilient designs.
21	Year 2, Sem 3	21ARC35 - Building Services 1	Understanding sustainability issues of water supply and sanitation systems has been included and this has been supported with a connecting activity to study Waste management, water supply, sewerage, fire infrastructure and life safety systems, storm water, other developmental infrastructures. This activity will also expect the student to think of the sustainable design concepts that can be integrated in the service systems studied.
22	Year 2, Sem 3	21ARC38, Elective 1, Vernacular Architecture	Case Study to explore how vernacular materials can help ease climatic challenges. A design activity has been included to acquire design thinking skills to design an informal settlement using vernacular elements. Mapping old vernacular materials and how they have evolved (different contexts) and thus how it can be applied for informal settlements today.
23	Year 2, Sem 4	21ARC41, Architectural Design IV	The site visits have been extended to include residential informal settlements alongside formal settlements. The project work has been extended to include a minor project on an informal settlement or vernacular parts of the city or rural setting for settlement/community study and design.

24	Year 2, Sem 4	21ARC42, Materials and Methods in Building Construction IV, Module 3	Alongside understanding steel as building material, life cycle and environmental impact of steel will be understood. Reuse and repurpose of steel construction and demolition waste will be focused on as part of climate responsive use of material.
25	Year 2, Sem 4	21ARC42, Materials and Methods in Building Construction IV, Module 5	Alongside understanding aluminium as building material, life cycle and environmental impact of aluminium will be understood. Reuse and repurpose of aluminium construction and demolition waste will be focused on as part of climate responsive use of material.
26	Year 2, Sem 4	21ARC44, Building Services II	The entire course has been adapted a) to introduce students to the Indian green building council and codes. b) to sensitize students about the energy consumption and carbon emissions of different electrical equipment, technologies and lighting. c) To address energy requirements in different socio-economic sections of the society. d) Introduction and study of renewable energy systems.
27	Year 2, Sem 4	21ARC44, Building Services II, Module 1	Introduction to Codes and Standards like National Green Building Code, National (Renewable/Clean energy) Electric Code.
28	Year 2, Sem 4	21ARC44, Building Services II, Module 2	Adapting to sustainable (solar/wind powered) electrical generation and distribution systems design in high rise buildings have been introduced.
29	Year 2, Sem 4	21ARC44, Building Services II, Module 4	High energy and low energy (sustainable) lighting have been introduced.

30	Year 2, Sem 4	18ARC37, Computer Application in Architecture 1	<p>Alongside acquiring learnings on the Building energy Modelling Software an activity has been introduced for encouraging students to use Building Energy Modelling Software and Sustainable Cooling System Modelling Tools (e.g. ISHRAE's Smart Energy Software) to enable students to estimate energy conservation and climate impact mitigation of their design projects through integration of passive design features such as insulation, shading, thermal mass, appropriate window-wall-ratios etc. and sustainable cooling systems (including direct and indirect evaporative cooling, radiant cooling, structure cooling).</p>
31	Year 2, Sem 4	21ARC48, Elective-2	<p>The elective which includes acquiring learnings on a) Environment Responsive Architecture b) Product Design c) Heritage Documentation , has been strengthened with activities in each of these areas.</p> <p>The Environment responsive architecture activity involves acquiring skills on calculating carbon footprint based on the materials used in building a formal and informal house and critically reasoning the materials used. It also involves documenting how lifestyles of residents of formal and informal houses contribute to carbon footprint.</p> <p>The Product Design Activity Based Learning includes study of a few houses in Informal settlements. Based on their requirements, designing a multipurpose product or spatial resolution that can help informal household dwellers makes their small spaces more multi functional. (Could be an architectural system, furniture, modular low cost housing, etc.)</p> <p>The Heritage documentation activity involves documentation of an old Heritage structure (or any local informal settlement) redevelopment / up gradation/ rehabilitation program and the consequences on livelihoods,</p>

			current informal architecture, increased vulnerabilities of the community, etc.
32	Year 3, Sem 5	21ARC51-Architectural Design-V	Objectives: Included green technologies and materials, sustainable systems- active cooling using natural and low global warming potential refrigerants, vernacular, local, and low embodied energy/carbon materials and sustainable water, waste management systems. , significance of passive/natural cooling systems, to learn to look at the organic nature of Architecture, environmental dimension to perspective building
33	Year 3, Sem 5	21ARC51-Architectural Design-V, Assignment 1:Case study	Included traditional informal market as part of the building study
34	Year 3, Sem 5	21ARC51-Architectural Design-V, Assignment 2: Seminars	Apart from Mechanical, Electrical and HVAC systems included sustainable HVAC technologies including radiant cooling, direct evaporative and indirect evaporative cooling, structure cooling, solar vapor absorption cooling and natural refrigerant air conditioning), discussions on innovations in green sustainable materials and techniques
35	Year 3, Sem 5	21ARC51-Architectural Design-V, Assignment 3: Projects	To encompass response to the local context, locally adapted passive design features and cooling systems, natural cooling systems, materials and sustainable architectural design and systems, design to be sensitive to existing socio-economic realities. Included to study traditional skill based workshops or communities e.g., weaving, potter community, waste picker community for service dominant buildings
36	Year 3, Sem 5	Activity Based Learning	Research and document a building or a campus or a gated community which has implemented several sustainable passive design techniques and

			approaches (such as waste water, storm water, passive design, energy generation, materials, etc).
37	Year 3, Sem 5	21ARC52-Materials and Methods in Building Construction-V	In the course objectives included -aspect of environmental impact, energy intensiveness, carbon emissions and circularity (recyclability) of each material studied.
38	Year 3, Sem 5	21ARC53-History of Architecture-V	-
39	Year 3, Sem 5	21ARC54-Sociology and Building Economics	Included in the objectives -environment-impacted by sociology and economics. To guide students in critically analyzing common social and economic narratives to catalyse them to work towards just architectural endeavours.
40	Year 3, Sem 5	21ARC54-Sociology and Building Economics, Module 2	Included the terms social and ecological as characteristics to study between urban and rural communities. <ul style="list-style-type: none"> ● Effects of urbanization influencing migration from rural to urban areas. ● Understanding cities as socio-ecological systems. ● Social research: Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal techniques
41	Year 3, Sem 5	21ARC54-Sociology and Building Economics, Module 4	Included the study of housing supply demand in formal and informal housing. Analysis of affordable housing
42	Year 3, Sem 5	21ARC54-Sociology and Building Economics, Module 5	Included the terms social, ecological and economical in Urban land value

43	Year 3, Sem 5	21ARC54-Sociology and Building Economics, Activity Based Learning	<ul style="list-style-type: none"> ● Introduction to life cycle costs of a building ● Initiating understanding towards economy driven development versus people and ecology centric development
44	Year 3, Sem 5	21ARC55-Building Services III-Air-conditioning,mechanical transportation and fire protection	Emphasizing at each level social and environmental Issues related to conventional Refrigeration and Air-conditioning- Including understanding connections between air conditioning, climate change, fossil fuel economy and the injustices built into this. Exploring passive cooling methods and different ways of choosing appropriate passive systems
45	Year 3, Sem 5	21ARC55-Building Services III, Activity Based Learning	<p>8 activities that encourage students to explore the various aspects of air-conditioning-</p> <ul style="list-style-type: none"> ● thermal heat released by its use ● energy usage comparison to fan ● psychrometric pathway for cooling air ● cooling load estimate ● efficiency and wastage in entire volume cooling versus point cooling in buildings ● is airconditioning an inefficient way of cooling? ● radiant cooling effect ● carbon offsets from ACs
46	Year 3, Sem 5	21ARC56-Building Structure IV	-
47	Year 3, Sem 5	21ARC57-Building Information Modelling	Usage of software/tools to assess the life-cycle carbon footprint of buildings including emissions from cooling systems and refrigerant use, and analyzing trade-offs between increased embodied carbon emissions for high thermal mass, high caliber insulation, glazing and other materials and reduced operational phase carbon

			emissions through increased energy efficiency.
48		21ARC58-Elective- (a)Alternate Building technology and material (b)Digital Architecture (c Architectural lighting design	-
49	Year 3, Sem 6	21ARC61, Architectural Design VI	The objective of this course has been aligned to understand the role of built environments in context of climate change, and limited planetary resources. This studio has aligned the project and design objectives to integrate sustainable design in every aspect and process possible, with an emphasis on reducing thermal loads and integrating ventilation, insulation, thermal mass, shading, cool roofs, passive/natural cooling and low energy, low-carbon active cooling technologies; local materials as much as possible; sustainable systems such as storm water harvesting, water recycling and reusing, waste management systems and renewable energy systems and above all response to site context and existing informal systems.
50	Year 3, Sem 6	21ARC62, Materials and Methods in Building Construction VI	The course has been aligned to the objective of studying the thermal properties, passive cooling possibilities, capabilities for mitigating climate change related impacts (heat, humidity and precipitation) and circularity (recyclability) of each material studied.
51	Year 3, Sem 6	21ARC62, Materials and Methods in Building Construction VI, Module 1	Glass as a building material has been included for qualitative and quantitative study of the material's contributions to increased building solar heat gain in the tropics, increased air conditioning load and hence artificial cooling energy needs,

			and inability to promote natural unassisted night-time cooling through spontaneous release of accumulated heat. The life cycle environmental impacts, carbon emissions and recyclability of Glass as a material used in building construction will also be studied.
52	Year 3, Sem 6	21ARC62, Materials and Methods in Building Construction VI, Module 3	Metal cladding of facades has been included to be studied qualitatively and quantitatively for the material's contributions to increased building solar heat gain in the tropics, increased air conditioning load and hence artificial cooling energy needs, and inability to promote natural unassisted night-time cooling through spontaneous release of accumulated heat. The life cycle environmental impact and circularity (recyclability) of metal facades has also been included.
53	Year 3, Sem 6	21ARC62, Materials and Methods in Building Construction VI, Module 5	Under the alternative wall technology solutions, critical analysis and study of materials such as glass, aluminium and steel used in medium-high rises in terms of its environmental impact has been included.. The focus will be on building a narrative of climate stress and how Architecture can contribute to reducing it. Alternative sustainable and less energy intensive materials will be explored in this context.
54	Year 3, Sem 6	21ARC63,Landscape Architecture, Module 5	Landscape Design project has been included to study the design of a current or recently proposed landscape project such as riverfront development, lake projects, religious corridors, tourism projects and analyze and assess the design, identify the loopholes and its impact on the environment and inhabiting population.

55	Year 3, Sem 6	21ARC63,Landscape Architecture, Activity Based Learning	Critical Study of a public project has been included. This involves study of an already developed landscape project, primarily a public realm such as riverfront, lake redevelopment in terms of the existing and shifted contours and levels, impact on the watershed inclusive of the site, existing and proposed biodiversity, soft and hard landscape and its impact on ground water and soil and affected communities while development of this public project
56	Year 3, Sem 6	21ARC68, Elective 4	Alongside learning of design of high rise buildings the students will also critically analyse and assess the impact of high rise buildings on environment and climate. This is supported with an activity -to critically examine the downside of the skyscrapers in its environmental impact and the skewed aspiration of skyscraper cities.
57	Year 3, Sem 6	21ARC64, Contemporary Architecture, Module 1	Developing an environmental and vernacular expression connection in Pre-independence architecture has been added alongside to learning of architecture of princely states and city examples.

58	Year 4, Sem 7	21ARC71-Architectural Design VII	Analysing a design brief also in the lens of low-energy and low-carbon performance attributes. Strongly included aspects of both solar and wind passive design elements and vernacular designs in the case study concepts
59	Year 4, Sem 7	21ARC72 -Materials and Methods in Building Construction - VII, Module 1 and 3	Brought into the objective, aspects of environmental impact, energy intensiveness, carbon emissions and circularity (recyclability) of each material studied.
60	Year 4, Sem 7	21ARC72 -Materials and Methods in Building Construction - VII, Module 5	Impact of highly computerized construction techniques on the construction industry in the Indian context
61	Year 4, Sem 7	21ARC73 - URBAN DESIGN	Understand urban design interventions from many perspectives reflecting the diverse groups of people inhabiting it, introduction to environmental challenges, low-carbon cities, compact cities, healthy cities, informal spaces, green spaces etc. Case studies that reflect this form of critical thinking. Understanding the differences between organic and planned city-making through the concepts of density, building-street ratio, safety, communal significance, etc.
62	Year 4, Sem 7	21ARC74 – PROFESSIONAL PRACTICE	Moral and Ethical Orientation of Architects: articulating the non-negotiable values of architects practicing their profession in the era of climate crisis and breach of planetary limits, understanding architecture as a guardian-profession that is charged with stewardship of a healthy coexistence between the natural and built environment. Activity to understand the impact of policies, laws, rules on holistic Architecture

63	Year 4, Sem 7	21ARC75–Estimation and Costing	To develop the sensitivity and necessary skills for calculating the environmental cost of a building has been added to the objective
64	Year 4, Sem 7	21ARC75–Estimation and Costing, Module 3	Introduction to Life cycle assessments of buildings - both financial and environmental
65	Year 4, Sem 7	21ARC75–Estimation and Costing, Module 5-Term project 5	Preparing an estimate and detailed BOQ of a low cost housing layout(rehabilitated slum) with all basic amenities
66	Year 4, Sem 7	21ARC76 – INTERIOR DESIGN	Concepts of reusing, repurposing and recycling of materials. Considering natural daylighting over artificial lighting. Engaging in interior design of an informal house with its challenges
67	Year 4, Sem 7	21ARC78 – ELECTIVE -V (a)CRAFT IN ARCHITECTURE:	Sustainable practices in Art & Crafts-including recycling and repurposing of materials as a practice within the Architecture course and the choice of sustainable materials for model making
68	Year 4, Sem 7	21ARC78 – ELECTIVE -V (b)Architectural writings and Journalism Objective	To write in a way that situates architecture in its social, ecological and economic context. The course shall sensitize students to the need to highlight unjust built space issues through their journalistic endeavours.
69	Year 4, Sem 8	PROFESSIONAL TRAINING	-

70	Year 5, Sem 9	21ARC91– ARCHITECTURAL DESIGN - VIII - ARCHITECTURE IN URBAN DESIGN CONTEXT	Critically examine the nature of urban spaces and design in terms of their production and consumption. Examine historical context of urban agglomerations with enmeshed inequities, analyse newer urban projects including smart cities critically
71	Year 5, Sem 9	21ARC91– ARCHITECTURAL DESIGN - VIII, Activity based Learning	Activities that enable one to view any urban component as a fragment of a larger whole and to learn to critique contemporary media discourse on current urban design projects
72	Year 5, Sem 9	21ARC92 – MATERIALS AND METHODS IN BUILDING CONSTRUCTION VIII	Include recycled and repurposed materials as major considerations while designing.
73	Year 5, Sem 9	21ARC92 – MATERIALS AND METHODS IN BUILDING CONSTRUCTION VIII, Activity based Learning	Explore the circular economy of repurposed/recycled materials. Explore retrofitting in informal settlements. Critically analyse green building concepts and certifications
74	Year 5, Sem 9	21ARC93 – URBAN PLANNING, Activity Based Learning	Comparison of organic city versus planned city, Spontaneous city-slums, Experience a slum redevelopment project, Experience a slum rehabilitation project, Linkages between highrises and informal settlements (slums), Open Space Index concept in informal settlements also
75	Year 5, Sem 9	21ARC93 – URBAN PLANNING, Activity based Learning	Activities that enable one to think of the various challenges faced in a city and to understand the importance of participatory mode of thinking through solutions. Solutions that take into account high benefits to all the citizens and the environment

76	Year 5, Sem 9	21ARC94 – THESIS SEMINAR	Encourage students to take up thesis topics in informal settlements, net zero Architecture, rural upskilling, public spaces. Ground their project in environmental and climate emergency times
77	Year 5, Sem 9	21ARC95 – CONSTRUCTION AND PROJECT MANAGEMENT	Concept of mindful management over a ‘business as usual mechanistic approach’. Best practices - Dealing with uncertainty, complexity, timelines, in a mindful way.
78	Year 5, Sem 9	21ARC97X (b)Principles of real estate development	<p>Help students to look at real estate development through the lens of socio-ecologically just development practices. Also give an understanding of governing bodies of land and housing</p> <p>Outline</p> <p>Concepts of ownership: land tenure insecurity of informal settlements and underlined reasons for that.</p> <p>Land use and control: urban infrastructure development activities leading to forced evictions of people inhabiting marginalized settlements.</p>

4.0 Updated Curriculum (2021 pattern)

The updated curriculum is available on the VTU website at these links.

- 1) <https://vtu.ac.in/pdf/2021syll/barch12syll.pdf>(Sem 1 & 2)
- 2) <https://vtu.ac.in/pdf/2021syll/barchsyll.pdf>(Sem 3 to Sem 8)

For comparative purposes, the prior curriculum (2018 pattern) is available on the VTU website at these links:

3) <https://vtu.ac.in/pdf/2018syll/arc.pdf>

5.0 Way Forward

While the vision is to reach out to more universities to engage on the curriculum changes to be inclusive of informal housing and climate responsive architecture, the way forward with VTU has been to design a Training Centre that can cater to the training needs of the teachers at VTU's 49 Architecture colleges across Karnataka. A Memorandum of Understanding (MOU) has been signed between cBalance and VTU to achieve the following objectives over a period of next 2 years –

1. A Training of Trainers Workshop of Architecture Professors/Faculty.
2. Conduct a series of Training of Trainers workshop - act as a HUB to train architecture faculty in the Karnataka region.

5.1. Vision of the Training Centre

To co-design (with teachers) a physical and 'virtual' continual-educational training centre to equip undergraduate architecture teachers from colleges affiliated with the VTU (~ 1000 teachers) with the knowledge, skills, motivations, and ethical courage (on a recurring basis) to be able to 'teach' the new B. Arch Curriculum adopted by VTU as the 2021 pattern, with the primary emphasis being on

- a) sustainable building design - which furthermore focuses on passive design and AC avoidance, sustainable cooling systems, and
- b) response to the predicament of problematic housing conditions of informal settlements in Indian cities

Interviews are being conducted with VTU teachers to understand and identify their needs and the gaps to deliver the updated curriculum. The inputs from these interviews will provide guidance to content and physical space design for the co-created training centre envisioned.

This endeavour to update the University curriculum to include informal housing perspectives, which so far has been excluded from the discourses in the Architecture profession, could be a catalyst in transforming the normative views of the Architecture profession and the role an architect plays in the society. This could bring in a paradigm shift in the thought process of Architect practitioners to own the climate crisis and be responsible in building climate responsive spaces.

