Structure of the Subject

Accessible Built Environment

proposed to be included in

Model Curriculum
for
UG Degree Course in Civil Engineering (Engineering & Technology)

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

सत्यमेव जयते

Ministry of Social Justice and Empowerment
Government of India

Proposed by

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Government of India

Course Curriculum
Accessible Built Environment

Type of Course (preferred option)	**PEC – Professional Elective Courses** *(ref: clause E of AICTE Model Curriculum for Bachelor of Planning, 2023)*		
Credits: 4	**L-T-P: 3-0-2** *(ref: Table on pg 21 of AICTE Model Curriculum for UG Degree Course in Civil Engineering, 2024)*	Semester	6th

The MNC-AU-03 Disability, Accessibility and Universal Design deals with many theoretical aspects of Universal Design but the proposed subject focuses on strengthening the technical skill required for designing and constructing universally accessible built environment.

Course Overview

The course (professional elective course) is meant primarily for undergraduate students as part of B. Tech curriculum (4-year undergraduate level degree programme in Civil Engineering, to strengthen their technical knowledge on designing and constructing accessible built environment. Through study of theoretical perspectives, guidelines, standards, operational policies, and good practices, the course underscores crucial elements in planning for inclusivity, with a focus on people from vulnerable groups (People with Disabilities, Elderly, Children, Women). The content of the subject will build on the fundamental concepts of disability inclusion, global good practices, and mainstreaming disability in built environment. Aspects related to accessibility in informal-sector and low-cost construction will also be included.

Course Objectives:

1. Highlight the need, rising concerns, and benefits of Universal Accessibility and safety in built environment with respect to Indian cities.
2. I all types of vulnerable groups who would benefit from accessible built environment and all stakeholders in the process.
3. Provide students with a holistic understanding of the various dimensions of Barrier, throwing light on traditional and contemporary models of Design for Disability. Also explain the impact of the social and physical environment on people with disabilities using real-life examples.
4. Present global and Indian Universal Design principles, norms, standards, guidelines, statutory provisions.
5. Provide hands-on experience – To comprehensively explore challenges faced by individuals with disabilities through a checklist based audit exercise as well as role-playing activities (a simulation exercise).
6. Systematically explain the steps for designing and constructing accessible built environment professionally.

Course Content:

Unit 1 : **Background or need for barrier-free design a rising concern**

L = 3 hours ; P = 2 hours

- Definition of vulnerable population (people with disabilities, elderly, women and children). References to be drawn from Census of India and RPWD Act 2016 along with UN definitions.
- Socio-economic aspects of vulnerability - concepts like temporary disability and transactional needs
- Global and national statistics on vulnerable groups along with their socio-economic profiling – their special needs and aspirations.
- Identification of different categories of barriers in cities - physical, psychological, social and institutional with the help of role-playing exercises conducted in different categories of buildings for early sensitization of the students.
- Levels of Access - Reasonable Accommodation, Visitable, Barrier-free and Universal Design
- Need and benefits of Accessible Built Environment

Unit 2	:	**Theories, Principles, Policies and Models on Accessible built Environment** L = 3 hours; P = 1 hours • Approaches towards disability – Change from 'charity-based' to 'right-based' approach. Changing definition of universal design / accessibility / inclusion • International Classification of Impairment, Disability, and Handicapped, International Classification of Functioning • 7 Principles of Universal Design and 5 Universal Design India Principles (UDIP) • UNCRPD and SDGs Vision • RPWD Act (2016), Accessible India Campaign (2015) • Human-environment interaction system, introduction to theories on ergonomics and design of built environment to ensure safety, comfort and accessibility.
Unit 3		**Guidelines for Accessible Built Environment** L = 3 hours; P = 1 hours • Time-line of development of barrier-free initiatives taken across the globe • Norms and standards for barrier free design - Design requirements according to human abilities • Introduction to Harmonized Guidelines 2021 • NBC, and other exemplary international codes and guidelines • Anthropometrics study of persons with different disabilities (practical exercise)
Unit 4		**Steps towards Accessible Built Environment:** This will elaborate on the Five stages towards creating a safe and accessible environment: L = 15 hours; P = 6 hours • Design conceptualization: Concept of Levels of Access (Reasonable Accommodation, Visitable, Barrier-free and Universally Designed), Design consideration for internal and external environment for new design as well as retrofitting cases • Preparation of Technical Drawings – statutory and working drawings (GFC drawings) • Finishes, Material Selection and Detailing for implementation • Procurement–Specification and Costing (DSR and other documents). Preparation of a model tender document for an accessible building. • Implementation – Construction at Site as per drawings • Good practices on all of the above
Unit 5		**Post-Occupancy Evaluation** L = 6 hours; P = 12 hours • Access audit- approach and methodology – hands-on audit of different categories of buildings with help of checklist (Harmonized Guidelines will be used as reference). • Simulation exercise – hands-on experience – group exercise by students under the mentorship of faculty members and teaching assistants. • Maintenance of accessible infrastructure – accessibility standards in escape routes and during the process of disaster evacuation, mock drills – special consideration for vulnerable population • Accessibility certification and grading using ABLE India Framework (MoHUA and DEPwD initiative)
Unit 6	:	**Multi-Sectoral Application of Principles of Accessible Built Environment** L = 6 hours; P = 2 hours Introductory guidelines on universal design standards in other domain Public open spaces, Transportation, Work places, Tourism and Recreation, Product Design etc.

Unit 7	:	**Digital Accessibility and Application of AI in creating accessible built environment** L = 3 hours; P = 1 hours • Role of digital technology in promoting safety and inclusion in built environment, incorporation of MIS into the process. • Accessibility to information and communication technologies (ICT)- making public documents and websites accessible • Role of Artificial Intelligence (AI) in design, construction and maintenance of the Built Environment, AI-powered technologies

Practical Assignments (Compulsory): Simulation Exercise (Role-playing activities) and Strategic Accessibility Audits for first-hand experiencing the barriers to safety, accessibility and inclusivity within different categories of buildings is required. This should include micro-exercises to understand the different ergonomic requirement of different people like people with disabilities, children, elderly, women. These exercises can be conducted in various subzones of the buildings like toilets, living spaces, kitchen, office spaces etc.

Study Tour (Compulsory): Visits to public buildings / institutions which showcase good examples of safety and accessibility standards - both executed and maintained.

Suggested Practical Exercises:

Simulation exercises and Audit exercises can be conducted within different categories of buildings to sensitize students and also make them aware of technical nuances of creating accessible buildings. The categories of buildings must include: (i) Residential – both formal and informal, (ii) Public buildings – education, healthcare, offices, recreation, assembly etc., (iii) Industries and work places, (iv) Transport terminals, and (v) Others.

These strategic accessibility audit exercises must culminate in proposing grounded solutions suited to the context along with costing and material specification. Also, a phasing plan for retrofitting the case-study building must be suggested causing minimum disturbances to the regular activities of the occupants.

Suggested Laboratory Requirements (Optional)

- **Full-scale Simulation Lab (audit-based approach):** A research lab that will allow full scale simulation exercises in a controlled environment with potential to simulate in real-world situation – facilitate ergonomic research based on principles of human-environment interaction. The lab needs to be equipped with flexible partitions to create different spaces along with assistive devices and technologies to simulate and understand the challenges faced by people with disabilities in different types of built spaces.
- **Inclusive Planning and Design Lab (project-based approach):** The activities will be based on "Real-life problem identification and solution" approach and the institutions may identify specific public buildings for group work and discussions. The lab will be equipped with whiteboards, projectors with video-conferencing facilities and seating arrangements.
- **Robotics Lab (AI – based approach):** This will facilitate research on application of AI and techniques of digital twining for identification of barriers within a built environment – scenario generation and problem solving.
- **Supportive facilities:** There can be a **Model Making space** for creating physical models of buildings / parts of buildings, including tools and materials such as foam boards, cutting tools, and adhesives. A **Computer Laboratory** equipped with drawing and rendering software will be necessary.

Text Books and Reference:

1. Ministry of Housing and Urban Affairs [MoHUA], Government of India. (2021). Harmonised Guidelines & Standards for Universal Accessibility in India. https://cpwd.gov.in/Publication/HarmonisedGuidelinesUA2021.pdf
2. Rights of Persons with Disabilities Act [RPwD]. (2016). No. 49 of 2016. Government of India. https://lddashboard.legislative.gov.in/sites/default/files/A2016-49_1.pdf
3. Inclusive City Framework (2021). Copyright © 2021 NIUA & IIT-Kharagpur. Published by the National Institute of Urban Affairs.
4. A Guide for Inclusive, Accessible, Safe and Resilient Urban Development. https://niua.in/intranet/sites/default/files/2346.pdf

5. Accessibility for the Disabled – A Design Manual for a Barrier Free Environment by the United nation [available online] http://www.un.org/esa/socdev/enable/designm/index.html.
6. Bednar, M.J., Barrier Free Environments.
7. Harkness, S., Building without Barriers for the Disabled.
8. The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995
9. Design manual for a barrier- free built environment, UNNATI. https://www.unnati.org/pdfs/manuals/barrier-free-built-environment.pdf
10. ISO 21542: Accessibility and usability of the built environment (2011)
11. Building Construction- Accessibility and usability of the built environment (FDBNS ISO 21542:2011).
12. ASA. A117.1: American National Standard Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped (1961) [*Its latest version is: ICC A117.1-2017 Accessible and Usable Buildings and Facilities]. https://codes.iccsafe.org/content/icca117-12017P4/american-national-standard
13. ISO. TR 9527: Building Construction -Needs of Disabled People in Buildings – Design Guidelines (1994)
14. CPWD (1998) Guidelines and Space Standard for Barrier Free Built Environment for Disable and Elderly Persons, Ministry of Urban Affair and Employment, Government of India.
15. Indian Building Congress (2012) Guidelines for Design of Universally Accessible Built Environment, Indian Building Congress, New Delhi.
16. ADA Standards of Accessible Design (2010). https://www.ada.gov/regs2010/2010ADAStandards/2010ADAstandards.htm

Course Outcome

- The gap between theoretical expertise on design conceptualizing and constructing and maintaining accessible built environment will be eliminated through the pragmatic approach adopted in framing the content of this subject.
- The students will gain professional expertise on techniques of mainstreaming inclusion at all stages like auditing, design conceptualizing, preparing detailed working drawings, selecting and procuring materials as per required specifications, implementing and maintaining accessible facilities.
- The subject will exhaustively deal with all categories of buildings like residential, educational, health, offices, recreational et-cetera.
- An exhaustive checklist for conducting strategic accessibility audit will be taught which will be professionally useful for designing new buildings as well as for framing retrofitting strategies for existing buildings with minimal interventions.
- Various planning organizations (specially ULBS) who desire to make their city safe, accessible, and inclusive will have a pool of professionals knowledgeable about all prevailing standards, guidelines and statutory provisions.