**Course Name: Introduction to Infrastructure Planning**

**Number of credits: 3 ECTS**

**Period: Spring semester**

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| Coordinator | **Dr Swati Kothary** |
| Credits | 3 ECTS |
| Lecturers | **Dr Swati Kothary** |
| Level | Bachelors |
| Host institution | Nirma University |
| Course duration | 15 weeks |

**Summary**

This 3 ECTS course is an elective course that will be taught by Dr Swati Kothary at Nirma University to B Arch (Bachelors in Architecture) students. The elective is offered to students of VIII, IX and X semesters.

**Target student audiences**

Bachelors in Architecture - VIII, IX and X semesters

**Prerequisites**

NA

**Aims and objectives**

The main course objective is to introduce basic concepts of essential structure to students at the city level. The focus will be more on water supply, stormwater drain, sewerage & sanitation and solid waste management. Other services will be introduced. The main objectives are:

* To define the lifeline infrastructure of a city.
* To identify the significance of lifeline infrastructure to human settlements, environment, public health and hygiene.
* To inculcate knowledge about stormwater drainage system, water supply system, wastewater drainage system, solid waste management and other services.
* To acquaint the students with the principles of demand, supply, and management of different resources in an urban fabric.

**The Authentic Tasks are:**

No

**General learning outcomes:**

By the end of the course, successful students will:

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| Knowledge | * Observing and exploring the different aspects of infrastructure planning of a city including management of services like stormwater drainage system, water supply system, wastewater drainage system, solid waste management and other services. |
| Comprehensive | * Understand the basic concepts related to lifeline infrastructure and their significance to human settlements, environment, public health and hygiene. |
| Application | * Apply the standards and relate to the concept of demand, supply, and management. |
| Analysis | * Identifying and organizing patterns of different services in a city. |
| Synthesis | * Using different case studies to create new solutions to overcome existing problems. |

**Overview of sessions and teaching methods**

The course will make most of the interactive and self-reflective methods of teaching and learning and, where possible, avoid standing lectures and presentations.

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| **Learning methods** | | | * Video presentations * Interviews, surveys, field trip, group work, written articles/essay * Project-Based Learning * Literature review * Stakeholder analysis/client consultancy | | |
| **Course Outline** | | |  | | |
| **No. of Weeks** | | **Description of Lesson/ Studio/seminar** | | | |
| 1 | | **1** | **Introduction to Basic Concepts** | | Introduction to Basic Concepts |
| Concept |
| Importance |
| History - Examples |
| Current Scenario - Examples |
| Implications of utilities and services planning on public health and environmental protection |
| Familiarizing with different Manuals, codes and standards e.g. CPHEEO (manual and guidance) |
| 3 | | **2** | **Water Supply System** | | Water & Health |
| Surface and groundwater sources, quality and quantity, location of sources and water intakes, area requirements of the components of water intakes |
| Water requirement for different land uses, factors affecting water demand, per capita requirement and its relationship with population sizes, variation |
| 4 | | The water treatment system, location and space requirements |
| Components of water distribution systems, planning for various uses, Storage & Supply network |
| Population Projection |
| 5 | | **3** | **Storm Water Drainage System** | | Definition of Hydrology |
| Classification, hydrological cycle, urban water cycle |
| 6 | | Types precipitation and measurement, rainfall analysis, Surface water runoff, Measurement of Runoff, Watershed |
| Layout and design of stormwater system, rainwater harvesting systems |
| 7 | | **4** | **Sanitation & Sewage System** | | Sanitation & Public Health |
| Off-Site & On-Site sanitation & technology |
| Low-cost appropriate technologies for sanitation |
| Disposal systems- Conventional & Alternate |
| Social stigma associated with sanitation- use & disposal |
| Public Toilets |
| National Urban Sanitation Plan (City Sanitation Plans)/ Swachh Bharat Mission (SBM) |
| 9 | | **5** | **Solid Waste Management** | | Solid Waste Management for Indian cities, quantity of solid waste and its character |
| Methods of Solid Waste Management, collection, transportation and disposal |
| 10 | | Landfilling and composting, pre and post-treatment, different methods of solid waste disposal systems |
| Community participation and involvement of NGOs in efficient solid waste management |
| 11 | | **6** | **Other Services** | | Telecommunication Services - Location criteria for Mobile Phone Tower |
| Pipelines - Gas, Oil |
| Power - Requirement, Electric Substation requirement, capacity, location and space requirement |
| 12 | | **7** | **Service Delivery & Management** | | Water Supply, Storm Water Drainage |
| Government Structure - LSG, State, Central |
| Institutional Arrangement - Urban, Rural |
| Responsibility - Urban, Rural |
| Financing - Urban, Rural |
| PPP Arrangement |
| Examples - Successful, Unsuccessful |
| Status - Best, Worst state |
| Potentials |
| Challenges |
| Case Study in each - Best Practice, Innovation, Service Delivery, Financing, Regulation |
| 13 | | Sanitation &Sewerage |
| Government Structure - LSG, State, Central |
| Institutional Arrangement - Urban, Rural |
| Responsibility - Urban, Rural |
| Financing - Urban, Rural |
| PPP Arrangement |
| Examples - Successful, Unsuccessful |
| Status - Best, Worst state |
| Potentials |
| Challenges |
| Case Study in each - Best Practice, Innovation, Service Delivery, Financing, Regulation |
| 14 | | Solid Waste Management |
| Government Structure - LSG, State, Central |
| Institutional Arrangement - Urban, Rural |
| Responsibility - Urban, Rural |
| Financing - Urban, Rural |
| PPP Arrangement |
| Examples - Successful, Unsuccessful |
| Status - Best, Worst state |
| Potentials |
| Challenges |
| Case Study in each - Best Practice, Innovation, Service Delivery, Financing, Regulation |
| 15 | | Other Services |
| Government Structure - LSG, State, Central |
| Institutional Arrangement - Urban, Rural |
| Responsibility - Urban, Rural |
| Financing - Urban, Rural |
| PPP Arrangement |
| Examples - Successful, Unsuccessful |
| Status - Best, Worst state |
| Potentials |
| Challenges |
| Case Study in each - Best Practice, Innovation, Service Delivery, Financing, Regulation |

**Literature**

* CPHEEO Manual on Water Supply & Treatment, 3rd Edition, revised & Updated, 1999
* CPHEEO Manual on Operation & Maintenance of Water Supply Systems, 2005
* CPHEEO Manual on Sewerage & Sewage Treatment, 2013
* CPHEEO Manual on Municipal Solid Waste Management, 2000
* CPHEEO Manual on Municipal Solid Waste Management, 2016
* CPHEEO Manual on Storm Water Drainage Systems, 2019
* Report on Indian Urban Infrastructure and Services, Ministry of Urban Development, March 2011, The High Powered Expert Committee (HPEC) for Estimating the Investment Requirements for Urban Infrastructure Services
* Garg, S K (2010) “Water Supply Engineering” Khanna Publishers
* IDFC-Government of India (2011) “India Infrastructure Report: Water: Policy and Performance for Sustainable Development” to be retrieved from https://www.idfc.com/pdf/report/IIR-2011.pdf
* IDFC-Government of India (2007) “India Infrastructure Report: Rural Infrastructure” to be retrieved from https://www.idfc.com/pdf/report/IIR-2007.pdf
* IDFC-Government of India (2006) “India Infrastructure Report: Urban Infrastructure” to be retrieved from https://www.idfc.com/pdf/report/IIR-2006.pdf
* Morgan, Charles S (2010) “Regulation and the Management of Public Utilities” UK: Gale
* Peavy, Howard S., Rowe, Donald R. & Tchobanoglous, George (2013) “Environmental Engineering” Tata McGraw Hill
* Town and Country Planning Organisation (2015) “Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines” Ministry of Urban Development, Government of India; to be retrieved from <http://moud.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>
* Kundu, Amitabh (1991) “Micro Environment in Urban Planning-Access of Poor to Water Supply and Sanitation” EPW, September, 14
* Mohan, Rakesh (2003) “Infrastructure Development in India: Emerging Challenges” Paper presented at Annual Bank Conference on Development Economics, Bangalore
* Shreyaskar, Pankaj K P (2016) “Drawing on the Right to Live with Human Dignity: Contours of Access to Water and Sanitation in India” EPW, December.

**Course workload**

The table below summarizes course workload distribution:

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| --- | --- | --- | --- |
| **Activities** | **Learning outcomes** | **Assessment** | **Estimated workload (hours)** |
| **In-class activities (52.5 hours)** | | | |
| Lectures | Understanding theories, concepts, methodology and tools | Class participation | 30 |
| Moderated in-class discussions | Understanding various policy and management contexts and common problems in communication in infrastructure planning | Class participation and preparedness for discussions | 7.5 |
| In-class assignments, field assignment | Understanding various policy and management contexts and common problems in communication in infrastructure planning | Class participation and preparedness for assignments | 7.5 |
| Reading and discussion of assigned papers for seminars and preparation for lectures | Familiarity with and ability to critically and creatively discuss key concepts, tools and methods as presented in the literature | Class participation, creative and active contribution to discussion | 3.75 |
| Group presentation | Ability to interpret data, analyze audience, and use the concepts, tools, and methods for communicating the infrastructure planning | Quality of group assignments and individual presentations | 3.75 |
| **Independent work (75 hours)** | | | |
| Group work:   * Contribution to the group case-study projects * Contribution to the preparation and delivery of individual presentation | Ability to interpret data, analyze and use the concepts, tools, and methods for communicating information to all participants  Population projection for selected area and assess demand for future | Quality of group assignments and individual presentations | 30 |
| Course group assignment | Ability to conceptualize and frame an infrastructure planning problem, find related literature and data, interpret data, use the concepts, tools and methods covered in the course, and draw policy/management relevant conclusions | Quality of developed presentation | 25 |
| Group presentation | Ability to interpret data, analyze audience, and use the concepts, tools, and methods for communicating the infrastructure planning issues. | Quality of group assignments and individual presentations | 20 |
| ***Total*** |  |  | ***127.5 hours*** |

**Grading**

The student’s performance will be based on the following:

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| **Assessment** | * Progress assessment (60%):   - Exercise (20%): students have to complete the quiz or exercise on each topic done in class.  - Homework (20%): Assignment on selected topics.  - Group Assignment ( 20%): On water Supply / Solid Waste Management     * Final assessment (40%): * Group report (20%): The students will be divided into groups of 2-3 students and choose 1 topic among 6 topics. Project report according to the specific requirements of each topic. * Individual Assessment (20%) on the topic of choice from all units. |
| **Evaluation** | A+ (10)  A (9)  B+ (8)  B (7)  C+ (6)  C (5)  Interim Fail (0)  Final Fail (0) |