Group Discussion

Design of a FSSM course outline

DAY 1

WORKSHOP FOR ACADEMIC INSTITUTES IN FAECAL SLUDGE AND SEPTAGE MANAGEMENT

AHMEDABAD

6TH MARCH, 2018

SCBP

National Institute of Urban Affairs

CEPT UNIVERSITY

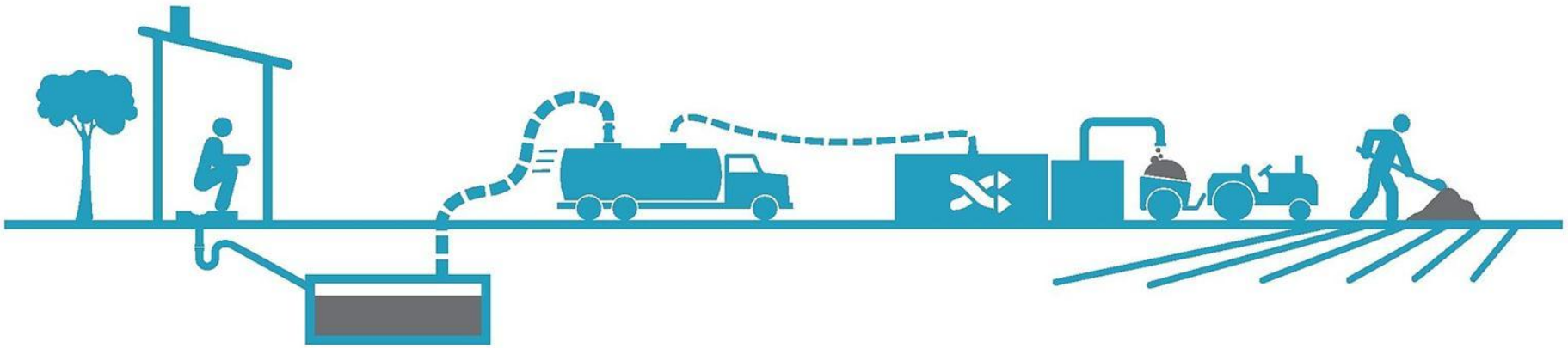
C-WAS

Discussion Points

- Learning Objectives and Outcomes of the course
- Teaching Strategies to achieve learning outcomes
- Course Structure
- Course Outline
- Resources needed to support learning outcomes
- Student Intake numbers and qualification

Group- 1

Course Title -
Fundamentals of FSSM



Learning Objectives

1. Health hazard
2. Design – System considerations
3. Institutional framework and Financing mechanisms
4. Social
   - BCC
   - Safety (MS)

Teaching Strategies

- Lectures / Tutorials
- In house guest
- Films
- Site visits / Surveys
- Assignments
- Seminars / GDs/ Workshops

Course Structure

Session - 42 hours

1. Introduction
2. Design systems and technology options
3. Institutional Framework
4. Financing and investment mechanisms
5. Social Framework

Course Outline

1. Introduction – 5 hrs
   a) Terms, Concepts, Need, Objectives, Terminologies
   b) Environment
      - Health
      - Natural resources
      - Networked Vs Non networked, partial networked
2. Design systems and technology options – 14 hrs
   a) Natural conditions
   b) Indicators
   c) System divisions – value chain
   d) Norms and standards
   e) Assessment of alternatives
   f) Costing
   g) O&M
   h) Case studies

Course Outline

3. Institutional framework – 10 hrs
   a) Global framework
   b) Legislation, policy, programs
   c) State specific structure
   d) Evaluation and monitoring
   e) HRM & Capacity building

4. Financing and investment mechanisms – 8 hrs
   a) Sources
   b) PPP
   c) Business models
   d) Innovative financing mechanisms (Crowdfunding)

5. Social framework – 5 hrs
   a) Stakeholder identification (R&R) - CBOs, SHGs, NGOs etc
   b) Informal service providers
   c) Awareness programmes
   d) Case studies

Resources

- HR
  a) Engg / Env Sci
  b) Economics
  c) Social
  d) Planning
- Specific reference materials

Student Intake

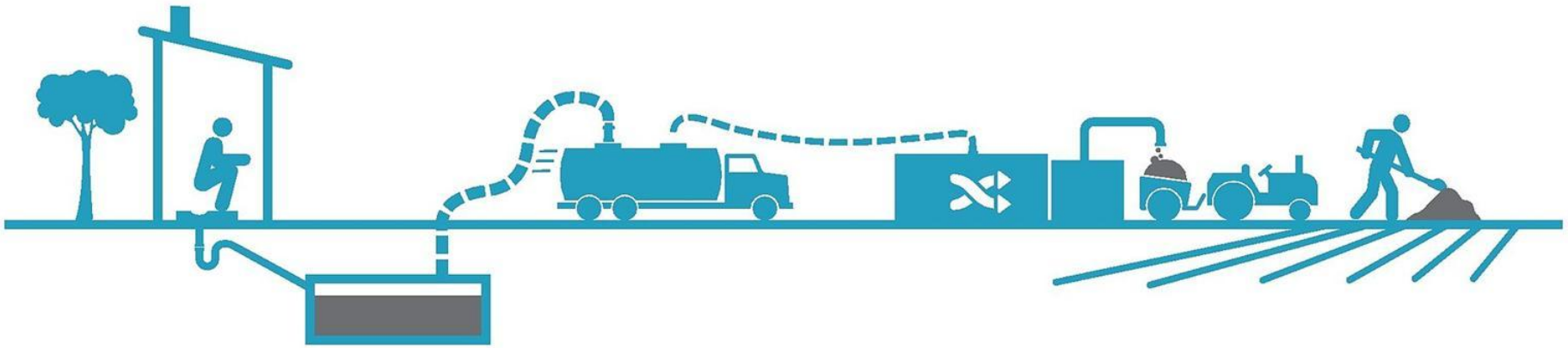
Training program for:-

- Sanitary workers
- Operators
- Masons
- Sanitary officers
- Middle level administrators of ULB

Extension program – 1 to 2 weeks

Group- 2

Course Title -
Faecal Sludge and Septage Planning and Management



Learning objectives

1) To provide understanding of the concepts of FSSM and its relation to the environment and public health.

2) To offer knowledge pertaining to holistic solutions for different contextual situations in Indian cities.

3) To offer integrated learning of various aspects of FSSM to make its implementation functional.

4) To provide skills to the professionals for capacity building.

Teaching Strategies

- Classroom and field based teaching
- Studio exercises in FSM
- Case study Approach
- Evaluation: Theoretical Examination, studio evaluation and assignments

Course Structure

Course Credits: 3 (45 Sessions)

1. Module 1: Introduction to sanitation and FSSM
2. Module 2: Assessment of baseline situation using various tools.
3. Module 3: Technological alternatives for FSSM
4. Module 4: Collection, transport and treatment of Faecal sludge
5. Module 5: Planning for FSSM (Physical, financial and Institutional)
6. Module 6: Implementation of FSSM (Regulations and policies)

Course Outline

Module 1:

Introduction to sanitation and FSSM - 4 sessions

a) Concepts of sanitation (Definition and explanation)
b) Introduction to related terminology
c) Basics of FSSM
d) The service chain of FSSM
e) Approaches: centralized/ decentralized, On-site/ Off- site etc.

Module 2:

Assessment of baseline situation using various tools - (8 sessions)

a) Assessment of physical and spatial characteristics of sanitation infrastructure (Household surveys (Sanitab), existing data base preparation, mapping, GIS and other available tools)
b) Assessment of stakeholders
c) Socio-economic assessment
d) Assessment of related policies.

Course Outline

Module 3:

Technological alternatives for FSSM - 8 sessions

a) Faecal Sludge Quantification
b) Treatment Mechanism
c) Containment systems
d) Characterization of FS

Module 4:

Collection, transport and treatment of Faecal sludge - 8 sessions

a) Investigation of various methods
b) Septage interactive toolkits
c) Pit latrine and empting system
d) FS volume and cost

Course Outline

Module 5:

Planning for FSSM (Physical, financial and Institutional) - 12 sessions

a) Settlement wise planning for FSSM
b) Different process involved in Planning
c) Different tools and techniques involved in Planning
d) Financial mechanisms for FSSM
e) Institutional Mechanism for FSSM

Module 6:

Implementation of FSSM (Regulations and policies) - 5 sessions

a) Assessment and review of various policies and regulations at various levels (national, state, city, local)
b) Stakeholders involvement
c) Institutional involvement
d) Resource mobilization
e) Integrated mechanisms for successful FSSM

Resources

- Experts/ professionals working in related projects
- Technical Experts
- Stakeholders- NGO/ CBOs, Municipal Officials, policy makers, consulting firms.
- Teaching materials- Audios, Videos, Books, Presentations, websites and other e- learning materials

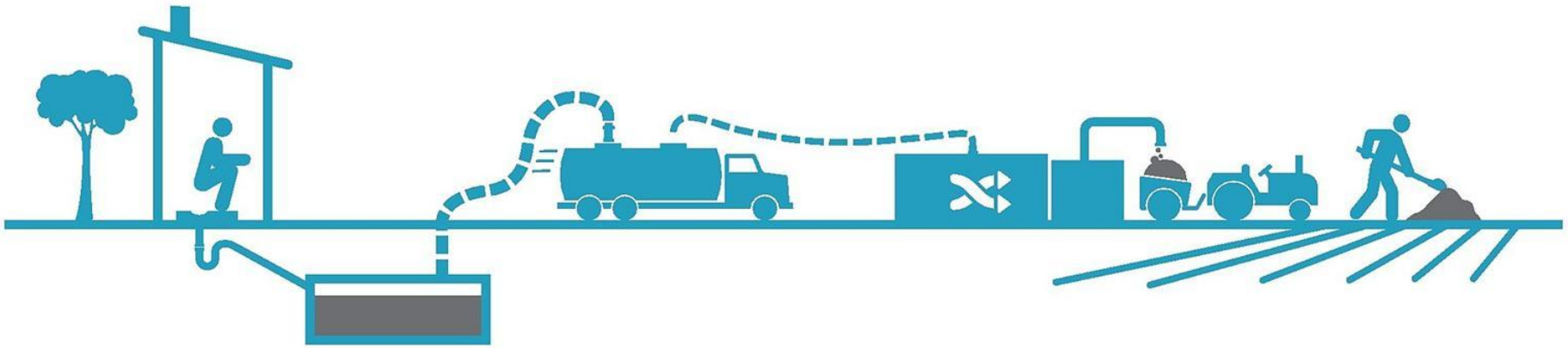
Student Intake

Pre- Qualification:

- **Diploma** in engineering/architecture
- **Graduation** in student in engineering/architecture/planning
- **Post graduation** in architecture/ planning/ engineering and social sciences(Geography, Economics and Sociology)

Group- 3

Course Title –



Course on FSSM – Entry Points

1. Elective subject in ongoing courses in Engineering/Planning both UG/PG level
2. Sensitize/encourage students to take subject related to FSSM in dissertation
3. Executive programme or professional certification for ULB official or service provider –

- Option 1 – One year programme (spread over two year)
- Option 2- Short term courses for 1 months

Learning objectives

- To sensitize students towards sustainable sanitation services
- Students will gain knowledge and understanding related to sanitation services
- Students will be able to apply gained knowledge to real life situation
- Students will be able to comprehend the various issues and challenges
- Students will be benefited by integrated and holistic approach to achieving sustainable sanitation services in India

Learning Outcomes:

- **Create robust professional base for addressing sanitation related challenges;**
- **Dissemination of knowledge gained**

Teaching Strategies

- Lectures/ Expert lectures
- Video tutorials
- Case studies
- Activity based learnings - Studio
- Exposure visits
- Peer learnings

Course Structure

1. Module 1: Introduction to sanitation (Global/ National/ State/ULB situation)
2. Module 2: Components of FSSM (Characterization, collection and transportation, treatment etc.)
3. Module 3: Technology Options (Technology systems/ end use, Case studies, Design/FSM Plan, etc.)
4. Module 4: Governance, Institutional - Regulatory mechanism and Finance (Policy, regulation, Act, Programme, scheme etc)
5. Module 5: IEC
6. Dissertation / Seminar/ Project

Resources

- Seed funding – To encourage planning/ engineering schools to initiate course on FSSM
- Monetary incentives/scholarship for dissertation on FSSM related subject
- Resource materials from other Universities, Online courses etc.
- Exposure/Networking to resource person
- Exposure visits/ capacity building/ workshops for faculty members
- Access to journals, online books etc.

Student Intake

Intake capacity : 15

Pre-Qualification:

Any graduate with minimum one year of experience in sanitation and its allied fields

Proposed Course Outline by the Academic Institutes

DAY 2

WORKSHOP FOR ACADEMIC INSTITUTES IN FAECAL SLUDGE AND SEPTAGE MANAGEMENT

AHMEDABAD

7TH MARCH, 2018

SCBP

National Institute of Urban Affairs

CEPT UNIVERSITY

C-WAS

Discussion Points

- Which course format will you like to introduce in your institute?
- What will be the Course Content?
- What opportunities and challenges do you foresee to introduce the course in the curriculum?

Amity School of Architecture and Planning, Noida

One- Year Programme
Post Graduate Diploma in Fecal Sludge and Septage Management
(PGDFSSM)

Ms. Anika Kapoor
Urban Planner

Dr. Ekta Singh
Professor

Programme formulation

- Programme Mission
- Admission Criteria
- Programme Attributes
- Learning Outcomes
- Operational Outcomes
- Teaching Pedagogy
- Programme Structure
- Programme Framework
- Assessment Tools
- Teaching Resources

Programme Mission

The mission of the programme is to dissipate knowledge of fecal sludge and septage management and to produce professionals and technical experts in the same field.

The programme intends to develop problem solving attitude amongst students, who will serve the community and contribute to the society.

We aim to yield good professionals who possess regards for varied human behaviors and have courage of conviction and action.

Admission Criteria

- Minimum of 60% marks in the required qualification

- Diploma in engineering/ architecture/

or

- Graduation in architecture/ planning/ engineering

or

- Post Graduation in architecture/ planning/ engineering and social sciences (Geography, Economics and Sociology)

Programme Attributes

1. Knowledge and Expertise in FSSM
2. Research and Analysis
3. Advanced Digital Technology for FSSM
4. Proficiency in Technical skills
5. Effective Communication and Teamwork
6. Professional Ethics
7. Creative and Futuristic Thinking
8. Social responsibility
9. Sustainability
10. Sensitivity
11. Employability, Enterprise & Entrepreneurship
12. Lifelong learning

Note: These Attributes are used to define programme objectives and subsequent outcomes

Learning Objectives

Students shall be able to:

1. Define their knowledge pertaining to fecal sludge and septage management.
2. Classify areas of research and their applications in the field of FSSM.
3. Illustrate advanced digital technology and technical skills for service chain and design of treatment technologies.
4. Summarize concept and philosophy in allied fields for effective decision making.
5. Demonstrate effective communication and teamwork that support and enhance project management skills effectively.
6. Develop behavioural skills for enabling the stakeholders involvement in the projects.
7. Characterize the professional ethics to perform his/her duties as a technical expert for contribution as a global citizen.
8. Recognize futuristic thinking to ensure sustainable and socio- cultural diversity for the development of the society.
9. Create lifelong learning and personal flexibility to sustain as a professional.
10. Justify employability, enterprise & entrepreneurship in industry.

Operational Outcomes

The Programme will :

1. Identify the use of effective methodology and pedagogical tools for teaching, learning and development.
2. Describe the relevant and contemporary curriculum to meet the requirement of industry.
3. Estimate potential possibilities for a sustainable and environmental friendly growth in urban areas.
4. Determine employment opportunities of all the students
5. Examine the scholarly and professional activities and will fetch digital and technical knowledge in order to enhance competencies and to contribute to the existing body of knowledge and expertise.
6. Assess the need to perform duties ethically and practice the highest standards to serve the society.
7. Justify a habit of continuous lifelong learning and personal development during the work to support their career aspirations in future.

Teaching Pedagogy

1. Classroom Lectures
2. Field Visits
3. Studio exercises
4. Case study Approach
5. Research
6. Assignments

Teaching Resources

- Experts/ professionals (resources) working in related projects
- Technical Experts
- Stakeholders- NGO/ CBOs, Municipal Officials, policy makers, consulting firms.
- Teaching materials- Audios, Videos, Books, Presentations, websites and other e- learning materials

Programme Structure

1. Module 1: Introduction: an Overview of Sanitation and Fecal Sludge and Septage Management
2. Module 2: Fecal Sludge Service chain
3. Module 3: Technological interventions for FSSM
4. Module 4: Planning for FSSM (Physical, financial and Institutional)
5. Module 5: Dissertation

Programme Outline

Module 1:

Introduction - An Overview of Sanitation and Fecal Sludge and Septage Management

a) Concepts of sanitation (Definitions and explanations)
b) Introduction to related terminology
c) Types of sanitation management (On- site vs Off- site)
d) Basics of Fecal Sludge and Septage
e) Understanding Global and local scenario pertaining to fecal sludge and septage
f) Relevance of Fecal Sludge and Septage management with respect to environmental and financial resources.

Programme Outline

Module 2:

Fecal Sludge Service chain

a) Fecal Sludge quantification, characterization and treatment
b) Understanding sludge and septage containment mechanism
c) Methods for collection and transportation of Fecal sludge
d) Overview of treatment mechanisms
e) Case studies for understanding the different stages of fecal sludge service chain

Module 3:

Technological interventions for FSSM

a) Technological variants in Containment Mechanism,
b) Technological alternatives in Collection Mechanism
c) Technological options in transportation of fecal sludge and septage
d) Technological alternatives in Treatment Mechanism
e) Exploring waste to engage treatment bye- products.

Programme Outline

Module 4:

Planning for FSSM (Physical, Institutional and financial planning)

1. Physical Planning

a) Understanding ways to assess physical and spatial characteristics of a particular site with respect to sanitation requirement

b) Exploring tools for quantifying the sanitation requirement eg. Household surveys (Sanitab), existing data base preparation, mapping, GIS and other available tools

c) Settlement wise planning for FSSM

d) Assessment of stakeholders and their socio-economic status

e) Different process involved in Planning

2. Institutional Mechanism

a) Knowledge regarding regulations and policies pertaining to implementation of fecal sludge management.

b) Evaluating the available alternative institutional frameworks both Global & Domestic

3. Financial mechanisms

a) Understanding different financing models, eg., PPP, crowd- funding, pooled funding etc.

Programme Framework

Modules	Credits	L/T/FW/SW	Weeks
1	2	L/T	2
2	4	L/T/FW	6
3	4	L/T/FW	6
4	6	L/T/FW	10
5	8	SW	16

Note:
L- Lecture
T- Tutorial
FW- Field Work
SW- Self Work

Assessment Tools

1. Examination
2. Viva- Voce
3. Dissertation
4. Thesis
5. Comprehensive Exam

Birla Institute of Technology, Ranchi

One subject/ course in a semester on Fecal Sludge and Septage Management

Dr. Bimal C. Roy
Assistant Professor

Learning Objectives

1. To understand the fundamentals of FSSM and its need.
2. To explain the inter-relation of FSSM to the environment and public health.
3. To assess the existing sanitation infrastructure.
4. To identify the suitable tool & technique.
5. To provide the holistic solutions for different contextual situations in Indian Cities.

To prepare efficient professionals to address the various aspects of planning and implementation of FSSM.

Teaching Pedagogy

Course Credits: L-T-P 3 (40 Sessions)

1. Classroom and field based teaching
2. Studio exercises in FSM
3. Case study Approach
4. Evaluation: Theoretical Examination, studio evaluation and assignments

Course Structure

1. Module 1: Introduction to sanitation and FSSM - (4 sessions)
2. Module 2 : Treatment process - (6 sessions)
3. Module 3: Design parameters & Technological Alternatives - (12 sessions)
4. Module 4: Planning for FSSM (Physical, financial and Institutional) - (12 sessions)
5. Module 5 : Regulations and Policy Framework - (6 sessions)

Course Outline

Module 1:

Introduction to sanitation and FSSM - (4 sessions)

a) Basic concepts of sanitation (Definition and explanation)
b) Various related terminology
c) Characteristics of FS
d) Basics of FSSM
e) The service chain of FSSM
f) Approaches: centralized/ decentralized, On-site/ Off- site etc.

Module 2:

Treatment Process - (6 sessions)

a) Collection (emptying system & frequency)
b) Transportation
c) Various methods of treatment of FS
d) Sustainable use of the treated effluent

Course Outline

Module 3:

Design Parameters & Technological Alternatives - (12 sessions)

a) Assessment of the exexisting sanitation infrastructure using various tools e.g. House hold survey, mapping, GIS etc.
b) Finding the gap and projection for the future.

Module 4 :

Planning for FSSM (Physical, Financial & Institutional) - (12 sessions)

a) Physical and spatial planning
b) Costing, operation and maintenance
c) Financial mechanism for FSSM
d) Institutional mechanism for FSSM

Course Outline

Module 5 :

Regulations &Policy Framework - (6 sessions)

a) Assessment and review of various policies and regulations at different levels (national, state, city, local)
b) Stakeholders participation
c) Institutional involvement
d) Resource mobilisation
e) Integrated mechanism for successful implementation of FSSM

Resources

- Experts/ professionals (resources) working in related projects
- Technical Experts
- Stakeholders- NGO/ CBOs, Municipal Officials, policy makers, consulting firms.
- Teaching materials- Audios, Videos, Books, Presentations, websites and other e- learning materials

Student Intake

Student Intake: 15

Education/ experience/ pre- requisite:

- Diploma in Engineering/architecture

OR

- Graduate student in architecture/ planning/ engineering

OR

- Post Graduate students in architecture/ planning/ engineering and social sciences (Geography, Economics and Sociology)

Birla Institute of Technology, Goa

Fecal Sludge and Septage Management Learnings

Debasis Patnaik
Assistant Professor

Introduction

- Swacchh Bharat Mission launched on 2nd Oct 2014
- Aim was to make India ODF by 2019
- By now 475 cities certified as such
- Important to make attempts for safe sanitation

How to take it forward

To form development groups with knowledge dissemination, skill training and acquisition to streamline sustainable fecal sludge and septage management.

What is Fecal Sludge

Solid and settled content of private latrines, septic tanks from onsite sanitation systems like pit latrines, non sewered public ablution blocks, septic latrine tanks, aquifers, dry toilets, septage liquid and solid material pumped from septic tanks, cesspool or such onsite treatment facility (after it has accumulated over a period of time).

Usually septic tanks retain 60% to 70% of solids, oils, grease entering it.

Septage is a combination of scum, sludge, liquid accumulating in septic tanks.

Gaps and Issues in Urban sanitation

- Issues in access to toilets due to households' financial constraints and space crunch as cited by people.
- Septic tanks placed under toilets or sealed or cemented.
- Septic tanks oversized (National Building Code ; Central Public Health, Environmental Engineering Organization, CPHEEO Manual)

Progress

- Promoting access for HH to safe FSSM facilities and proper disposal
- Thinking, planning, implementing measures related to FSSM in different sectors
- Sanitary and safe disposal
- Promote Recycle and Reuse of treated sewage
- Promote design, awareness, monitoring of laws.

College of Engineering, Pune

Open Elective: Urban Sanitation

Mr. Ravindra Thanedaar
Professor

Course Outcome

- Students will be able to know various processes which generate waste water and understand importance of FSSM
- Students will be able to identify &design appropriate decentralized wastewater system.
- Students will be able to prepare a septage management plan & design treatment facility
- Students will be able suggest suitable site for treatment facility.

Course Structure

1. B Tech. Civil Engg and B. Planning program

- Elective in 3rd, 5th and 7th semester
- Mini Project of 2 credits
- Project work of 8 credits

2. M Tech program in Environmental and Water Resource Engineering

- Elective in 1st and 2nd semester
- Mini Project of 2 credits in 2nd semester
- Dissertation of 18 credits

Teaching Scheme:

Lectures – 3 Hrs./ week

Course Outline

Unit 1:

a) Introduction
b) Sources of wastewater in a residential area
c) Current scenario in urban area, consequences of centralised & decentralised wastewater treatment

Unit 2:

a) Various Technique of decentralised waste treatment
b) Modifications in septic tank, UASB, anaerobic filter, DEWATS, EM technology, sullage treatment, vermin composting
c) Wastewater characteristics, design parameters, design calculations
d) Cost estimate for all units

Course Outline

Unit 3:

a) Understanding septage, & its management,
b) Characteristics of septage, need of septage management,
c) Preparation of plan, identification of site for treatment facility, distance to be travelled, power availability, neighborhood, **land availability, geological** parameters
d) Stages in septic management, containment system, septage quantification, emptying, transportation options,
e) Septage treatment, recycling effluent, resource recovery

Unit 4:

a) Financial planning, monitoring & evaluation,
b) Capacity building
c) Roles and responsibilities of all the stakeholders expected outcome
d) Case studies

Guru Ramdas School of Planning, Guru Nanak Das University, Amritsar

Fecal Sludge and Septage Management as part of Masters in Environment

Mr. Kuldip Singh
Associate Prof.

Ms. Sakshi Sahni
Associate Prof.

Dr. Kirandeep Sandhu
H.O.D and Associate Prof.

Course Format

- **A subject/subjects in a degree module**
  Additions in the existing course of masters in Urban Planning

- **Course title (Existing Paper)**
  Planning for Utilities and Services

Planning for Utilities and Services 1/2

M. Tech. (Urban Planning) (Semester-I)

(Under Credit Based Continuous Evaluation Grading System)

Credits: 03 (L=2, T=1, U=0)

Section A

Role of utilities in the functioning of settlements, Sources of Water, Assessment of water demand, Water Zoning system and densities of population, Water Collection and conveyance, Distribution system, Layout and Methods of supplying water, Pipe size and hierarchy, planning and design considerations, Water treatment processes and disinfection.

Section B

Issues related to Quality of water, Government Programs. Urban Sanitation- systems of sanitation, Methods of collection- Water Carriage System, Sewerage systems, Pattern of Collection system, sewage treatment process, activated sludge process, Sewage disposal, Pipe size and hierarchy, Planning and design considerations.

Planning for Utilities and Services 2/2

Section C

Urban Storm water collection system components, Drainage system: determination of intensity of rainfall and run off coefficient for various sources; rain water harvesting; Reuse and recycling of water, Solid waste generation and disposal methods like composting, incineration etc.

Biomass, energy – solar, photovoltaic cells, use of PPP models in various kinds of utilities, Govt.

Programs on storm water and urban drainage system

Section D

Disposal in un-sewered areas like septic tanks, privies-Introduction to Faecal Sludge, quantification of faecal sludge, characteristics, variability, treatment objectives, pathogens in faecal sludge; Treatment mechanisms: Physical, Biological and Chemical. Collection and transportation: manual collection, cartridge containment devices, direct lift, fully mechanized collection, Transfer stations, Occupational health and safety.

Masters in Environment Planning

Semester	Paper	Credits
I	Planning for Utilities and Services	3hrs/week
II	Methodologies of Faecal Sludge Analysis	3hrs/week
III	Faecal Sludge Treatment Technologies	3hrs/week
IV	Institutional Frameworks and Regulations for Faecal Sludge and Septage Management	3hrs/week

Course Structure

1. Paper 1 : Methodologies of Faecal Sludge Analysis
2. Paper 2: Faecal Sludge Treatment Technologies
3. Paper 3: Institutional Frameworks and Regulations for Fecal Sludge and Septage Management

Course Outline

Paper 1:

Methodologies of Faecal Sludge Analysis

SECTION A –

Sanitation Plan, Field **assessment of toilets and onsite system**, assessment of the initial situation – tools and methods for data collection – Literature review, semi structured interview, household level surveys, qualitative field observations, mapping, laboratory analyses, SWOT analysis; Data to be collected – General context, sanitation sector, profile of manual and mechanical service providers practices at household level, spatial data and city structure. Characterization, evaluation and selection of treatment sites – Identification of treatment sites.

SECTION B –

Stakeholder Analysis - Introduction to stakeholder analysis; why and how, identification of stakeholders – Faecal Sludge management stakeholders, difference between large and medium sized cities; characterization of stakeholders, information to be collected, Influence and interest, Selection criteria for key stakeholders, amalgamation of faecal sludge management stakeholders' main characteristics and involvement needs, Practical problems faced by faecal sludge management stakeholders, In practice: iterative selection of key stakeholders

Course Outline

SECTION C –

Stakeholder Engagement- The importance of engaging stakeholders, participation levels, from information to delegation, determination of the participation levels based on the stakeholder analysis, the stakeholder participation matrix, involvement tools, list of involvement tools, determining the most appropriate involvement tools, milestones and cross-cutting tasks, main milestones in the participatory process, raising awareness, training and capacity building, distributing and formalizing roles and responsibilities, formalization documents

SECTION D –

Planning Integrated Faecal Sludge Management Systems - Need for an integrated approach. Understanding and working towards an enabling environment. Proposal of a planning approach and logical framework, exploratory and preliminary studies of study, detailed project development – action planning implementation, monitoring and evaluation, selecting context-appropriate technical options, combination of services, criteria for selection of treatment options, elimination-based approach, Sanitation system proposal

Course Outline

Paper 2:
Faecal Sludge Treatment Technologies

SECTION A –

Introduction to established **faecal sludge treatment technologies,** Transferred sludge treatment technologies: anaerobic digestion, Imhoff tank, sludge incineration, mechanical sludge treatment, new technologies for faecal sludge treatment: vermicomposting, black soldier flies, ammonia treatment, thermal drying, selecting treatment technologies.

SECTION B –

Introduction to faecal sludge **settling and thickening**, floatation, anaerobic digestion, solid liquid zones, Design of settling-thickening tanks: Faecal characteristics, area and length of tank, volume calculation, inlet-outlet design, Operation and maintenance, performance of the tank, basic design settling-thickening tank.

Course Outline

SECTION C –

Drying beds: Unplanted: treatment principle, design parameters: climate, faecal sludge type, layer thickness, number of beds, design parameters, construction, quality of dried sludge, leachate, basic design examples. Planted: macrophytes, treatment mechanism, performance indicators, basic design and construction, operation and maintenance.

SECTION D –

Faecal sludge treatment in treatment plant: Biodegradability of faecal sludge, characterization ratio, strength of faecal sludge, co-treatment with activated sludge treatment system, effluent quality, oxygen demand, sludge generation, aeration requirement, consideration for co treatment with activated sludge system, anaerobic co-treatment of faecal sludge, COD overloading, ammonia inhibition, pH variation, Sulphide inhibition, consideration for anaerobic systems

Course Outline

Paper 3:

Institutional Frameworks and Regulations for Fecal Sludge and Septage Management

SECTION A –

Sanitation importance and instruments at International Level, National level guidelines; National Faecal sludge and septage management policy, GoI advisory on Septage Management, Constitutional provisions with a bearing on sanitation; the public trust doctrine, precautionary principle and polluter pays principle, Legislation and regulatory regime for FSSM; The Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act 2013.

SECTION B –

Generic Institutional Structures for Faecal sludge management, Regulatory regime and institutional roles at various hierarchical levels, Role distribution among various institutions and coordination matters, Institutional arrangements for collection and transport ,Institutional arrangements for treatment of faecal sludge , Institutional arrangements for end use and disposal, private sector participation in FSSM and service delivery arrangements, Rights and responsibilities of citizens, community participation in FSSM

Course Outline

SECTION C –

Organizational structures at local level for system efficiency; human resource, data management, evaluation and monitoring systems, grievance redressals, Increasing knowledge dissemination and capacity development, Financial structures and models in Faecal Sludge Management Chains, Equity aspects through analysis of provisions and budgetary allocations for specific groups and locations

SECTION D –

FSSM in rural areas, organizational chains and instruments, National and state level schemes for FSSM; Central Rural Sanitation Scheme (CRSP), 1986, Total sanitation Scheme, 2001, Nirmal Bharat Abhiyan, 2007, National Urban Sanitation Policy, 2008, JNNURM, Swachh Bharat Abhiyan, AMRUT Mission, Best practices/ case studies in urban and rural sanitation and FSSM

Opportunities and challenges

S. No.	Opportunities	Challenges
1	GNDU is grade to University so permitted to start any course without UGC approval	Getting expert faculty
2	The course can be run on self financing mode and hencewill not be a financial liability for the University	Meeting threshold number of students
3	Guru Ram Das School of Planning has entire catchment of north west region and especially the states of J&K , Punjab, Haryana, Himachal and Rajasthan	Additional infrastructure for the courses- space, labs and studios
4	Possibilty of getting sponsored candidates from state government departments and tieups	Publicity and course outreach
5	Since the content is dovetailed into environment planning it is more holistic and employment opportunity is much larger	

Indian Institute for Human Settlements, Bangalore

Elective Course on Urban Sanitation

Molly Hepzibha Grace Sriharini Narayanan Suneethi Sundar

Learning outcomes

- Ability to understand the impacts of improper sanitation to public health, environment and economy
- Gain an understanding of concepts and principles of urban sanitation and specifically fecal sludge management (FSM) and various elements in the sanitation value chain.
- Familiarise themselves with broader policy and institutional framework, including the NUSP, AMRUT, Swachh Bharat Abhiyan, Septage management guidelines etc.
- Understand current management practices of wastewater and sanitation i.e. planning, financing, implementing, and maintenance management, service delivery mechanisms, deficiencies and challenges.

Learning format

The course will be taught as a mix of lectures, classroom discussion and group exercises. In addition, there will be a site visit (as per session requirement) and case study discussions as part of group work.

Session outline

Session 1:

Urban Sanitation in India - An Introduction

To set the overall context and framework for the elective, this session will draw out certain parameters on sanitation and will also highlight certain basic concepts and principles underlining the course e.g. service delivery, full cycle of sanitation etc.

Session 2:

Understanding Full Cycle of Sanitation and Networked Systems

To examine the concept of full cycle of sanitation in detail and discuss sanitation from the environmental and public health perspective, networked systems, various challenges and its potential impacts through examples and illustrations.

Session outline

Session 3:

Fecal Sludge Management

To provide an overview of the FSM value chain: containment, de-sludging, conveyance, treatment and re-use, key issues for each stage and roles of different stakeholders involved.

Session 4:

Institutional framework and Sanitation financing

To familiarise with the legal and institutional framework for urban sanitation in India across various states and cities. It will also examine the current policies and programmes, financing in urban sanitation. It will conclude with a discussion / case study approach, for emerging paradigms in sanitation service delivery.

Session outline

Session 5:

Sanitation Service Delivery to Urban Poor

To deal with sanitation service delivery in low income communities, informal settlements and slums in urban areas, encompassing different approaches and initiatives in service delivery through various examples. It will cover both individual household toilets, as well as, community/ public toilets.

Assessment framework

- **Quiz**
- **Assignment**
- **Case study and exercises**
- Participants will be given a case study and asked to develop a proposal for the city/town to improve its sanitation situation.

Indus University, Ahmedabad

FSSM as a subject in two semesters of the B.Arch Programme

Avisha Shah Vishal Chudgar Pratik Zaveri Bhanupratap Sharma

Learning objectives

- To understand significance of FSSM and its fundamentals in relation to surrounding context.
- To understand FSSM in relation to sustainable design and building practice.
- To understand different methods and techniques for FSSM as to have ability for independent implementation in design.
- To set up a base knowledge in student from roots - for scope of further exploration.

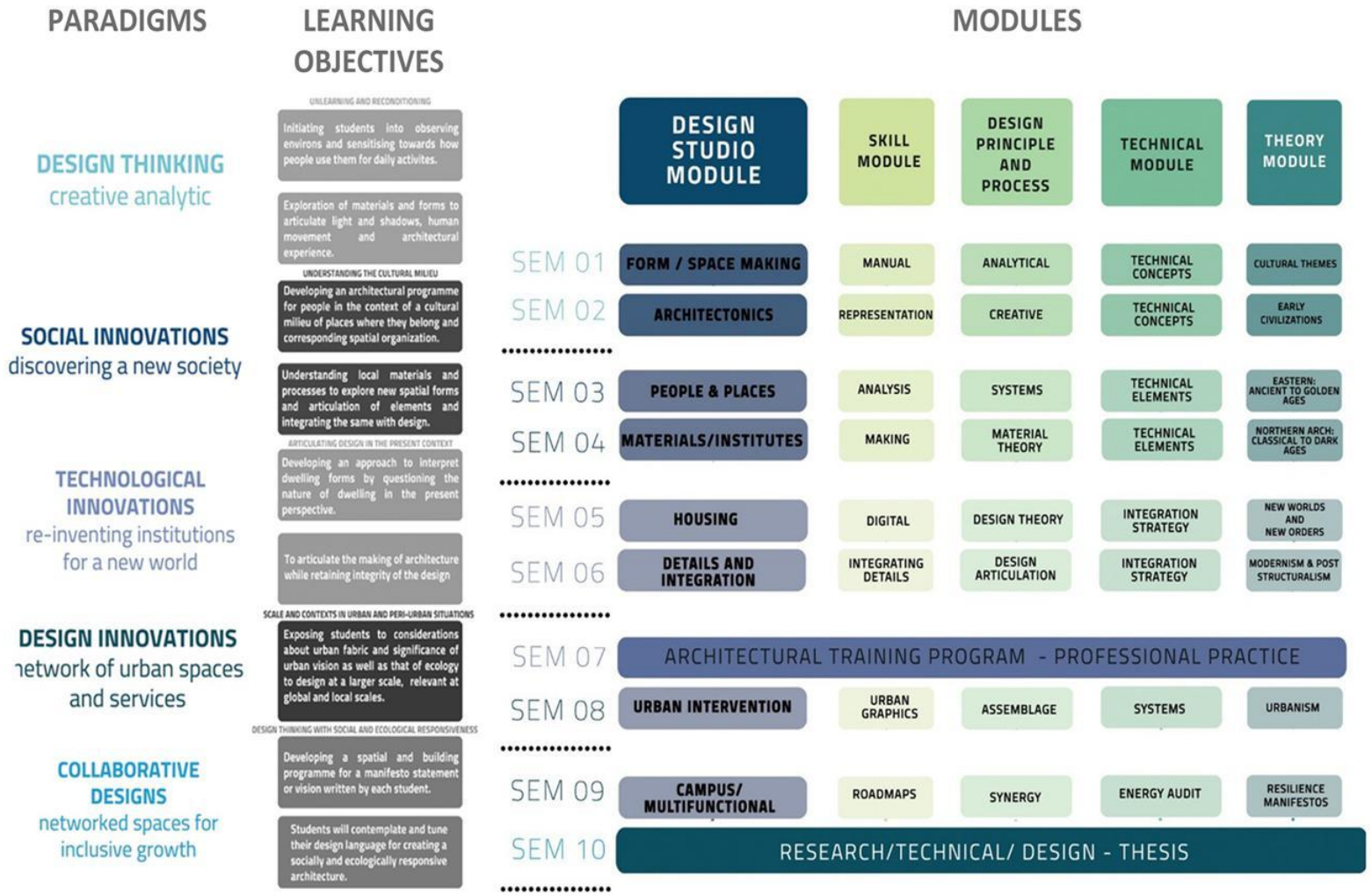
Course Implementation

- This course structure would be implemented in B - Arch from first semester.
- As a initiative of learning about sanitation from the beginning in small sections.
- This course structure would be of two modules each in 3rd and 4th semester.
- This will provide students opportunity of further exploration and development of their interest in Sanitation technologies for rest six semester.

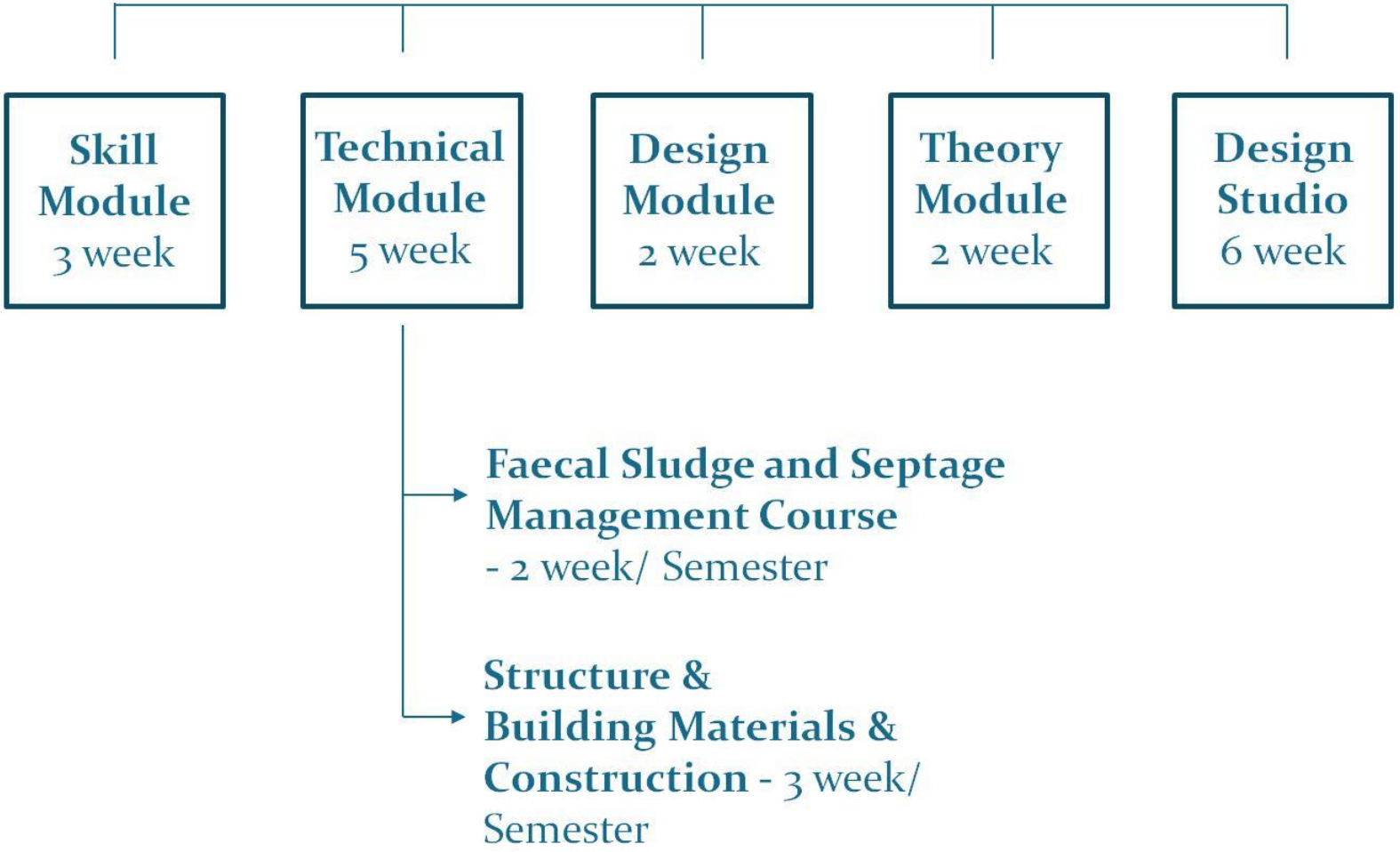
Teaching Strategies

- Interactive lectures/ Group Discussion
- Films & Presentation
- Mapping/ Survey
- Case studies
- Field visits, Interviews, Discussion with locals
- Design Problem
- Summer – Winter Collaborative programs

Course Structure



Course Structure



Course Outline

SEMESTER- 3

1. Fundamentals of FSSM
2. Case Study & System Analysis

SEMESTER- 4

3. Technical & Design
4. Policies & Programs

Course Outline

1. Fundamentals of FSSM

a) Current situation of Sanitation at National, State and regional level – Rural & Urban areas.
b) Issues and Impacts of Sanitation on Environment and Public health.
c) Need and benefits of safe sanitation.
d) Introduction of FSSM, terminology, concept and context.
e) Brief of sanitation system and service chain
f) Assignment- Mapping activities of real case:
   - Identifying real issues
   - Studying factors behind the problem

This will help students to have brief encounter with term Sanitation and FSSM and its aspects.

Course Outline

2. Case Study and System Analysis

Group case study of Rural and Urban area: (one could be national/ international but one have to be local)

Case study would focus on:

a) Mapping/ survey of no. of houses
b) Their water supply & drainage connection - its working condition & efficiency
c) Treatments/ methods used for disposal - adequate/ inadequate
d) Entire service chain analysis of waste in both Rural and Urban areas
e) Evaluation of system: efficient/ inefficient
f) Can include rough estimation of system
g) Their involvement- what could be done for its betterment- perhaps a quick design solution
h) Conclusion

This will help students to have an on- site experience training and understanding of service chain.

Course Outline

3. Technical Design

a) Revision of module 1
b) Education on different technologies and treatment implementation of FSSM.
c) Study of design considerations of technologies- climate, topography, economy & needs of local.
d) Gov./ approved norms and standards of systems
e) Cost estimation of system- keeping in mind local availability.
f) Brief on operation & maintenance
g) Brief on Evaluation & Monitoring
h) Semester 5 is Housing studio in institute, the design problem of studio will be developing a sustainable sanitation system integrated in housing.
i) This will help in application of above learnings and exploring new ways.

This will help in developing basic understanding about different treatments and their proper implantation for contextual response.

Course Outline

4. Policies and Finance Programs

a) Brief about government's different policies and campaigns
   - Briefly talks about standards, materials, construction & budget
   - Includes pros and cons of the policies- study from different articles & journals

b) Brief on Finance
   - Government subsidy
   - Micro financing
   - Revolving funds

c) Social aspects
   - Stakeholder identification
   - Community participation - awareness programs

This will help to setup overview of sanitation framework.

Institute of Development Studies, Jaipur

Introductory Course on FSSM

Dr. Motilal Mahamallick
Assistant Professor

About the Institute

The Institute:

- Supported by Indian Council of Social Science Research (ICSSR) and Department of Planning, Government of Rajasthan
- Faculties: Cultural History, Geography, Economics, Sociology, and Anthropology

Strength:

- Research

Teaching:

- Pre-Ph.D Programme, and
- One semester Course to 'Students of International Development, University of Life Sciences, OSLO, Norway'

Pedagogy

- Lecture – Slight Presentation and Short movie Presentation
- Guest Faculties
- Case Studies

Course Structure

In the form of "An Introductory Paper"

Target Groups:

- PhD Students: Social Science Background
- 15 Lecture

Objective of the Course:

- To introduce students with an emerging area of research, educating the faculties while reading through the literature and interacting with the students

Takeaway:

- This will help us to 'open the door for research' on FSSM with a social science perspective

Course Outline

Lecture 1:

Familiarizing with Urban Sanitation System in India

a) Different Types of Sanitation System in India
b) Urbanization and Sanitation Challenges in Urban India
    - Households with different types of toilet
    - Percentage of Households with access to different types of drainage

Lecture 2:

Introducing with the terminologies

Sanitation, Septage, Faecal Sludge, Faecal Sludge and septage Management (FSSM), ODF,ODF+, ODF ++ etc

Lecture 3:

Governance and Policies

a) Structure of Governance in India
b) Why Focusing on Urban area
c) Policies and programme: Sanitation issues in India a brief Review

Course Outline

Lecture 4:

Introducing FSSM

a) Mechanism
b) Technicality
c) A comparison with other types of sanitation system
d) Rationalizing the adoption of FSSM

Lecture 5:

Septage Treatment and Reuse

a) Understanding the technical Process
b) Social Cost-Benefit analysis of adapting STP

Lecture 6:

The Social and economic aspect of FSSM

a) Social benefit in Gender and Caste
b) The Economics of FSSM at input as well as outcome level

Lecture 7:

Visiting a sight and interacting with technical experts and people

Jamia Milia Islamia, New Delhi

Elective: Faecal Sludge and Septage Management

Dr. Qamar Irshad
Associate Professor

Course Objective

To understand the importance of Faecal Sludge and Septage Management and its role in the functioning of sustainable human settlements.

Teaching Pedagogy

Methodology:

Lectures, Tutorials and Field Study

CLASSES/ WEEK		MARKS				EXAM HOURS	CREDITS
L	ST	IA	WR	VV	TOT		
2	2	50	50	-	100	3	4

Course Structure

1. Unit 1: Introduction

2. Unit 2: Planning and Design for FSSM

3. Unit 3: Legislation, Policies and Guidelines

4. Unit 4: Financial Planning

5. Unit 5: Social Framework

Course Outline

Unit 1:

Introduction

a) Overview of Faecal Sludge Management in India
b) Current Septage Management Practices, Global Perspective of Faecal Sludge Management, SDGs.
c) Nature of Faecal Sludge, On site Sanitation Systems,
d) Collection and Transportation of Faecal Sludge, Disposal of Faecal Sludge

Unit 2:

Planning and Design for FSSM

a) Faecal Sludge Quantification
b) Characteristics of faecal Sludge
c) Design parameters
d) Operation and maintenance
e) Treatment Technology Options for FSM
f) Study of Best practices within India as well as abroad
g) FSSM Tools: SFD, SaniTab, SaniPlan, FSM Toolkit

Course Outline

Unit 3:

Legislation, Policies and Guidelines

a) National Policy on FSSM - Swacch Bharat Mission, Central Laws and Rules
b) State Level Implementation Strategies, ULB level Implementation Plans
c) Safety Guidelines

Unit 4:

Financial Planning

a) Financial Assessment for FSM Project
b) Sources for Capital Expenditure, Credit Institutions
c) Study of Innovative financing mechanisms
d) Cost Benefit Analysis
e) Forecasting User charges and taxes to be levied

Course Outline

Unit 5:

Social Framework

a) Stakeholder Identification
b) Informal Service Providers
c) Awareness programs
   Capacity Building Programs

Jawaharlal Nehru University, New Delhi

Sanitation Work and FSSM in the Centre of Social Medicine and Community Health

Mr. Ajit Lenka Mr. Kanhaiya Kumar Mr. Golak B. Patra

Course Outline

Optional Course in the CSMCH 'Urbanisation / FSSM and Public Health' (One Semester/ 3 Credits)

Course Outcomes / Objectives:

- The participants/students will gain knowledge on mechanism of the sanitation system in urban context, India (rural can be added as well).
- The history of the sanitation and cleaning jobs can be stressed back through the social science perspective and so as the policies and programmes till date.
- Information, Education and Communication (IEC) can be carried forward across the stakeholders.
- The mechanism and management of the human excreta can be understood by the participants.
- The Faecal Sludge and Septage Management (FSSM), which is the thrust of present time can be understood and carry forward in implementing.
- Set of skilled and resourceful personnel will be produce as the course outcome to get involved in the process of Water and Sanitation Management and FSSM in urban areas

Teaching Strategies

- Lecture and Tutorial – In-house; guest/special lecture
- Field Exposure and Assignment/presentations
- Evaluation-Term papers; Presentations/Seminar; Written Examination/ final presentation/interview

Course Structure

1. Evolution and History of the Sanitation and Cleaning work in India. Indian Social System and the Sanitation /cleaning work

2. Policies, Programmes and Provisioning of the Governments (Central and the State) in the field of Sanitation

3. Planning and Managenent of the FSSM (Physical, Financial and Institutional)

4. Field Visit, Case Study and Assignment

Course Outline

1. Evolution and History of the Sanitation and Cleaning work in India. Indian Social System and the Sanitation /cleaning work – (0.5 Credit)

a) Concept and definitions of the Sanitation work (Cleaning-Sanitation-FSSM)
b) History of Sanitation work in India (Before and after Independence of India)
c) Indian Social System (Caste, Class, Gender, religion and Regionalism) and Sanitation work

Course Outline

2. Policies, Programmes and Provisioning of the Governments (Central and the State) in the field of Sanitation – (1 Credit)

a) Five-Year Plans and the Sanitation work
b) Committee Reports on Sanitation Work [Barve Committee-1949, Backward Class Commission-1953, Malkani Committee- 1957, National Commission for Safai Karmacharis Act.1993, Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013 (PEMSR Act, 2013)]
c) TSC- 1999, JnNURM/AMRUT-2005, Swachh Bharat Mission-2014, MDG and SDG, FSSM
d) Provisioning to the Beneficiaries and Service providers (Coverage, Accessibility and availability of the Sanitation services, Tools and safety measures for the Sanitation workers, IEC & BCC

Course Outline

3. Planning and Management of the FSSM (Physical, Institutional and Financial) – (1 Credit)

a) Physical structure and mechanism of the FSSM, Service chain of FSSM (ODF, ODF+ and ODF ++)
b) Treatment and management of the FSSM
c) Institutional Management (Govt./Municipal Body, Private agencies, PPP and Business Model)
d) Financing FSSM (Annual budget allocations on Sanitation, management of resources-personnel-materials-and-money, people's contributions and crowdfunding)

4. Field Visit, Case Study and Assignment – (0.5 Credit)

a) Visit to the Sanitation Unit/Treatment Plant/Management Unit.
b) Observation and Case Study Report

Evaluation Process

- Class Presentations
- Mid-term Paper
- End Term Paper
- Written Exam
- Fielf Exposure/Case Study and Presentations
- Viva-voce

Resources

- Two plus two Faculties (Social Sciences / Sanitation* / Planning / Management / Architect); Two regular positions and other two can be visiting/guest faculties in initial period

- Course Compendium, Books, Journals

- Class rooms /Office (Can be attached with the mother institutions)

Intake and eligibility

- Capacity: Fifteen seats in one batch.

- Eligibility: Required Master degree in any discipline (Social Sciences/Medical Sciences/Planning/Architect) with working experience on Sanitation related activities.

Kalyani University

Integrated Faecal Sludge Management

Dr. J. N. Bhakta
Associate Professor

Introduction

Faecal sludge comprises all liquid and semi-liquid contents of pits and vaults accumulating in on-site sanitations installations, namely un-sewered public and private latrines or toilets, aqua privies and septic tanks. Due to presence of 25–54% (dry solid) microbial biomass including various pathogenic microbes (bacteria, fungi, virus, etc.) , it is hazardous in the view point of environmental and human health. Open defection, lack of proper sanitation and faecal sludge management process are the big problems to India like developing country. An estimated 2.6 billion people in the world lack access to improved sanitation, defined as the hygienic separation of human excreta from human contact (WHO/UNICEF, 2012). Diseases that are associated with inadequate sanitation are particularly associated with poverty and account for 10% of the total disease burden worldwide (Prüss-Üstün et al., 2008).

Introduction

In contrary, it is a potential store house of nutrients, since it contains high percentages of essential nutrients (10-20% N, 20-50% P and 10-20% K) including other nutrients (Daisy and Kamaraj, 2010). Therefore, these essentials nutrients can be harnessed from the faecal sludge through recycle and reuse processes.

From these above points of view, faecal sludge management (FSM) is a urgent issue to our country. In order to proper management of large volume of faecal sludge generated by about 130 crore peoples, huge number of skilled and trained expert personnel of FSM are required.
Stemming from this circumstances the present proposed certificate course entitled "Integrated Faecal Sludge Management" has been designed. It has significant dual benefits.

Learning Objectives

The main objectives of the propsed course are:

1. To generate skilled and expert personnel of FSM by providing various relevant concepts
2. To protect the human and environmental health from hazardous impacts of FS
3. To generate employment through capacity building
4. To harness the essential nutrients from FS using integrated green technological approach of waste into wealth

Course Details

Type of course : 6 months certificate course

Mode of learning : Regular course (not distance or online)

Target groups : Concerned professionals, fresher

Student intake : 20

Pre - qualification : Graduate in Engineering and Sciences

Teaching pedagogy : Theoretical, laboratory practical and field based teaching, audio-visual exercises in FSM, case study approach

Evaluation : Theoretical, practical and viva voce examinations, field report submission

Nature of course: Self finance

Course Structure

1. Module 1: Introduction to sanitation and fecal sludge management
2. Module 2: Characterization of fecal sludge
3. Module 3: Technological fundamentals of fecal sludge management
4. Module 4: Implementation planning
5. Module 5: Operation and maintenance
6. Module 6: Case studies
7. Module 7: Ecofriendly technology and resource recovery for developing useful product
8. Module 8: Practical in Laboratory
9. Module 9: Field trial and survey work
10. Module 10: Industrial training and linkage towards engagement

Course Outline

Module 1:

Introduction to sanitation and fecal sludge management – (30 hours)

a) Basic concepts of sanitation, definition, historical account, national and international scenarios,
b) Types (On-site/ Off- site, centralized/ decentralized,), septic tanks, septage, significance, human and environmental health impacts, related terminology
c) Basic concepts of fecal sludge, definition, types, significance, national and international scenarios, significance, human and environmental health impacts, related terminology
d) Fecal sludge management- definition, mechanism-service chain, related terminology

Course Outline

Module 2:

Characterization of fecal sludge – (30 hours)

a) Quantitative characterization, Physical, chemical and biological characterizations,
b) Nutritional values, energy values, economic values

Module 3:

Technological fundamentals of fecal sludge management – (60 hours)

a) Treatment mechanisms, collection, storage, transport and treatment of fecal sludge (settling-thinking tanks, drying beds, co-composting), Co-treatment with wastewater, Effluent treatment technology
b) Design of treatment plant
c) Investigation of various methods of pit latrine and empting system
d) Septage interactive toolkits
e) FS volume and cost

Course Outline

Module 4:

Implementation planning – (60 hours)

a) Baseline data collection and analysis
b) Physical settlement and construction planning for FSM
c) Different process involved in planning
d) Different tools and techniques involved in planning
e) Financial mechanisms for FSM
f) Institutional Mechanism for FSM
g) Assessment and review of various policies and regulations at various levels (national, state, city, local)
h) Stakeholders involvement
i) Institutional involvement
j) Resource mobilization
k) Integration of various ecofriendly sub-systems for sustainable management FSM (biogas, biofertilizer and agricultural systems)
l) Socioeconomic perspectives
m) Cost-benefit analysis

Course Outline

Module 5:

Operation and maintenance – (15 hours)

a) Construction of FSM system, operation, maintenance and continuous monitoring

Module 6:

Case studies – (15 hours)

a) Different cities, towns with varying populations and types

Module 7:

Ecofriendly technology and resource recovery for developing useful product – (40hours)

a) Biogas, bioenergy, biocompst, bioslurry, biofertilizer, biocake, etc.,
b) Human and environmental impacts
c) Case-wise cost-benefit analysis of generated resource,

Course Outline

Module 8:

Practical in Laboratory – (120 hours)

a) Physical, chemical and biological characterizations, Nutritional values, energy values, economic values
b) Model development including different management systems

Module 9:

Field trial and survey work – (60 days)

a) Model planning development integrating ecofriendly systems, construction of FSM system, operation, maintenance and continuous monitoring

Module 10:

Industrial training and linkage towards engagement –(30 days)

Manipal University, Jaipur

Open Elective on Fecal Sludge Management

Ms. Shilpa S. Ratoji
Assistant Professor

Dr. Monika Sogani

Dr. Anil Vyas
H.O.D

Broad program outcomes

- Engineering Knowledge
- Problem Analysis
- Design/Development of solutions
- Conduct investigation of complex problems
- Modern tool usage
- The engineer and society
- Environment and sustainability
- Ethics
- Individual and team work
- Communication
- Project management and finance
- Life long learning

Open Elective on FSSM – UG Level

- Elective subject in ongoing courses in Engineering at UG level (All branches)
- Sensitize / encourage students to take subject related to FSSM

Course Outcome

- To sensitize students towards sustainable sanitation services
- To provide knowledge and understanding related to sanitation services
- To be able to apply gained knowledge to real life situation
- To be able to comprehend the various issues and challenges
- To provide awareness of holistic solutions for achieving sustainable sanitation services in India

Teaching Strategies

- Lectures/ Expert guest lectures
- Video tutorials
- Case studies
- Exposure visits
- Group discussion / Peer learnings

Course Structure [36 hrs, 3 credits]

1. Unit 1: Introduction to sanitation (Global/ National/ State/ULB situation) – (3 hrs)

2. Unit 2: Components of FSSM (Characterization, collection and transportation, treatment etc.) – (10 hrs)

3. Unit 3: Technology Options (Technology systems/ end use, Case studies, Design/FSM Plan, etc.) – (12 hrs)

4. Unit 4: Governance, Institutional - Regulatory mechanism and Finance (Policy, regulation, Act, Programme, scheme *etc*.,) – (5 hrs)

5. Unit 5: Case studies – (6 hrs)

Course Outline

Unit 1:

Introduction to sanitation

a) What is FSM?
b) Why FSM?
c) What is FSM service chain
d) Global/ National/ State/ULB situation

Unit 2:

Components of FSSM

a) Characterization and quantification of FSM
b) Collection and transportation
c) Overview of treatment mechanisms
d) Resource recovery

Course Outline

Unit 3:

Technology Options

a) Drying beds
b) Settling tanks
c) Co-composting
d) Co-treatment with wastewater
e) Design of treatment plants
f) O&M of treatment plants

Unit 4:

Governance, Institutional

a) Institutional framework
b) Finances and business models
c) Assessment of initial situations
d) Stake holder analysis and engagement
e) Engineering economics

Unit 5:

Case Studies - Innovations in FSM

Opportunities and Challenges

- Approval from Academic Council.
- Resource materials from other Universities, Online courses etc.
- Exposure visits/ capacity building/ workshops for students
- Access to journals, online books etc

Intake/ Pre-qualification

Intake capacity – Max 100, Min 10

Pre-Qualification:
Students pursuing B.Tech. 4th / 6th Sem of all Engineering branches

School of Planning and Architecture, New Delhi

FSSM as a part of the existing course at UG level and as an elective at the PG level

Ms. Jayeeta Sen
Ms. Bidisha Chattopadhyay
Asst. Prof.
Mr. Rabidyuti Biswas
Professor

One subject/course in a semester on FSSM

FSSM as a part of the existing course at UG Level and as an elective at the PG Level

Course Structure

Including Faecal Sludge and Septage Management in the Curriculum of SPA Delhi

- Including in one/ two modules in Infrastructure Planning and Management in UG and PG Planning programmes

- Including a separate subject as elective subject in UG and PG Planning programmes

Course Structure

Including in Infrastructure Planning and Management in UG Planning programmes

- SEMESTER III Infrastructure Planning I
- SEMESTER V Infrastructure Planning II

Course Outline (Infrastructure Planning I)

- Unit 1. Introduction , Basics Concepts and Theory
- Unit 2. Storm Water Systems
- Unit 3. Water Supply Systems
- Unit 4. Sanitation and Sewer System
- Unit 5. Solid Waste Management
- Unit 6. Other Services

Course Outline (Infrastructure Planning I)

Unit 1:

Introduction , Basics Concepts and Theory

a) Basics and concepts of Faecal Sludge and Septage Management

Unit 4:

Sanitation and Sewer System

a) Methods of Sanitations - onsite and offsite

b) Onsite sanitations techniques, process chain, case studies

Course Outline (Infrastructure Planning II)

- Unit 1. Infrastructure development Policy
- Unit 2. Infrastructure Pricing and Financing
- Unit 3. Planning for Physical Infrastructure
- Unit 4. Planning for Social Infrastructure

Course Outline (Infrastructure Planning II)

Unit 1:

Infrastructure development Policy

a) National FSSM Policy, State Policy, Swachh Bharat Mission (Urban and Rural) with emphasis on FSSM, AMRUT and other missions that recognize FSSM or feasibility of integration of other relevant policy

Unit 2:

Infrastructure Pricing and Financing

a) Pricing for implemented FSSP and
b) Resource mobilization for FSSP

Unit 3:

Planning for Physical Infrastructure

a) City Sanitation Plan with integration of FSSM
b) Concepts of integration of FSSM in all development plan
c) Feasibility of preparation of development controls and building bye - laws for integrating FSSM

Including FSSM in the Curriculum of SPA Delhi at PG level

As an Elective Course

Basics of Fecal Sludge and Septage Management

Learning Objectives

1. To develop an understanding of the concepts of on-site sanitation congruent with environment and public health.
2. To develop a knowledge base on the fundamentals of FSSM and the service chain including suitable technical options and design of treatment technologies.
3. To understand the institutional and financial framework related to FSSM.
4. To appreciate issues and challenges related to FSSM based on principles of sustainability.
5. To familiarise applicability of the gained knowledge through case studies.

Teaching Pedagogy

Course Credits: (32 Hours)

1. Classroom teaching
2. In House Faculty and Domain experts
3. Studio exercises in FSSM
4. Case study Approach
5. Evaluation: Theoretical Examination, studio evaluation and assignments

Course Structure

1. Module 1: Introduction to Sanitation and FSSM
2. Module 2: Planning for FSSM
3. Module 3 : FSSM Service Chain Planning and Design with Technological alternatives.
4. Module 4: Governance Mechanism and Regulatory Framework for FSSM
5. Module 5: Participatory Techniques in FSSM
6. Module 6: Financing and Investment Arrangements for FSSM

Course Outline

Module 1:

Introduction to Sanitation and FSSM – (4 hours)

a) Concepts, Context (Relevance in Environment and Public Health), Terminologies
b) FSSM and SDG Baseline
c) Global Relevance and Scenario for FSSM
d) History of Sanitation Services (On site and off site) in India
e) Overview of Relevant Approaches: Centralized/ decentralized, On-site/ Off- site, EcoSan, Biotoilet etc.

Module 2:

Planning for FSSM – (5 hours)

a) Integrating FSSM with city sanitation plans/development PlansBaseline for Assessment of FSSM services at the spatial level.
b) Tools involved in planning FSSM.
c) Mapping as an instrument for developing FSSM integrated city sanitation plan

Course Outline

Module 3:

FSSM service chain planning and design with technological alternatives – (11 hours)

a) Design Criteria
b) Faecal sludge quantification and characterisation
c) Containment System
d) Methods and Means of Collection and Transportation of Faecal Sludge (Emptying Mechanism, No. of Trucks)
e) Sludge Treatment Mechanisms and use of treated end product
f) Settling-Thickening
g) Drying Beds
h) Co-Treatment with Faecal Sludge
i) Case Studies

Course Outline

Module 4:

Governance Mechanism and Regulatory Framework for FSSM – (4 hours)

a) National FSSM Policy, State Policy, Swacha bharat Mission (Urban and Rural) with emphasis on FSS management, AMRUT and other missions that recognize FSSM or feasibility of integration of other relevant policies.
b) Institutional Framework
c) Evaluation and Monitoring Mechanism

Module 5:

Participatory Techniques in FSSM – (3 hours)

a) Significance of Participatory Approach in FSSM
b) Behaviour Change in Sanitation (Urban and Rural)
c) Stakeholder Identification and Analysis -Households, SHGs, CBOs, NGOs, Informal Service Providers
d) Practical Problems faced by FSSM stakeholders- Case Studies

Course Outline

Module 6:

Financing and Investment arrangements for FSSM – (5 hours)

a) Financial Options for FSSM -Financial Assessment, Sources of Finance, Financial Flow
b) Public Private Partnership in FSSM
c) Innovative Business Models

Resources

- Experts/ professionals (resources) working in related projects
- Technical Experts
- Stakeholders- NGO/ CBOs, Municipal Officials, policy makers, consulting firms.
- Teaching materials- Audios, Videos, Books, Presentations, websites and other e- learning materials

School of Planning and Architecture, Vijaywada

Elective subject at UG level – Sustainable Sanitation Planning and Management

Ms. Shweta Sharma
Assistant Professor

Course Structure

- Introduction of Sustainable Sanitation Planning and Management course as an elective subject at UG level (sixth semester).

- Proposed Draft Course Structure would follow the fundamental logic of SPAV Senate approved Credit Pattern and Academic Regulations (as followed in the ongoing SPAV UG courses), which is : 3 credits per semester, for a core/ elective subject

- The course structure of International Institutes/ Universities offering Sustainable Sanitation Planning and Management/Faecal Sludge and Septage Management would be studied in detail

- Draft Course Structure once agreed upon, shall be developed into detailed syllabus subsequently. Detailed Syllabus would comprise of the subject being developed & explained into minimum 5 teaching units and detailed reading lists.

First Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN101	Graphics Studio	250	0	250	500	0	15	15	15
2	BPLN102	Computer Applications in Planning	50	0	50	100	0	3	3	3
3	BPLN103	Introduction to Urban and Regional Planning	50	50	0	100	3	0	3	3
4	BPLN104	Evolution of Human Settlements	50	50	0	100	3	0	3	3
5	BPLN105	Quantitative Methods for Planning	50	50	0	100	3	0	3	3
6	BPLN106	Surveying and Photogrammetry	50	50	0	100	3	0	3	3
		TOTAL	500	150	350	1000	12	18	30	30

Second Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN201	Planning and Mapping Studio	250	0	250	500	0	15	15	15
2	BPLN202	Introduction to Geoinformatics	50	0	50	100	0	3	3	3
3	BPLN203	Population and Settlement Geography	50	50	0	100	3	0	3	3
4	BPLN204	Planning Project Estimation	50	50	0	100	3	0	3	3
5	BPLN205	Elements of Economics for Planning	50	50	0	100	3	0	3	3
6	BPLN206	Elements of Sociology for Planning	50	50	0	100	3	0	3	3
		TOTAL	500	250	250	1000	12	18	30	30

Third Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN301	Built Environment and Site Planning Studio	250	0	250	500	0	15	15	15
2	BPLN302	Planning Techniques	50	50	0	100	3	0	3	3
3	BPLN303	Planning Theory	50	50	0	100	3	0	3	3
4	BPLN304	Planning for Physical Infrastructure	50	50	0	100	3	0	3	3
5	BPLN305	Traffic and Transportation Planning	50	50	0	100	3	0	3	3
6	BPLN306	Socio-economic Structure and Spatial Planning	50	50	0	100	3	0	3	3
		TOTAL	500	250	250	1000	15	15	30	30

Fourth Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN401	Transportation Planning Studio	250	0	250	500	0	15	15	15
2	BPLN402	Advanced Geoinformatics	50	0	50	100	0	3	3	3
3	BPLN403	Contemporary Planning Theory	50	50	0	100	3	0	3	3
4	BPLN404	Civic and Social Infrastructure Planning	50	50	0	100	3	0	3	3
5	BPLN405	Transport Modelling	50	50	0	100	3	0	3	3
6	BPLN406	Housing and Real Estate Development	50	50	0	100	3	0	3	3
		TOTAL	500	200	300	1000	12	18	30	30

Fifth Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN501	Area Development Planning Studio	250	0	250	500	0	15	15	15
2	BPLN502	Planning and Management of Green and Open Spaces	50	50	0	100	3	0	3	3
3	BPLN503	Integrated Planning for Informal Sector	50	50	0	100	3	0	3	3
4	BPLN504	Development Planning and Management	50	50	0	100	3	0	3	3
5	BPLN505	Environmental Planning and Management	50	50	0	100	3	0	3	3
6	BPLN506	Planning Legislation	50	50	0	100	3	0	3	3
			500	250	250	1000	15	15	30	30

Sixth Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN601	Master Plan Studio	250	0	250	500	0	15	15	15
2	BPLN602	Regional Planning	50	50	-	100	3	0	3	3
3	BPLN603	Planning Practice	50	50	-	100	3	0	3	3
4	BPLN604	Project Formulation and Appraisal	50	50	-	100	3	0	3	3
		ANY TWO								
5	BPLN611	Urban Renewal and Re-development *	50	50	-	100	3	0	3	3
6	BPLN612	Freight Transport and Logistics Management *	50	50	-	100	3	0	3	3
7	BPLN613	Elective from other Dept. **	50	50	-	100	3	0	3	3
			500	250	250	1000	15	15	30	30

* Elective – I offered from the Department of Planning

** Elective – II offered from the other Department/s

Seventh Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN701	Regional Planning & Development Studio	250	0	250	500	0	15	15	15
2	BPLN702	Dissertation –Formulation of Research Proposal	50	0	50	100	0	3	3	3
3	BPLN703	Urban Finance	50	50	-	100	3	0	3	3
4	BPLN704	Metropolitan Planning	50	50	-	100	3	0	3	3
5	BPLN705	Governance and Management	50	50	-	100	3	0	3	3
		ANY ONE								
6	BPLN711	Environmental Impact Assessment *	50	50	-	100	3	0	3	3
7	BPLN712	Planning for Disaster Management *	50	50	-	100	3	0	3	3
8	BPLN713	Elective from other Dept. **	50	50	-	100	3	0	3	3

Eighth Semester

Sl. No.	Code	Subject Title	Distribution of Marks				Distribution of Periods per week			Credits
			IA	EE	EJ	TM	L	P	TP	
1	BPLN801	Dissertation	350	0	350	700	0	21	21	21
2	BPLN802	Rural Planning and Development	50	50	0	100	3	0	3	3
3	BPLN803	Water sensitive Urban Development	50	50	0	100	3	0	3	3
4	BPLN804	Climate Change and Cities	50	50	0	100	3	0	3	3
		TOTAL	500	150	350	1000			30	30

* Elective – I offered from the Department of Planning

** Elective – II offered from the other Department/s

Course Structure

Sixth Semester

BPLN614 Sustainable Sanitation Planning and Mgmt.

Number of Credits	3
Subject Category	Theory
Lecture Periods/Week	3
Internal Assessment	50
Practicals /Lab/Workshop Periods/Week	--
End Evaluation	50
Total Periods/Week	3
Total Marks	100

Subject Objective: To impart in-depth understanding of urban sanitation terminologies and service chain, role and assessment of Faecal Sludge and Septage Management (FSSM) in sustainable urban sanitation, tools; techniques and standards for FSSM, financial planning and policy framework for sanitation planning.

Course Outline

Unit 1:

Basic concepts and terminology of urban sanitation

a) Offsite Sanitation, Wastewater/Sewage, Onsite Sanitation, Faecal Sludge, Septage, Supernatent/Effluent
b) Need for sanitation strategy for urban areas
c) Sanitation and hygiene in reference to MDGs and SDGs
d) Introduction to certain state sanitation strategies (Andhra Pradesh, Kerala), National Urban Sanitation Policy

Unit 2 :

On Site Sanitation: Gaps and Issue Assessment

a) Sanitation value chain, Access, Septage Collection and Conveyance, Treatment and Disposal
b) Fragmented Institutional Roles and Responsibilities
c) Lack of an Integrated City-Wide Approach
d) Gender Sensitive Gap
e) Assessing Service Performance Across the Full Service Chain

Course Outline

Unit 3:

Sustainable sanitation: Faecal Sludge and Septage Management (FSSM)

a) Conceptual and contextual link between sustainable sanitation & FSSM
b) Quantification of faecal sludge: Sludge production method, Sludge collection method
c) Characterisation of faecal sludge
d) Operational factors impacting variability of faecal sludge
e) Treatment mechanisms: physical; biological and chemical
f) overview of treatment technologies: established, transferred and innovative technologies
g) Sampling procedures and programmes

Course Outline

Unit 4:

Institutional and Regulatory framework for urban sanitation and FSSM

a) Institutional Structure for urban sanitation at state, regional, district and ULB level
b) Enabling regulatory environment
c) Institutional arrangements for FSSM: Overview of the service chain organisation
d) Role distribution among the stakeholders
e) Institutional arrangements for collection and transport, treatment of faecal sludge and for end-use and disposal

Unit 5:

Financial Framework for Urban Sanitation and FSSM Investments

a) Funding sources for urban sanitation projects: centre, state and city specific
b) Financial models
c) Future perspectives, case study examples; problem information

Xavier's University, Bhubaneshwar

Elective subject at UG level – Sustainable Sanitation Planning and Management

Mr. Jagatjeet Mohapatra Mr. Biswaprakash Kar

Content

- Introduction to XUMG-Program
- Objective
- Course Structure
- Outcome

Introduction to XUMG-Program

The Xavier Centre for Urban Management and Governance houses Xavier University's initiatives in education, research, capacity development and advisory services for the development of sustainable, smart and liveable cities.

Policy engagement, technical support and advisory services with government, corporate and civil society organizations aim to strengthen knowledge-based governance, planning and management of human settlements.

The **MBA in Urban Management and Governance** (MBA-UMG) is a two-year full time residential program uniquely designed to provide a systemic understanding of urbanization plus the management skills necessary to effectively develop, finance and manage cities and city systems in a public policy and urban governance context.

Objective

The program prepares city-management professionals equipped with functional management and organizational skills, and an understanding of the urban.

Our graduates not only understand places, systems and intelligent urban technologies, but also look beyond to set strategic road maps for sustainable development of cities in relation to its local, regional and global context.

Programme Structure

General Management

- Managerial Analysis
- Social Research Methods
- Legal Evidences and Contracts
- Financial Management
- Operations Management
- Human Resource Management
- Marketing
- Management Information Systems

Urban Management

- Urban Management & Governance
- Foundations of Sustainable Urbanization
- Spatial Planning & Economics
- Urban Informal Sector
- Participatory Planning
- Infrastructure Planning & Management
- Urban Environment and Climate Change
- Financing Urban Infrastructure Projects
- Urban Vulnerability & Mitigation Strategies

Special Training and Skills

- UMG-Colloquium
- Annual Research on Cities Summit
- Leadership Talks
- Summer Internship Program
- Live Projects
- GIS based Mapping (Immersion Course)
- FSSM-Emersion Course

Course Structure (FSSM Module)

2 Credits – 3 Credits
4th Term (Beginning of 2nd Year)

- Conceptualizations of Flush and Flow
- Nomenclature
- Stakeholder Mapping (3 tiers of Govt., Community, Civic Agencies, Urban Poor)
- FSSM Policy and correlation with other policies
- Situational Analysis (Pre & Post SBM-2014)
- Centralized System & O&M Issues (issues of collection, Human scavenging, Improper Infrastructure, services to urban poor)
- Decentralized System as an alternative for Tier- 2 & 3 cities
- Inter-govt. coordination
- Community Participation
- Finance Management (Fund raising or Municipal Tax Augmentation)
- Case studies (9 AMRUT towns of Odisha)+SFD preparation

Course Structure (FSSM Emmersion Course)

12 Hours

- Conceptualizations of Flush and Flow
- Nomenclature
- Stakeholder Mapping (3 tiers of Govt., Community, Civic Agencies, Urban Poor)
- FSSM Policy and correlation with other policies
- Situational Analysis (Pre & Post SBM-2014)
- Centralized System & Decentralized System (as an alternative for Tier- 2 & 3 cities)
- Community Participation
- Finance Management (Fund raising or Municipal Tax Augmentation)
- Puri – Case study

Course Objectives

- 100% Faecal Sludge and Septage Management (FSSM)
- Creating behaviour change for sustained demand
- Enabling integrated city wide sanitation
- Sustainable sanitation service delivery

Course Outcome

- Improved and equitable access of FSSM services
- Reduced burden of diseases
- Improved environment and water conditions
- Reduction in child morbidity
- Availability of alternative source of non-potable water
- Reduced burden on exchequer