

COURSE SCHEME
EXAMINATION SCHEME
ABSORPTION SCHEME
&
SYLLABUS

Of

First, Second, Third & Fourth Semester
Choice Base Credit System (CBCS)

Of

Master of Technology (M.Tech)

In

Environmental Architecture

Of

RASHTRASANT TUKDOJI MAHARAJ
NAGPUR UNIVERSITY, NAGPUR

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur
Faculty of Engineering & Technology (Board of Studies of Architecture)
Course and Examination Scheme of Master of Architecture
Choice Base Credit System(CBCS)

I Semester M. Arch. (Environmental Architecture)

Subject Code	Subject	Teaching Scheme			Examination Scheme									
					Theory					Practical/ Viva voce				
		Hours per week			No. of Credits	Duration of Paper (Hrs.)	Max. Marks	Max. Marks	Total Marks	Min. Passing Marks	Max. Marks	Max. Marks	Total Marks	Min. Passing Marks
		L	P	S			University Assessment	College Assessment			University Assessment	College Assessment		
PGEA101T	Society and Environmental Economics	3	-		3	70	30	100	50	-	-	-	-	
PGEA102T	Traditional Knowledge Systems	3	-		3	70	30	100	50	-	-	-	-	
PGEA103T	Sustainable Building Technology and Management	3	-		3	70	30	100	50	-	-	-	-	
PGEA104P	Elective –I (Discipline Specific)	1	-	3	4					50	50	100	50	
PGOPEN105T	Elective –II (Open for Architecture)	4	-		4	70	30	100	50	-	-	-	-	
PGEA106P	Environmental Architecture theory	1		3	4	-	-	-	-	50	50	100	50	
PGEA107P	Sustainable design studio-I	-		6	6	-	-	-	-	100	100	200	100	
Total		15	0	12		-	280	120	400	-	200	200	400	-
Semester Total		27			27	800 Marks								

Elective 1-1. Contemporary Practices in Sustainable Architecture 2. Housing, Environmental Planning & Policies. 3. Ecological Planning.

*Open Electives are offered Separately.

II Semester M. Arch. (Environmental Architecture)

Subject Code	Subject	Teaching Scheme		Examination Scheme											
				Theory						Practical/Viva voce					
		Hours per week			No. of Credits	Duration of Paper (Hrs.)	Max. Marks		Total Marks	Min. Passing Marks	Max. Marks		Total Marks	Min. Passing Marks	
		L	P	S			University Assessment	College Assessment			University Assessment	College Assessment			
PGEA201T	Environmental Laws and Legislation	3	-		3	3	70	30	100	50	-	-	-	-	
PGEA202T	Renewable Energy Systems and Technology	3	-		3	3	70	30	100	50	-	-	-	-	
PGEA203T	Environmental Impact Assessment and mitigation	3	-		3	3	70	30	100	50	-	-	-	-	
PGEA204P	Elective –III (Discipline)	1	-	3	4						50	50	100	50	
PGFD205T	Foundation Courses -I	4	-		4	3	70	30	100	50	-	-	-	-	
PGEA206P	Energy audits and codes	1		3	4	-	-	-	-	-	50	50	100	50	
PGEA207P	Sustainable design studio-II	-		6	6	-	-	-	-	-	100	100	200	100	
Total		15	0	12		-	280	120	400	-	200	200	400		
Semester Total		27			27	800 Marks									

Elective III- 1. Conservation as a tool for sustainability 2. Restoration of Ecologically Disturbed Sites 3. Climate Responsive Design System.

Foundation Course I- *Research Methodology for Architecture and Design

* To be conducted by a Teacher Having Ph.D qualification.

III Semester M. Arch. (Environmental Architecture)

Subject Code	Subject	Teaching Scheme			Examination Scheme									
					Theory					Practical/Viva voce				
		Hours per week			No. of Credits	Duration of Paper (Hrs.)	Max. Marks	Max. Marks	Total Marks	Min. Passing Marks	Max. Marks	Max. Marks	Total Marks	Min. Passing Marks
		L	P	S			University Assessment	College Assessment			University Assessment	College Assessment		
PGOPEN301T	Elective –IV (Open)	4	-		4	3	70	30	100	50	-	-	-	-
PGFD302T	Foundation Courses -II	4	-		4	-	-	-	-	-	50	50	100	50
PGEA303P	Software simulation tools for Energy Efficient Buildings	1		3	4						50	50	100	50
PGEA304P	Seminar	1	-	3	4	-	-	-	-	-	50	50	100	50
PGEA305P	Sustainable design studio- III			8	8						100	100	200	100
Total		10	-	14	24	-	140	60	200	-	150	250	400	-
Semester Total		24			24	600 Marks								

Foundation Course II- Architectural Project Planning & Management

IV Semester M. Arch. (Environmental Architecture)

Subject Code	Subject	Teaching Scheme			Examination Scheme									
					Theory				Practical/Viva voce					
		Hours per week			Duration of Paper (Hrs.)	Max. Marks	Max. Marks	Total Marks	Min. Passing Marks	Max. Marks	Max. Marks	Total Marks	Min. Passing Marks	
		L	P	S		No. of Credits	University Assessment			College Assessment	University Assessment			College Assessment
PGEA401P	Professional Training*									50	-	50	25	
PGEA402P	Colloquim	1		3	4						50	50	25	
PGEA403P	Dissertation	2	-	10	12	-	-	-	-	-	100	200	300	150
Total		3	-	13		-	-	-	-	-	150	250	400	-
Semester Total		16			18	400 Marks								

The IV semester will start with Professional Experience (Placement) of duration 8 Weeks.

ABSORPTION SCHEME FOR PROPOSED BACHELOR OF ARCHITECTURE COURSE

Absorption Scheme in new scheme

Sem	Subject Code	Subject Name	Sem	Subject Code	Subject Name
1st	1-EA-1	Environmental Economics	1st	PGEA101T	Society and Environmental Economics
1st	1-EA-2	Society and Sustainability	1st	PGEA101T	Society and Environmental Economics
1st	1-EA-3	Traditional Knowledge Systems	1st	PGEA102T	Traditional Knowledge Systems
1st	1-EA-4	Colloquium I	1st	PGEA104P	Elective I
1st	1-EA-5	Elective I	1st	PGEA104P	Elective I
1st	1-EA-6	Environmental Architecture Studio-I	1st	PGEA107P	Sustainable design studio-I

2nd	2-EA -1	Environmental Laws & Legislation	2nd	PGEA201T	Environmental Laws & Legislation
2nd	2-EA -2	Environmental Management & Ecological planning	1st	PGEA106P	Environmental Architecture theory
2nd	2-EA -3	Sustainable Building Materials and Technologies	1st	PGEA103T	Sustainable Building Technology and Management
2nd	2-EA -4	Climate Responsive Design Systems	2nd	PGEA206P	Energy audits and codes
2nd	2-EA -5	Elective II	2nd	PGEA204P	Elective –III
2nd	2-EA -6	Environmental Architecture Studio-II	2nd	PGEA207P	Sustainable design studio-II

3rd	3-EA -1	Renewable Energy Systems and Environmental Technologies	2nd	PGEA202T	Renewable Energy Systems and Technology
3rd	3-EA -2	Energy Efficient Building Services and Management	3rd	PGEA303P	Software simulation tools for Energy Efficient Buildings
3rd	3-EA -3	Research Paper	3rd	PGEA304P	Seminar
3rd	3-EA -4	Environmental Impact Assessment	2nd	PGEA203T	Environmental Impact Assessment and mitigation
3rd	3-EA -5	Elective III	3rd	PGEA304P	Seminar
3rd	3-EA -6	Environmental Architecture Studio-III	3rd	PGEA305P	Sustainable design studio-III

4th	4-EA -1	Professional Training	4th	PGEA401P	Professional Training
4th	4-EA-2	Colloquium – II	4th	PGEA402P	Colloquium
4th	4-EA -3	Dissertation(Thesis)	4th	PGEA403P	Dissertation

Semester – I

PGEA101T - Society and Environmental Economics

Objective:

1. To understand the society
2. To maintain national integration through social sciences
3. To aware, identify and solve the various social problems
4. To cover basic environmental economics principles and environmental protection principles

Unit I Man and society, Definition and scope of sociology; levels of social organization and

evolution of social institutions; expressions of different scales of social organizations in built form- urban sociology, Sustainable development and Human Ecology school

Unit II Sustainable Development

Classification of resources, Capital accumulation and growth – Different models (Ramsey, OLG, Solow), Demography and growth, Endogenous Growth and Technical Change, Structural change and growth, Growth v/s Climate Change

Unit III Theory and concepts of Environmental Economics.

Fundamentals of Environmental Economics, Basic Theory of Environmental Economics, Environmental Quality as a public good, Environmental Problems in Capitalist and Socialist Economics, Natural Resource Economics, Conservation of Natural Resource.

Unit IV Environmental Problems

Environmental Pollution, Air Pollution, Water Pollution, Forest and Environmental quality, Land Use, Urbanization and its impact on Environment, Population and Environmental Quality

Unit V Some Important Concepts and Issues In Environmental Protection

Cost Benefit Analysis, the Environmental Cost of Economic Growth, Limits to Growth,
Environmental Issues in Developed and Developing Economics

Unit VI Economic instruments for pollution control

Price and pollution rights, The sustainability principle and economic instrument, The
polluter pays and precautionary principles applied, Rights, equity and participation
principles applied

Unit VII Social Principles and environmental protection

The Equity Principle, Human rights principles, the participation principle

Reference books :

Bottomore , T.B.P.Goode(eds) readings in Marxist Sociology,Oxford,Part 1City and Grassroots:A Cross Cultural Theory
of Urban Social Movements ,London

Growth Economics by Amartya Sen.

Economic and social development by S.L.Sinha

Martin Gerald (2001): Human Ecology - Basic Concepts for Sustainable Development, Routledge, London .

PGEA102T- Traditional Knowledge Systems

Objective:

The aim of the course is to introduce the culture and knowledge systems of indigenous people

Unit I Agrarian society and its impact on architecture

Crop pattern, domestic animals, equipment and its relation to various living and storage spaces; Agricultural practices and waste contributing to materials & techniques.

Unit II Living style, beliefs, festivals and Spaces

Space- Activity relationship; living style and beliefs reflected on space usage and design. Conscious efforts for environmental design; Indian Festivals and built habitat.

Unit III Indian Artisans and contribution to spaces

Artisans as integrating thread of civilization. Product, utilitarian concept, design, Trade and business; Spaces as reflection of artisans skills using local material.

Unit IV Building materials and Technology with region based, Vernacular

Use of Local materials leading to climate responsive design, Regional character reflecting organic development, Vernacular thought leading to sustainable habitat. Ease of modification, extension, intervention due to people based technology.

Unit V Water, its judicial use and management

Water as location criterion, rivers in Indian traditions; phenomenon of Monsoon, Techniques of making reservoirs, Social contribution to Scarcity, pollution and management of water.

Unit VI Settlement design and issues

Settlement types and its guiding principles restoring social, economic & environmental resilience; Scale and location of various structures, Issues and limitations in design, Historical references in scripts and *LOKVIDYA*.

Sessional work:

Assignment will be in the form of a journal or small project showing the application of the methods

Reference books :

Gram Swaraj by M. K. Gandhi, Navjeevan Trust publication, Ahmedabad
Gram Geeta by Rashtrasant Tukdoji Maharaj, Govt. of Maharashtra publication.
of Center of Sciences for Villages, Dharamitra, Dattapur, Wardha.
Tribes of Central India,
Publications of Vriksha mitra, Chandrapur, M. S.
Green is Red, by Ar. Anil Laul, New Delhi.

PGEA103T- Sustainable Building Technology and Management

Objective:

To introduce concepts of Eco Friendly building materials and alternative methods of building construction and energy efficient construction.

Unit I Eco Friendly Building Materials

Environmental impact of building materials, Eco Friendly building materials, their composition, production and recycling, physical properties etc. Embodied energy of materials like bamboo, soil blocks, thatch, steel, fly-ash bricks, gypsum, eco-boards etc, Life Cycle assessment of materials

Unit II Design Strategies to reduce

Building concept, Site and Context understanding, Design in synergy to Natural factors.

Unit III Energy efficient systems and techniques

Energy Efficient HVAC systems, Plumbing Design, Illumination, Mechanical and Electrical transportation, Fire Fighting etc.

Unit IV User awareness and response

Building Users, Types and responses, Awareness program, role of users in Operations and Maintenance of Buildings for energy efficiency

Unit V Building Management System

Management as tool for reduction, Human and machine management, Threats and Solutions, Architectural Intervention.

Unit VI Building Automation System

Introduction to building automation system, components and application of BAS, architectural implications.

Sessional work:

Assignment will be in the form of a journal or small project showing the application of the Methods.

Reference books :

Green Architecture, Design for a sustainable future

Energy efficient buildings by Wagner Walter

Architecture, Engineering and Environment by Hawkes Dean and Foster Wayne

Manual of Tropical housing and climate by Koenisberger

Energy Efficient Buildings in India by Milli Mujumdar

Earth Construction by Houben Hugo

Publications from - CBRI - Roorkee

Refrigeration and Airconditioning by Sarao, Gaabi and Singh

Water supply and Sanitary Engineering (Environmental Engineering)-by Rangwala

Plumbing Services and Design Guide –Compiled and published by Institute of Plumbing

Building Services and Equipment (Part I & Part II)-by F Hall

Mechanical and Electrical Systems in Construction and Architecture-by Frank R Dagostino

Advances in Tall Buildings-by Lynn S Beedle(Council of tall buildings and urban habitat)

Heating, Cooling and lighting design methods for architecture. By Lechor Worbert

PGEA104P - Elective –I (Discipline Specific)

1. Contemporary Practices in Sustainable Architecture

Objective:

Is to provide understanding about the different approaches adopted by the institutions and individuals working for sustainable Architecture and their contribution to the Sustainable Architecture.

Unit I Indian Individuals

Contribution of Indian individuals such as Laurie Baker, Yatin Pandya, Anil Laul, M.N Ashish Ganju etc in the form of their ideas, Philosophies and their work.

Unit II Foreign Individuals

Contribution of Foreign individuals such as Geoffrey Bawa, Hassan Fathi, Moshe Safdi, etc in the form of their ideas, Philosophies and their work.

Unit III Indian Institutions

Importance of the Institutes, Indian approaches to achieve sustainability in architecture contribution of those institutes such as GRIHA, DA, E.C., Auroville, C.E.A.S.I.D.

Unit IV Foreign Institutions

Importance of the Institutes, Western approaches to achieve sustainability in architecture, contribution of those institutes such as LEED, IISD, USAID, IRG

Unit V Government and Governance.

Government Administrative setup, execution of policies and Programmes. Role of service Providers in Government System.

Sessional work:

Assignment will be in the form of a journal or small project showing the application of the Methods. Documentation of the Projects.

Reference books :

Energy Efficient Buildings in India by Milli Mujumdar

Green is Red by Anil Lau

Publications from - CBRI - Roorkee

- IDC - Mumbai

- NID - Ahmedabad

Green Architecture, Design for a sustainable future

2. Housing, Environmental Planning & Policies

Objective :

Main objective is to introduce the concepts of Environmental Planning and the various emerging issues , also to provide an understanding and relevant techniques formulating urban housing strategies The course is aimed at creating awareness of the Environment

Unit I: Environmental Planning

Introductions to Environmental Planning, Definition of environment, types of environment, pollutants and their effects.

Unit – II: Ecosystem

Ecosystems types, components energy flow, interactions is ecosystem. Physical

Environment-air environment , water environment, soil environment. Environmental

Policies and Program mes- International and National.

Unit III: Housing

Housing – Relevance & scope of subjects, housing stress, demand and supply.

Quantification of housing needs.

Unit – IV: Financial aspect of housing:

Housing affordability economic Rent, etc. Policies and protocols.

Sessional work:

Journal or Report covering the above mentioned theories and concepts

Reference books :

Environmental Biology, K C Agarwal Agro Botanical Publishers ,New Delhi

International law and the Environment ,Birnie ,P W & Boyle

Energy and Ecology ,David M Gates

Ecology and Environmental Planning ,Edington ,John

The Environment ,Public Health and Human Ecology consideration for Economic Development

Environmental Policies and Programs in India , Saksena ,K.D.

3. Ecological Planning

Objective:

The aim of this course is to make the students understand the various environmental management systems. To make the students understand the importance of land planning for sustainability, resource planning and allocation and protection of natural resources and their use for sustainability

Unit I Ecology and Physical Planning

Preservation and protection of important sensitive areas

Rehabilitation of degraded sites

Unit II Site Development & Eco-System Preservation.

Development of sites/ land in accordance to their environmental properties.

Plant Material and its importance in Eco System preservation

Unit III GIS as tool for Land Planning

Remote sensing

Aerial photography

Sessional Work:

Journal or Report covering the above mentioned theories and concepts

Reference books :

Cerver Francisco Asensio: Environmental restoration landscape.

Cever Francisco a: Elements of landscape world of environment.

Mukherjee Pippa: Nature Guides Common Trees Of India. Worldwide Fund For Nature

Papanek Victor: Green Imperative Ecology

Ethics In Design. Thames And Hudson,

Randhawa M S: Flowering Trees. India

Environmental analysis for land use and site planning. By Marsh Williams M. (MC Grew hill (1978)

Climate Change and Biodiversity-Edited by Thomas Lovejoy and Lee Hannah-TERI publication

Landscape Planning and Environmental Applications-By M.W.Marsh

River Ecology-by Prakash Gole

PGEA106P - Environmental Architecture theory

Objective:

Develop an awareness of Components of Environment & their interrelationship. Historical Perspective: Natural & Physiological factors influencing human civilizations & settlements.

Unit I History of Environmental Degradation

Industrial Revolution and its Impact, End of Regional Architecture.

Unit II Movements in Environmental Architecture.

Need and start of Movements , Movements in Environmental Architecture by different agencies and Individuals.

Unit III Western and Eastern Theories of Environmental Architecture.

East guided by Principles West guided by rules .

Unit IV Case Studies and Works of Environmental Architects

Case studies of various Nature which deals with environmental issues in Architecture, Works of eminent architects based on Environmental Concerns.

Sessional work:

Journal or Report covering the above mentioned theories and concepts

Reference books :

Pedagogy of the Earth by Dr. Rashmi Mayur and Carlos Hernandez

The Green Living Design for a Sustainable Earth By International Institute of Sustainable Future, Mumbai

Voluntary Simplicity by Duane Elgin

Silent Spring by Rachel Carson.

Eco Economics by Jane Jacobs

Environmental Science : The Way the World Works by B. J. Mebol

Asphalt Nation by Jane Holtz Kay

Review Our Dying Planet by Sarala Devi.

PGEA107P- Sustainable design studio-I

Objective:

The aim of the course is to introduce the students to climate as an important aspect of sustainable design, to understand in depth the factors affecting comfort and creation of comfort conditions and the building physics associated with it.

Sessional Work:

A journal covering the above theories to be prepared. Analysis of a building in terms of its thermal properties, comfort factors etc. as an individual assignment in form of a report

Design of a small unit taking into consideration the above.

Semester – II

PGEA201T - Environmental Laws and Legislation

Objective:

The aim is to introduce the students to the existing environmental policies and environment laws and legislation in India.

Unit I Environmental Laws

Public Health and Safety: Remedies under law of torts, law of crimes and other common law remedies. The Constitution of India: Salient features, Fundamental Rights and Directive Principles of State Policy, Writ petitions, Public Interest Litigation

Unit II Environmental Legislation

EP Act 1986, Air (Prevention and Control of pollution) Act, Water (Prevention and Control of pollution) Act, Mines and Mineral Act, Factories Act, Pesticides Act, Indian Forest Act, Wildlife Act, Ancient Monuments and Archaeological Sites and Remains Act, Hazardous Waste Management and Handling Rules / Biomedical Rules / Solid Waste Management Rules, Environment Tribunal Act, Climate change Protocols and Conventions, MOEF Guidelines and Notifications, Appellate Authority Act, Other related Notifications

Unit III Environmental Notifications

Costal Regulation Zones, Dahanu taluka Eco-Fragile Area, Environment Impact Assessment of Development Projects, Matheran Eco-Sensitive Zones, Bio-Medical Waste (M&H) Rules, 1998, Hazardous Waste (M&H) Rules, 1989, Municipal Solid Waste (M&H) Rules, 2000.

Unit IV Policies

Environmental Policies and Programmes – International and National

Sessional Work:

Journal or Report covering the above mentioned theories and concepts

Reference books :

International law and the Environment ,Birnie,P W & Boyle

Environmental Policies and Programs in India ,Saksena, K.D

India Development Report IGIDR 97

PGEA202T- Renewable Energy Systems and Technology

Objective:

Subject aims at introducing the students to various forms of renewable energy

sources and appropriate technologies for harnessing them for our benefit.

To introduce environmental technologies for waste management, water management and waste to energy, at city and building project level

Unit I Renewable & Alternate Energy Systems

Global energy scenario and its status in India.

Renewable Source such as Solar, Wind, Biomass.

Non Renewable Clean Source such as Nuclear, CNG, LPG.

Unit II Environmental Technologies

Water and its status in India

Source, Review of Management of water

Type of Waste and review Management system

Environmental Technologies for various status of water.

Sessional work:

Assignment will be in the form of a journal or small project showing the application of the Methods.

Reference books :

Solar Energy in Architecture and Urban Planning by Herzog Thomas

Solar Heating, Design Process by Kreider Jan F

Energy - Manual for college teachers (CEE publications)

Renewable Energy & Environment - A policy analysis for India (CEE publications)

Sustainable Building Design Manual-Volume I and II –TERI Publication

Municipal Water and Waste Water Treatment – by Rakesh Kumar and R N Singh,edited by

T.V.Ramchandra

Natural Systems for Waste management & Treatment

Renewable Energy and Environment - A policy analysis for India. (Publication from CEE)

PGEA203T- Environmental Impact Assessment and mitigation

Objective:

The aim of the subject is to introduce the students to techniques for carrying out an assessment of the impact on the environment.

Unit I EIA

Definition and need, Role of EIA in the Planning and decision making process, evolution and objectives, tasks and scope

Unit II Process of EIA

Methods of EIA; Advantages and limitations, Criteria to implement, Process of EIA,

Unit III Assessment of impacts

Assessment of impacts on resources (Including air, water, flora and fauna), Assessment of impacts on Land use, Assessment of social and health impacts, Public Participation in EIA, PRA techniques.

Unit IV Mitigation Techniques

Mitigation Techniques and Strategies, EIA as a strategic tool for sustainable development.

Sessional work:

Assignment will be in the form of a journal or small project showing the application of the Methods.

Reference books :

Methods of Environmental Impact Assessments-Edited by Peter Morris and Ricky Therival

Eleven Years of the Environment Impact Assessment Notification 1994- How Effective Has it Been-by Kanchi Kohli and Manju Menon kalpavriksha Environmental Action Group.

Handbook of Environmental Analysis-Chemical Pollutants in Air, Water, Soil and Soil waste-By Pradyot Patnaik

PGEA204P- Elective –III (Discipline)

1. Conservation as a tool for sustainability

Unit I

Ecology of various natural Ecosystems such as Ecology of fishes, Wildlife Ecology & Conservation, Soil Ecology, Agro ecosystems etc, Fundamentals of Environmental Law, Climate Change – Its indicators and effects.

Unit II

Land Use and Global Change, Economics of Environment and Development, Environmental Security and Conflict, Analysis and Modeling of Ecological Data. Ecological Risk Assessment

Unit III

Principles of GIS, GIS and Natural Resource Application, Remote Sensing, Environmental Space Data Analysis, Network Analysis for Natural Resource and Environmental Planning.

Unit IV

Climate and Development, Water Resource Policy, Environmental Politics and Policy, International Environmental Policy, Principles of Transition, Environmental Econ: Quantitative Tools & Methods, Environmental Foot printing and Input-Output Analysis, Sustainable Energy System

Unit V

Research Methods in Environment and Behavior, Eco Design Principles, Research Paradigms, Eco Site Design, Green Construction, Master's Project Planning Course.

Sessional Work:

Assignment will be in form of group study which is presented in the form of presentation and a written report of the same.

Reference books :

Nature's Matrix: Linking Agriculture, Conservation and Food Sovereignty by Perfecto, I., J. Vandermeer, and A. Wright.

2. Restoration of Ecologically Disturbed Sites

Objective

Basic objective of this subject is to understand and assess the conditions /status of ecologically sensitive / disturbed areas due to manmade activities and study various techniques for their revival.

Unit I. Introduction to Ecology & Related System

Introduction and summary, Environmental restoration, restoration ecology -- why, what, how, for whom. Ecosystem structure and function. Understanding the environmental history of a site, The basis of restoration – soil, fungi, roots, plants, water.

Unit II. Monitoring and Evaluation

Monitoring and evaluation, Understanding different methods / techniques for monitoring & evaluation Rehabilitation and restoration - Coastal sage/grasslands/forests, lessons from successful and troubled projects. Field trip.

Unit III- Restoration Techniques

Restoration approaches, restoration planning and management - Soil restoration, restoration soil structure and function. Use of vertical mulch, compost, tillage. Seed collection, plant production, planting, plant protection, and aftercare.

Unit IV- Restoration for various types of ecological systems

Rehabilitation and restoration-Coastal sage/grasslands/forests, lessons from successful and troubled projects. Field trip, Stream and wetland restoration

Unit V- Management Plan

The Design and Preparation /Development of management plans for "saved areas". Anticipation of possible, endangered species, habitats and the economic benefits of

ecosystem services.

Sessional Work:

Assignment will be in the form of group study which is presented in the form of presentation and a written report of the same.

Reference books :

A Guide for Desert and Dryland Restoration by Bainbridge

Repairing Damaged Wildlands by Whisenant

Restoration Ecology: The New Frontier by Van Andel

3. Climate Responsive Design System.

Objective: Study of this subject aims at understanding of climate responsive design systems with greater emphasis on functional aspects involved in various climate responsive design.

Unit I Thermal comfort design systems

Study of Solar active and passive systems for cooling and heating, structural controls for thermal comfort and ventilation. Advanced system for cooling heating and ventilation.

Unit II Day lighting

Principals of day lighting, day lighting requirements in building, prediction techniques, day lighting systems, simulation techniques and methods.

Unit III Noise and Noise control

Sound principles, Noise and noise control in various climates, design aids.

Sessional work: Notes, Case studies to understand practical application of various systems. Design of climate responsive built environment to achieve thermal comfort, ventilation, day lighting and noise control

Reference books:

Manual of Tropical housing and climate by Koenisberger

Climate responsive architecture by Arvind Krishnan

Manual of solar passive architecture - by Nayak J.K. R. Hazra J. Prajapati.

Sun Wind and Light-Architecture Design Strategies-by G.Z.Brown and Mark Dekay

Detailing for Acoustics-Duncan Templeton and Peter Lord

Acoustics in the building environment, Advice for the design team-Edited by Duncan Templeton

Acoustical Design of Concert halls and theatres-By William Lassen Jordan

Day Light in Architecture by Benjamin H.Evans,AIA

Day lighting Design and Analysis by Claude L.Robbins

The Lit Environment – by Derek Phillips

PGFD205T- Foundation Courses -I

*The foundation Course will be carried out as per P.G Guidelines of RTM Nagpur University.

PGEA206P- Energy audits and codes

Objective: Introduction to energy conservation in buildings, international and national energy conservation building codes and rating systems, use and application of various codes in India, Use of codes or certification

Unit I Energy conservation in buildings

Study of Energy conservation in buildings, codes & rating systems, Role and objectives of energy conservation building codes and rating systems.

Unit II Development of codes

Study of development of various building codes at national and international level, objectives, key features, role and application.

Unit III Administrations & enforcement

Indian scenario in Energy conservation of buildings, various stakeholders involved, role of stakeholders, role of Indian government in successful implementation of codes and rating systems.

Unit IV Study of Indian codes & Rating systems

Study of Energy conservation building codes (ECBC, India), Indian Green Building Congress (IGBC) rating system, TERI Green Rating for Integrated habitat Assessment (GRIHA)

Unit V Application of codes

Use of codes and guidelines to get certification and rating for new and old buildings/campuses.

Sessional work: Notes, Case studies to understand practical application of various codes.

Reference books :

Energy Management: W.R.Murphy, G.Mckay (Butterworths).

Energy Management Principles: C.B.Smith (Pergamon Press).

Efficient Use of Energy : I.G.C.Dryden (Butterworth Scientific)

Energy Economics -A.V.Desai (Wiley Eastern)

Industrial Energy Conservation : D.A. Reay (Pergamon Press)

Energy Management Handbook – W.C. Turner (John Wiley and Sons, A Wiley Interscience Publication)

Industrial Energy Management and Utilization – L.C. Witte, P.S. Schmidt, D.R. Brown (Hemisphere Publication, Washington)

Industrial Energy Conservation Manuals, MIT Press, Mass, 1982

Energy Conservation guide book Patrick/Patrick/Fardo (Prentice Hall)

Handbook on Energy efficiency –

ASHRAEE Energy Use (4 Volumes)

CIBSI Guide –Users Manual (U.K.)

PGEA207P-Sustainable design studio-II

Objective:

To apply the design principles for energy efficiency and sustainable development

☐ Design of Campus, Housing etc. OR Project with Increased complexities with respect to energy efficiency and sustainable principles.

☐ Study and the application of environmental planning at settlement level.

Semester – III

PGOPEN301T - Elective –IV (Open)

PGFD302T- Foundation Courses -II

*The foundation Course will be carried out as per P.G Guidelines of RTM Nagpur University.

PGEA303P - Software simulation tools for Energy Efficient Buildings

Objective:

The course will introduce software simulation tools like ECO TECH /ENERGY PLUS or any other software tool for energy efficient buildings.

Unit I Introduction

History, importance, compatibility of the relevant softwares.

Unit II Application & Operation

Tools, modeling, simulations, analysis of buildings by softwares.

Sessional Work:

Assignment will be in form of project work. (Individual / group) related to any one of the topics mentioned above

Reference books :

Introductory digital Image processing: A Remote Sensing Perspective, John R. Jensen

Land use Planning and Remote Sensing, David T. Lindgren

Remote sensing and interpretation by Thomas m Lilles and Kiefer

PGEA304P-Seminar

Objective:

To develop the capacity of the students to work undertaking research in a given subject relating to Environmental Architecture and presenting his observations.

To Equipped Student Finally with skill to scale his project Efficiently and effectively.

PGEA305P- Sustainable design studio-III

Objective:

To apply the design principles for energy efficiency and sustainable development

Planning Studio to apply the Environmental Planning at the urban scale and

generating the Environment Management Plan document for the same,

Semester – IV

PGEA401P- Professional Training

Objective:

To give an insight into the practical applications of the technical knowhow.

The students will need to undertake professional training of 8 weeks full time

with the concerned office/ organization/ NGO at any time during the semester as decided by the institution offering the course

PGEA402P- Colloquium

Objective:

1. To inculcate research techniques, report writing techniques and presentation techniques.
2. The student will choose any topic of interest and present a colloquium.

The student will present the analysis of **Non explored concepts and cases**; expected to generate discussion leading to participation of various stake holders; presenting detail

exploration of the above chosen concept and cases. It is expected that, this analysis

could further be develop in to Research article ready for Publication.

Sessional work:

Assignment will be in the form of project work submitted as a Presentation and Report.

This Presentation could be done individually or in a group. This shall have Abstract of

Presentation in Report form.

PGEA403P- Dissertation

Objective:

To undertake detailed research and analysis of design or planning area on a subject of the students choice related to environmental architecture.

Thesis

This subject gives an opportunity for the student to explore a practical or conceptual project to evolve a sound methodology and solution

The student has a choice to focus on the planning and policy aspect, or the thesis could culminate in a design of a sustainable built form.

The thesis can also be in the form of designing computer software for environment related issues. The thesis can be on any one or more topics studied in the earlier semesters.