



**Central University of Rajasthan**  
**School of Architecture**  
**Department of Architecture**

**M. Arch. (Sustainable Architecture)**

**Syllabus**

**(Approved by the School Board in June 2020)**

**(Approved in the 21<sup>st</sup> Meeting of the Academic Council held on 7<sup>th</sup> July, 2020)**

**(Applicable from AY 2020-21)**

1. **Learning Outcomes:** The M. Arch. (Sustainable Architecture) the program offered by the School of Architecture at CURAJ, prepares its graduates to be professionals who will be able to:

1. Demonstrate an understanding of environmental, economic, societal, and cultural aspects of sustainable development of the human settlement.
2. Appreciate the contribution of the rich heritage of India and other ancient civilizations and apply the knowledge of passive design strategies, building materials and construction technologies to create sustainable architecture
3. Effectively blend the Vernacular and traditional wisdom with modern technologies to plan and design a wide range of building typologies, large campuses, and townships in different climatic zones of India with reverence to natural resources, building materials, and the environment.
4. Engage constructively with communities using participatory approaches both in rural and urban contexts.
5. Use simulation tools for improving overall building performance during the architectural design process.
6. Appraise architectural designs and assist in the preparation of documents for green certifications and environmental clearances
7. Exhibit intellectual autonomy with humility and openness to information and ideas from different disciplines.
8. Assimilate complex ideas and communicate them effectively in professional and academic forums.
9. Work independently and collaboratively in multidisciplinary teams to manage resources, design processes, and implementation of sustainable architectural projects.

**Following are the tables indicating the relationship of courses and learning outcomes:**

Table 1: Core and compulsory courses for Semester 1 and 2

Program outcomes	Core and Compulsory Courses									
	Semester 1						Semester2			
	ARC 601	ARC 602	ARC 603	ARC 604	ARC 605	ARC 606	ARC 607	ARC 608	ARC 710	ARC 609
<b>Outcome 1</b>	X		X		X	X				X
<b>Outcome 2</b>	X	X		X	X	X	X			X
<b>Outcome 3</b>	X	X		X	X	X		X		X
<b>Outcome 4</b>					X	X				X
<b>Outcome5</b>				X			X			X
<b>Outcome 6</b>			X					X		
<b>Outcome 7</b>			X						X	
<b>Outcome8</b>									X	
<b>Outcome 9</b>						X			X	X

Table 2: Core and compulsory courses for Semester 3 and 4

Program outcomes	Core and Compulsory Courses				
	Semester 3				Semester 4
	ARC 701	ARC 702 Summer Project	ARC 703 Dissertation	ARC 723 Professional and Research Writing Skills"	ARC 705
<b>Outcome 1</b>	X		X		X
<b>Outcome 2</b>					X
<b>Outcome 3</b>					X
<b>Outcome 4</b>					X
<b>Outcome 5</b>					X
<b>Outcome 6</b>	X				X
<b>Outcome 7</b>		X	X	X	
<b>Outcome 8</b>		X	X	X	X
<b>Outcome 9</b>					X

Table 3: Electives

<b>Program Outcomes</b>	<b>ARC 711</b>	<b>ARC 712</b>	<b>ARC 713</b>	<b>ARC 714</b>	<b>ARC 715</b>	<b>ARC 716</b>	<b>ARC 718</b>	<b>ARC 719</b>	<b>ARC 720</b>	<b>ARC 721</b>	<b>ARC 722</b>
<b>Outcome 1</b>					X			X			
<b>Outcome 2</b>			X		X						
<b>Outcome 3</b>		X	X		X						
<b>Outcome 4</b>					X						
<b>Outcome5</b>				X							X
<b>Outcome 6</b>	X					X	X		X		X
<b>Outcome 7</b>	X	X	X	X		X	X	X			
<b>Outcome8</b>	X					X				X	
<b>Outcome 9</b>		X	X		X		X	X			X

## Course ARC 601 (SA 1)

### Introduction to Sustainable Development and Architecture

#### Learning Outcomes:

On successful completion of the course, the students will be able to:

1. Explain the concepts related to Sustainable Development and its three pillars – economic, environment, and society.
2. Describe the genesis and evolution of SDGs and explain the relevance of Goals directly related to sustainable architecture
3. Describe the conceptual framework of ‘Systems Thinking’ and ‘Building as a System.’
4. Demonstrate the understanding of participatory approaches to development while interacting with communities during field studies.
5. Explain the influence of culture, lifestyle in shaping the sustainable built-environment with the help of examples drawn from Indian and other ancient civilizations of the world.
6. Explain the concept and principles of Sustainable Architecture, and the strategies used for the passive design of energy efficient buildings in different climatic conditions that bring a paradigm change in the architectural design field.
7. Comprehend overview of Green Building certification systems in India and other parts of the world.
8. Assess challenges and opportunities for sustainable architecture.

CO-PO Mapping:

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 7	CO 8
PO 1	3	3	0	1	0	0	3	3
PO 2	0	1	0	0	3	0	0	0
PO 3	0	0	2	0	1	3	0	0
PO 4	1	0	3	3	0	0	2	0
PO 5	0	0	0	0	0	0	0	1
PO 6	0	0	0	0	0	0	0	0
PO 7	2	1	0	0	0	0	0	0
PO 8	0	0	0	0	0	1	0	2
PO 9	0	0	0	0	1	0	0	0

## Course ARC 602 (SA 2)

### Sustainable Building Materials and Technology - I

#### Learning outcomes:

On successful completion of the course, the students will be able to:

1. Explain the use of the natural and conventional building materials which are cost-effective, environmentally friendly, and appropriate to the context of the site, climate, and culture.
2. Demonstrate an understanding of the 'modern' building material developed using advanced technologies and testing methods.
3. Describe the application of recycled/reconstructed building materials in the construction of green buildings.
4. Describe the basic provisions of the Bureau of Indian standards related to select building material.

All students will write a paper dealing with a topic acceptable to the course instructor, and the paper must have at least five references.

#### CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4
PO 1	1	2	1	1
PO 2	3		3	0
PO 3	0	3	0	3
PO 4	2	0	0	0
PO 5	0	0	0	0
PO 6	0	0	0	1
PO 7	0	1	0	0
PO 8	0	0	1	0
PO 9	1	0	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

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## Course ARC 603 (SA 3)

### Ecology and Environmental Management

#### Learning outcomes:

.At the end of this course, the students will be able to

1. Explain the basic concepts of Ecology and different types of ecosystems in the context of the development of human habitat.
2. Describe ways of applying ecology-based principles to various areas like ecological restoration, urban areas, climate change, etc.
3. Identify and analyze environmental concerns related to the built environment both in rural and urban areas and suggest ways to implement sustainable solutions.
4. Describe the importance of Ecology and Environment to achieve the Sustainable Development Goals.
5. Understand the trickle-down effect of ecology and environment from macro to micro level at urban and neighborhood scale.
6. Explore the traditional wisdom for ecological and environmental management.
7. Conceptualize the resource analysis and management in development projects with various tools and techniques.
8. Understand the role of GIS and Remote Sensing in Resource Analysis, Ecological and Environmental Management
9. Imply the basic concepts of ecological and environmental management at urban, regional, eco-sensitive zones.
10. Apply the concept of Nature based solutions and Environmental approaches in sustainable planning and design.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 7	CO 8	CO 9	CO 10
PO 1	0	0	3	1	0	0	0	0	0	0
PO 2	0	3	0	0	0	1	0	0	1	0
PO 3	0	1	0	3	0	0	1	0	0	0
PO 4	0	0	2	0	0	3	0	2	3	0
PO 5	3	0	0	0	3	0	0	0	0	1
PO 6	0	0	0	0	0	0	0	3	0	0
PO 7	2	0	1	0	0	0	1	3	1	0
PO 8	0	1	0	1	0	0	3	0	0	0
PO 9	1	0	0	0	2	0	0	0	1	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 604 (SA 4)

### Climatology and Building Physics

#### Learning outcomes:

At the end of this course, the students will be able to:

1. Describe the components of climate science applicable to the design of buildings and its immediate environment.
2. Describe various climatic zones in India, ways to apply the information while designing buildings and identify through secondary or primary research climatically responsive features used in contemporary buildings
3. Describe the basic concepts of heat transfer concerning buildings and point to strategies that need to be incorporated to achieve climatically appropriate buildings.
4. Explain the concepts of psychometry and human thermal comfort and its measurement.
5. Apply a basic understanding of heat transfer through buildings and calculate U values for different building skins.
6. Present an understanding of basic concepts and principles of building physics that are used by building analysts and scientists.
7. Describe various aspects of solar geometry and solar radiation and its application for the design of buildings.
8. Explain the functions and mechanisms of ventilation

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 7	CO 8
PO 1	0	0	0	1	2	0	0	1
PO 2	0	3	1	0	0	0	2	0
PO 3	3	3	0	0	0	1	0	0
PO 4	0	0	0	0	0	0	0	0
PO 5	3	0	3	3	3	3	3	3
PO 6	0	1	0	0	0	0	0	0
PO 7	2	0	2	0	0	0	1	0
PO 8	0	1	0	0	0	2	0	1
PO 9	0	0	0	2	0	0	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance



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## Course ARC 605 (SA 5)

### Sustainable Architecture – Historical and Community Perspectives

#### Learning outcomes:

At the end of this course, the students will be able to:

1. Present a general review of concepts and principles of vernacular, and historical architecture that provide unique insights on the sustainable development of human habitat.
2. Explain the practices, strategies, and implementation processes that shape sustainable architecture.
3. Undertake field studies using participatory approaches while interacting with communities
4. Document the vernacular and historical examples of development present them in the form of reports and presentations.
5. Describe the historical and community perspectives largely from the Indian context
6. Draw references from traditional community wisdom from India and other parts of the world to be applied while designing.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6
PO 1	3	3	0	0	1	0
PO 2	0	0	1	3	0	3
PO 3	2	0	0	0	3	0
PO 4	0	1	3	2	3	0
PO 5	0	0	0	0	0	2
PO 6	0	0	0	1	0	0
PO 7	1	2	0	0	0	0
PO 8	0	0	0	0	0	1
PO 9	0	1	0	0	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 606 (DSA 1)

### Sustainable Architecture Design

#### Learning outcomes:

At the end of this course, the students will be able to:

- Present a document of field studies that reflect local culture, vernacular and historic architecture and sensitivity to ecology and environment
- Design a small or medium-sized real-life project applying the knowledge of theory subjects learned during the semester and other studies.

**# The studio hours of Design courses will involve one to one counseling, review, and feedback sessions. Students are also expected to undertake substantial self-work beyond the prescribed studio hours.**

CO-PO Mapping:

	CO 1	CO 2
PO 1	3	3
PO 2	3	3
PO 3	0	3
PO 4	3	3
PO 5	0	3
PO 6	1	0
PO 7	3	3
PO 8	3	3
PO 9	0	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 607 (SA 6)

### Energy Efficient Building Design – Theory and Technologies

#### Learning outcomes:

At the end of this course, the students will be able to:

1. Explain the relevance of various climatic factors to undertake site analyses for developing climate-responsive site designs suitable for local conditions.
2. Explain the influence of a built form, building envelope, fenestration, and shading devices to develop climate responsive building design.
3. Describe the techniques and control devices ways of maximizing effective use of daylight while reducing the heat ingress.
4. Identify the passive/hybrid design strategies and techniques for reducing the energy demands of the buildings, especially in the context of heating and cooling.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4
PO 1	3	3	0	3
PO 2	3	3	1	0
PO 3	0	3	0	3
PO 4	0	0	0	0
PO 5	3	3	3	3
PO 6	0	0	0	0
PO 7	1	0	2	1
PO 8	0	3	0	0
PO 9	2	0	0	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 608 (SA 7)

### Building Services and Waste Management

#### Learning outcomes:

At the end of this course, the students will be able to:

1. Demonstrate understanding of basic concepts, principles, and terminology related to building services and waste management sufficient enough to apply them in architectural design independently or while working with consultants.
2. Describe the various components of MEP services with special reference to green and other innovative technologies.
3. Explain basic concepts and techniques related to the design of sustainable human habitat with the aim of Net Triple Zero - energy, water, and waste.
4. Describe the '4R' approach and various technologies for scientifically managing waste as a resource with the involvement of different stakeholders.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4
PO 1	3	3	0	3
PO 2	0	0	0	0
PO 3	0	3	3	3
PO 4	0	0	1	0
PO 5	0	1	0	1
PO 6	0	0	3	0
PO 7	1	2	0	0
PO 8	0	0	3	2
PO 9	2	0	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course Code: ARC 710 (SA 8)

### Seminar Course

#### Learning Outcomes

After successful completion of the course, the student will be able to

1. Apply effective strategy to undertake a literature survey through the university library and other resources.
2. Identify, explore, and use reliable internet resources and e-database to gather information and perspectives related to a given topic.
3. Evaluate multiple perspectives and synthesize ideas
4. Work individually or in teams to present evidence-based arguments through essays/articles/papers and
5. Make effective presentations and interact with diverse groups.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5
PO 1	0	1	2	0	1
PO 2	2	0	0	0	0
PO 3	0	0	0	1	2
PO 4	0	0	2	0	0
PO 5	1	0	0	0	0
PO 6	0	1	0	2	0
PO 7	3	0	0	3	3
PO 8	3	3	3	0	3
PO 9	3	3	3	3	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 609 (DSA 2)

### Sustainable Architecture Design II

#### Learning Outcomes

At the end of this course, the students will be able to:

1. Work in a team to undertake studies of contemporary buildings that are worthy examples of renewable energy technologies, complex building services, sustainable waste management, innovative eco-sensitive design, and present the documentation before a group of experts.
2. Design an Architecture project of substantive scale involving of building services and contemporary technologies and thus demonstrate an understanding of theory subjects learned during the previous semesters and other studies.

# The studio hours of Design courses will involve one to one counseling, review, and feedback sessions. Students are also expected to undertake substantial self-work beyond the prescribed studio hours.

CO-PO Mapping:

	CO 1	CO 2
PO 1	3	3
PO 2	3	3
PO 3	0	3
PO 4	3	3
PO 5	0	3
PO 6	1	0
PO 7	3	3
PO 8	3	3
PO 9	0	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

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## Course ARC 702 (DSA 3)

### Summer Project

#### Learning Outcomes

On successful completion of this course, the student will be able to:

1. Document and present good practices of sustainable architecture through primary research and field studies or while working in an organization working towards sustainable development and architecture.
2. Prepare a formal long report/document and present the documentation before a group of experts.

NOTE: The students will present a formal report and make presentations before a panel of experts in the third semester. The credits of this work will be counted in the third semester.

# The studio hours of Design/Project/Dissertation courses will involve one to one counseling, review, and feedback sessions. Students are also expected to undertake substantial self-work beyond the prescribed studio hours.

CO-PO Mapping:

	CO 1	CO 2
PO 1	3	3
PO 2	3	3
PO 3	1	3
PO 4	3	3
PO 5	1	3
PO 6	0	0
PO 7	3	3
PO 8	3	3
PO 9		3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 701

### Economic, Legal and Policy Framework for Sustainable Architecture

#### Learning Outcomes:

On successful completion of this course, the student will be able to:

1. Describe the economic approaches to sustainable development.
2. Explain various phases of Project life cycle in the context of the social sector and infrastructure development projects.
3. Explain the concept of various types of feasibility studies for development projects.
4. Identify and describe the current government policies and schemes related to infrastructure, development of human habitat.
5. Describe the broad objectives and applications of environment-related legislation that directly relate to architecture, urban development, and conservation of natural and built heritage.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5
PO 1	3	0	3	0	1
PO 2	0	0	0	0	0
PO 3	0	3	0	2	0
PO 4	0	1	0	0	3
PO 5	2	0	2	0	0
PO 6	0	0	0	1	0
PO 7	1	0	0	3	2
PO 8	0	1	1	0	0
PO 9	0	0	0	0	1

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance



## Course ARC 703

### Dissertation

#### Learning Outcomes:

At the end of this course, the student will be able to

1. Identify a topic of interest for research or documentation that individuals knowledge base related to sustainable architecture and development.
2. Undertake systematic literature survey on a given topic.
3. Develop a research methodology and carry out field studies and surveys
4. Use technology to prepare dissertation reports and presentations
5. Effectively present their ideas and research work before a panel of experts and in public forums.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5
PO 1	3	0	3	0	1
PO 2	0	0	0	1	0
PO 3	0	1	0	0	2
PO 4	1	0	0	0	0
PO 5	0	2	1	3	1
PO 6	0	0	0	0	0
PO 7	3	3	3	1	3
PO 8	1	0	3	3	3
PO 9	3	0	3	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 705 (DSA 6)

### Sustainable Architecture Masters Design Thesis

#### Learning Outcomes:

At the end of this course, the student will be able to

1. Work in a team to undertake studies related to neighborhood planning and large area Development and present the documentation before a group of experts.
2. Demonstrate understanding of campus planning, sustainable settlement planning, landscape design, and the statutory framework related to waste management, environmental protection, and sustainability through a large scale project.

#### CO-PO Mapping:

	CO 1	CO 2
PO 1	3	3
PO 2	3	3
PO 3	1	3
PO 4	3	3
PO 5	0	3
PO 6	1	0
PO 7	3	3
PO 8	3	3
PO 9	0	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Elective Course: ARC 711

### Research Methods in Architecture

#### Learning Outcomes:

After successful completion of this course, the student will be able to:

1. Identify a potential research topic related to sustainability in the built environment and present an overview of the research design process and frame a research question.
2. Describe the conceptual and analytical frameworks for the literature review
3. Explain various methods commonly used for research in Architecture and identify pertinent methods for their research
4. Develop a strategy for field work
5. Present a brief research proposal before a panel of experts.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5
PO 1	3	0	3	0	0
PO 2	0	3	0	2	1
PO 3	1	3	2	0	0
PO 4	0	0	0	0	0
PO 5	0	1	1	0	1
PO 6	2	0	0	3	3
PO 7	0	3	3	3	0
PO 8	3	0	0	3	0
PO 9	0	1	1	0	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 712 (SAE 2)

### Water Management

#### Learning Outcomes:

After successful completion of this course, the student should be able to:

1. Describe the need and importance of Management of Water for Architecture students
2. Describe various systems for treatment, supply, and drainage of water in the context of sustainable development of human habitat.
3. Describe traditional methods of water harvesting and conservation used by communities in different climatic zones and geographic terrain
4. Describe various facets of Architecture related to water systems in India with special emphasis on Rajasthan.
5. Explain the approach to the planning of settlements and large campuses based on watershed
6. Identify various technological options and products for the efficient use of water in buildings

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6
PO 1	3	3	0	2	0	0
PO 2			3	0	0	1
PO 3	0	3	0	3	0	0
PO 4	0	0	1	0	2	0
PO 5	1	0	0	1	0	2
PO 6	0	2	0	0	1	0
PO 7	3	0	0	0	3	0
PO 8	0	1	2	1	0	0
PO 9	1	0	3	0	2	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Elective Course ARC 713

### Sustainable Urban Transportation: Basics of Transport Planning and Design at Neighborhood Level

#### Learning Outcomes:

At the end of this course, the students will be able to:

1. Explain the fundamental principles of transportation in urban areas and within campus designs.
2. Demonstrate a basic understanding of movement geometry in campus designs and specialized designs like metro stations, bus stations, and multi-modal interchanges.
3. Use standards of transportation as described in IRC codes in their architectural designs.
4. Design parking spaces for large scale buildings, campuses, and urban areas.
5. Analyze traffic and movement data to create time-space prisms that can help architectural designs become more accessible and efficient.
6. Understand and implement policies of Transit Oriented Development.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6
PO 1	3	1	0	2	0	1
PO 2	3		0	1	0	2
PO 3	0	3	3	0	3	0
PO 4	0	0	3	2	0	2
PO 5	0	1	0	0	0	0
PO 6	1	0	1	1	0	0
PO 7	0	3	1	3	0	3
PO 8	0	0	1	0	1	0
PO 9	2	0	3	0	0	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 714 (SAE 4)

### Renewable Energy Technologies

After successful completion of this course, the student will be able to:

1. Demonstrate understanding of basic concepts, principles, and terminology of different Renewable Energy production.
2. Apply and size and integrate solar thermal and photovoltaic systems in buildings.
3. Appraise various government schemes and incentives and economics of integration of renewable energy sources in built forms.

CO-PO Mapping:

	CO 1	CO 2	CO 3
PO 1	0	2	0
PO 2		0	0
PO 3	0	0	2
PO 4	0	1	0
PO 5	0	0	0
PO 6	3	3	0
PO 7	3	3	3
PO 8	0	0	0
PO 9	2	0	2

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course ARC 715

### Sustainable Neighborhood Planning and Urban Design

#### Learning Objectives:

After successful completion of this course, the student should be able to:

1. Apply vernacular as well as modern urban design strategies that can mitigate the negative impacts of urban climate.
2. Appreciate the role of efficient resource (water, waste, materials, energy) management in the development of a sustainable neighborhood.
3. Demonstrate an understanding of the concepts of Urban renewal, different government schemes of slum Upgradation.
4. Understand and implement URDPFI guidelines
5. Integrate renewable energy resources and smart grid at the neighborhood scale.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5
PO 1	3	0	3	3	1
PO 2	3	1	0	0	0
PO 3	3	0	3	1	1
PO 4	0	0	3	3	0
PO 5	0	2	0	0	0
PO 6	2	1	1	0	2
PO 7	0	3	0	2	0
PO 8	1	0	1	0	0
PO 9	0	3	0	1	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course Code: ARC 716

### Technical and Scientific Communication for Architects

#### Learning Outcomes:

After successful completion of this course, the student should be able to:

1. Demonstrate an understanding of the basic principles and methods of scientific and technical writings.
2. Write research papers, technical reports, dissertations, and other documents commonly used in scientific and technical fields and organizations.
3. Demonstrate formal presentations and oral communication skills, to effectively communicate the scientific and technical information in seminars, conferences, and other public forums

CO-PO Mapping:

	CO 1	CO 2	CO 3
PO 1	0	0	2
PO 2	0	1	0
PO 3	0	0	1
PO 4	1	2	0
PO 5	0	0	1
PO 6	3	3	0
PO 7	3	3	3
PO 8	0	3	3
PO 9	2	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance



## Course ARC 718 (SAE 14)

### Project Management for Sustainable Architecture

#### Learning outcomes:

After completion of this course, participants will be able to:

1. Explain the fundamental principles of management and describe the various schools of management thoughts from historical to current times.
2. Demonstrate a basic understanding of Project Management, Project Planning and Project Financing
3. Develop a basic cash flow requirement for a simple building project.
4. Describe various phases of the Project Life Cycle.
5. Prepare bar charts and showing a list of activities in various phases of project management in the context of the implementation of sustainable architecture projects.

#### CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5
PO 1	0	0	1	0	0
PO 2	0	0	0	0	1
PO 3	0	1	2	1	0
PO 4	0	0	0	0	0
PO 5	1	0	0	0	0
PO 6	0	1	3	1	0
PO 7	3	0	3	3	2
PO 8	0	3	1	1	1
PO 9	3	0	0	3	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

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## Course ARC 719 (SAE 15)

### Sustainable Landscape Architecture

#### Learning outcomes:

On successful completion of this course, the students will be able to:

1. Present an overview of landscape design covering important historical cases in Indian and International context.
2. Describe the Hierarchy of open spaces and the safety and security aspects in landscape design
3. List eco-sensitive landscape building materials, and plant varieties
4. Demonstrate an understanding of various aspects related to exclusive landscapes.
5. Undertake ecological analysis of sites with regarding physiography, microclimatic conditions, soil, and local vegetation

	CO 1	CO 2	CO 3	CO 4	CO 5
PO 1	✓			✓	✓
PO 2	✓	✓			
PO 3					
PO 4					
PO 5					
PO 6					
PO 7		✓	✓	✓	
PO 8					
PO 9				✓	

CO-PO Mapping:

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course Code: ARC 720

### Green Building Certification

#### Learning outcomes:

After successful completion of the course, the student should be able to:

1. Describe what are 'green buildings' the financial considerations of green buildings and the concept of Life Cycle Costing
2. Describe various green certification systems used in different parts of the world.
3. Describe the IGBC Green Building Rating Systems
4. Work individually or in teams to evaluate a building based on GRIHA Rating systems.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4
PO 1	0	0	1	1
PO 2	1	0	0	0
PO 3	0	2	1	0
PO 4	1	0	0	1
PO 5	3	1	0	0
PO 6	3	3	3	3
PO 7	0	0	1	0
PO 8	1	0	0	3
PO 9	0	1	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course Code: ARC 721

### Basic Teaching Skills for Higher Education<sup>2</sup> (Prepared by Prof. Neeraj Gupta)

#### Learning Outcomes:

On successful completion of this course, learners should be able to:

1. Explore the attributes of effective teaching,
2. Describe the adult teaching-learning process,
3. Identify and apply suitable teaching methods in the classroom, studio, labs, and field situations and professional settings.
4. Develop lesson plans for courses
5. Use case studies, activities and exercises in the classroom
6. Use visual aids effectively for lectures and seminars
7. Facilitate and support e-learning
8. Explore ways of handling challenging behavior in classrooms
9. Demonstrate enhanced competency in communicating with students.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	CO 7	CO 8	CO 9
PO 1	0	0	0	0	0	0	0	0	0
PO 2			0	0	0	0	0	0	0
PO 3	0	0	0	0	0	0	0	0	0
PO 4	0	0	0	0	0	0	0	0	0
PO 5	0	0	0	0	0	0	0	0	0
PO 6	0	0	0	0	0	0	0	0	0
PO 7	0	0	0	0	0	0	0	0	0
PO 8	3	3	3	3	3	3	3	3	3
PO 9	0	0	0	0	0	0	0	0	0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Elective Course ARC 722

### Simulation and Modelling for Building Energy Performance

#### Learning Outcomes:

After completion of this course, the students will able to:

1. Describe various energy Efficiency compliance approaches for the building as per relevant Code/ standards
2. Identify various input parameters for software used for building energy performance calculations.
3. Select and use appropriate software for whole building performance simulation and daylight simulation for showing compliance of parameters given by ECBC /other relevant codes in the Indian context.
4. Identify and recommend various Energy Efficiency Measures (EEMs) for achieving the energy-efficient design of buildings.

CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4
PO 1	0	0	2	0
PO 2	1	0	0	1
PO 3	0	1	1	0
PO 4	0	0	0	0
PO 5	3	3	3	3
PO 6	3	3	3	3
PO 7	0	0	0	0
PO 8	1	0	2	1
PO 9	2	1	0	0

0

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance

## Course Code: ARC 723

### Academic Research Writing

#### Learning Outcomes:

On successful completion of the course, and with some additional self-practice the students will be able to:

1. Describe distinguishing features and structure of research writing and process of writing
2. Write research papers with proper formatting
3. Write professional emails
4. Make effective presentations in conferences

#### CO-PO Mapping:

	CO 1	CO 2	CO 3	CO 4
PO 1	0	0	2	0
PO 2	1	0	0	1
PO 3	0	1	1	0
PO 4	0	0	0	0
PO 5	1	0	0	1
PO 6	3	1	1	0
PO 7	2	3	3	0
PO 8	0	3	3	3
PO 9	2	0	2	3

0= No Relevance    1= Low Relevance    2= Medium Relevance    3= High Relevance