D Y Patil Deemed to be University

School of Architecture

SYLLABUS

For

MASTER OF ARCHITECTURE
ADVANCED COMPUTATION IN ARCHITECTURE AND DESIGN

DIGITAL ARCHITECTURE

Goal of the program

The program envisages to be recognized as a place for nurturing graduates adept at using technology integrated with regional and local knowledge systems, social concerns and sustainability issues to offer optimized design solutions at multiple scales.

Program Objectives

The Masters of Architecture: Computation in Architecture and Design, has been framed on the basis of following objectives:

1. To understand the role of Computational Design in shaping the built environment in India and globally.
2. To reinforce research and innovation in employing computational Design for sustainable development.
3. To foster a deeper connection between nature, culture, and technology in design.
4. To foster interdisciplinary collaborations and knowledge exchange between academia and industry/ practice.
5. To promote the integration of innovative materials and technologies in design and construction.
6. To nurture socially responsible and globally competitive designers bringing positive impact in the field of design and architecture

With the above in view, following are the four pillars shaping the courses across the four semesters.

1) **Theory, Philosophy Critical Thinking:** This pillar aims that graduates have a strong theoretical and philosophical foundation. It shall orient them to the way architecture shaped at the turn of the 21st century right up to the current times due to the various socio-political and socio-cultural forces. It shall imbibe critical thinking such that graduates are quipped to form an argument, have their own opinion and take a stand.
2) **Design Processes and algorithmic thinking:** This pillar equips the graduates towards parametric thinking and enables them to various design processes. It is the application of theories learnt in 1. Above. It is the core pillar of the program where integration of all learning happens.
3) **Computational Skills for Design and Production:** Here the graduates shall be equipped with all the software and technology required to sharpen their skills. They shall be introduced to various design communication methods as well.
4) **Entrepreneurship Abilities/ Employability:** To make sure that the graduates prove their mettle in the industry and leave a mark to make the world a better place to live. Here the graduates shall be oriented to ways of bring their innovative ideas to fruition.

CURRICULUM

PROGRAMME OUTCOMES (POS): The broad Program outcomes for PG students in Architecture are as follows

	By the end of the Program the students shall be able to demonstrate the following_
PO 1	**Perceive beyond the obvious and innovate ' Out of the Box' designs**
PO 2	Acquire the tools of Perceptions, Abstractions and Representation.
PO 3	Think critically and argue for unique standpoints
PO 4	Apply the argument for stating the (Design) problem
PO 5	Understand the various aspects of Building Sciences and Technology (BST)
PO 6	Integrate the know- how of BST in the (Design) process
PO 7	Engage with various allied disciplines
PO 8	Integrate allied disciplines with architecture
PO 9	Understand the nuances of Building Practices
PO 10	Apply innovation and critical standpoints to practice
PO 11	Develop insights into changing scenarios, climatic/ socio-political. Global
PO 12	Employ the latest design tools. technology and practices to achieve transformation

PROGRAMME SPECIFIC OUTCOMES (PSO)

	By the end of the Program the students shall be able to demonstrate the following_
PSO1	A coherent integration of Algorithmic Design thinking, Generative Design processes and Advanced Computation in the creation of a built environment.
PSO2	A deep understanding of History and Theory of Advanced Computation in the development of the built environment.
PSO3	The ability to situate research in regional and local contexts and analyze the role of Advanced Computation in bringing about contextually driven radical ideas

PSO4	The skill of Advanced Computation in designing built environment
PSO5	the ability to apply research findings towards sustainable development.
PSO6	An ethical approach in the application of Advanced Computation in research (profession.)
PSO7	An ability to adapt to evolving knowledge in Advanced Computation specially concerning technological & material advancements, conceptual & theoretical ideas.
PSO8	The ability to work in collaboration and in multi-disciplinary environments to meet the challenges of a multi-dimensional society.

Overview of Alignment with NEP

SEM 01	**S. No**	**Course Code**	**Course Title**	**Job opportunities (skill sets required)**	
	1	PGACAD-25101	Theory of Computation in Architecture and Design- I	1. Articulate the role of theory in design 2. Ability to identify concerns and issues in design that can be resolved through the use of computation 3. Ability to identify design principles from nature 4. Demonstrate the ability to carry out 2D and 3D digital fabrication 5. Demonstrate the ability to carry out basic modeling in RHINO and grasshopper 6. Ability to use GIS for analysis 7. Ability to communicate design process diagrammatically	1. Architecture and Design Firms 2. Real Estate and Infrastructure Companies 3. Engineering and Construction Firms 4. Technology and Software Companies 5. Sustainability and Environmental Firms 6. Media, Gaming, and Virtual Reality Industries 7. Entrepreneurial Ventures and Startups
	2	PGACAD-25102	Research- I		
	3	PGACAD-25103	Advanced Computation Design Studio- I		
	4	PGACAD-25104	Advanced Computation Skills and Fabrication I		
	5	PGACAD-25105	Entrepreneurship- I		
	6	PGACAD-25106	Elective- I		
	7	PGACAD-25107	Value added course- I		
SEM 02	1	PGACAD-25201	Theory of Computation in Architecture and Design- II	1. Articulate the role of theory in design 2. Ability to identify concerns and issues in design that can be resolved through the use of computation 3. Ability to identify design principles from nature 4. Demonstrate the ability to carry out 2D and 3D digital fabrication 5. Demonstrate the ability to carry out basic modeling in RHINO and grasshopper 6. Ability to use GIS for analysis 7. Ability to communicate design process diagrammaticallyAbility to write basic algoritms for design 8. Ability to use game engines and the basics of AR,VR technologies 9. Understanding of basic entrepreneurship	
	2	PGACAD-25202	Research- II		
	3	PGACAD-25203	Advanced Computation Design Studio- II		
	4	PGACAD-25204	Advanced Computation Skills and Fabrication II		
	5	PGACAD-25205	Entrepreneurship- II		
	6	PGACAD-25206	Elective- II		
	7	PGACAD-25207	Value added course- II		

	S.No	Course Code	Course Title		
SEM 03	1	PGACAD-25301	Dissertation Research	1. Ability to critically articulate the role of computation in region specific issues and concerns 2. Ability to carry out methodical research and contribute significantly to the body of knowledge 3. Ability to resolve urban Design issues through computation 4. Ability to articulate a design concern and develop a fullfedged design solution for the same 5. Ability to use procedural and generative methods for design 6. Demonstrate the ability to carry out advanced 2D and 3D digital fabrication 7. Demonstrate the ability to carry out advanced procedural modeling in RHINO, grasshopper and other parametric softwares 8. Ability to use GIS for analysis informing design 9. Ability to write advanced algoritms for design 10. Ability to use game engines and AR,VR,MR technologies	1. Architecture and Design Firms (1,3,4,5,6,7,9) 2. Real Estate and Infrastructure Companies (2,5,6,7,8,9) 3. Engineering and Construction Firms (2,3,6,7,8,9) 4. Technology and Software Companies (2,4,5,9) 5. Smart City Projects and Government Initiatives (2,3,4,5,7,8,9) 6. Sustainability and Environmental Firms (2,4,7,8,9) 7. Research and Academia (2,4) 8. Media, Gaming, and Virtual Reality Industries (5,7,9,10) 9. Entrepreneurial Ventures and Startups (11) 10. International Opportunities (1,2,3,4,5,6,7,8,9,10,11)
	2	PGACAD-25302	Advanced Computation Design Studio- III		
	3	PGACAD-25303	Industry Led Project		
	4	PGACAD-25304	Elective- III		
	5	PGACAD-25305	Value added course-III		
SEM 04	1	PGACAD-25401	Design Dissertation		
	2	PGACAD-25402	Elective- IV		

Credit and Examination Framework

SEMESTER 01			CREDITS			TEACHING HOURS- 18 WEEKS**					EXAMINATION SCHEME								
											Theory				Practical/ Studio				
S.No	Course Code	Course Title	T	S	W/EL/L	Total Credits	T	S	W/EL/L	Total contact hours	HRS/ WEEK	IA		ESE		IA		ESE		TOTAL
												Max	Min			Max	Min	Max	Min	
1	PGACAD-25101	Theory of Computation in Architecture and Design- I	2	0	0	2	36	0	0	36	2	30	15	60	30	0	0	0	0	90
2	PGACAD-25102	Research- I	0	2	0	2	0	36	0	36	2	0	0	0	0	30	15	30	15	60
3	PGACAD-25103	Advanced Computation Design Studio- I	1	6	0	7	18	108	0	126	7	0	0	0	0	50	25	50	25	100
4	PGACAD-25104	Advanced Computation Skills and Fabrication I	1	2	1	4	18	36	36	90	5	0	0	0	0	50	25	50	25	100
5	PGACAD-25105	Entrepreneurship- I	2	0	0	2	36	0	0	36	2	30	15	60	30	0	0	0	0	90
6	PGACAD-25106	Elective- I	0	2	0	2	0	36	0	36	2	0	0	0	0	30	15	30	15	60
7	PGACAD-25107	Value Added Course- I	0	2	0	2	0	36	0	36	2	0	0	0	0	30	15	30	1	60
		TOTAL				**21**				**396**	**22**	**CUMULATIVE**								**560**

SEMESTER 02			CREDITS				TEACHING HOURS- 18 WEEKS **					EXAMINATION SCHEME								
												Theory				Practical/ Studio				
S.No	Course Code	Course Title	T	S	W/EL/L	Total Credits	T	S	W/EL/L	Total contact hours	HRS/ WEEK	IA		ESE		IA		ESE		TOTAL
												Max	Min			Max	Min	Max	Min	
1	PGACAD-25201	Theory of Computation in Architecture and Design- II	2	0	0	2	36	0	0	36	2	30	15	60	30	0	0	0	0	90
2	PGACAD-25202	Research- II	0	2	0	2	0	36	0	36	2	0	0	0	0	30	14	30	14	60
3	PGACAD-25203	Advanced Computation Design Studio- II	1	6	0	7	18	108	0	126	7	0	0	0	0	50	23	50	23	100
4	PGACAD-25204	Advanced Computation Skills and Fabrication II	1	2	1	4	18	36	36	90	5	0	0	0	0	50	23	50	23	100
5	PGACAD-25205	Entrepreneurship- II	2	0	0	2	36	0	0	36	2	30	15	60	30	0	0	0	0	90
6	PGACAD-25206	Elective- II	0	2	0	2	0	36	0	36	2	0	0	0	0	30	14	30	14	60
7	PGACAD-25207	Value added course- II	0	2	0	2	0	36	0	36	2	0	0	0	0	30	14	30	14	60
		TOTAL				**21**				**396**	**22**	**CUMULATIVE**								**560**

SEMESTER 03			CREDITS				TEACHING HOURS- 18 WEEKS **					EXAMINATION SCHEME								
												Theory				Practical/ Studio				
S.No	Course Code	Course Title	T	S	W/EL/L	Total Credits	T	S	EL/L	Total contact hours	HRS/ WEEK	IA		ESE		IA		ESE		TOTAL
												Max	Min			Max	Min	Max	Min	
1	PGACAD-25301	Dissertation Research	1	5	0	6	18	90	0	108	6	0	0	0	0	50	25	50	25	100
2	PGACAD-25302	Advanced Computation Design Studio- III	1	8	0	9	18	144	0	162	9	0	0	0	0	50	25	50	25	100
3	PGACAD-25303	Industry led Project	0	2	0	2	0	36	0	36	2	0	0	0	0	30	15	30	15	60
4	PGACAD-25304	Elective- III	0	2	0	2	0	36	0	36	2	0	0	0	0	30	15	30	15	60
5	PGACAD-25305	Value added course- III	0	2	0	2	0	36	0	36	2	0	0	0	0	30	15	30	15	60
		TOTAL				**21**				**378**	**21**	**CUMULATIVE**								**380**

SEMESTER 04			CREDITS			TEACHING HOURS- 18 WEEKS **						EXAMINATION SCHEME								
												Theory				Practical/ Studio				
S.No	Course Code	Course Title	T	S	W/EL/ L	Total Credits	T	S	EL/L	Total contact hours	HRS/ WEEK	IA		ESE		IA		ESE		TOTAL
												Max	Min			Max	Min	Max	Min	
1	PGACAD-25401	Design Dissertation	2	12	0	14	36	216	0	252	14	0	0	0	0	50	23	50	23	100
2	PGACAD-25402	Elective- IV	1	2	0	3	18	36	0	54	3	0	0	0	0	30	14	30	14	60
3	PGACAD-25403	Elective- V	1	2	0	3	18	36	0	54	3	0	0	0	0	30	14	30	14	60
		TOTAL				**20**				**378**	**20**	**CUMULATIVE**								**220**
		TOTAL CREDITS				83	Total Marks					Sem01 + 02 + 03 + 04								1720

* As prescribed by CoA's Minimum Standard of Architectural Education Guidelines for Master of Architecture, 2023- Appendix A , Table- 1.1

** Each semester shall be of 18 working weeks (90 working days) each.

	Credits to contact hour ration as per COA		
	Nature of Course	**Credit**	**Contact hours**
	T = THEORY	1	1
	S = STUDIO	1	1
	W/ L = WORKSHOP/ LAB	1	2
	EL = EXPERIENTIAL LEARNING	1	2

As suggested by COA - Appendix A Credits for courses								
	Sem-01		Sem-02		Sem-03		Sem-04	
Type of Course	Planned	CoA	Planned	CoA	Planned	CoA	Planned	CoA
Studio/ Thesis/ Tutorials/Dissertation	10	6 to 9	10	9 to 12	13	9 - 12	12	12 - 18
Theory Courses	6	6	6	6	2	6	2	0 - 3
Elective	4	3	4	3	4	3	6	3 - 6
Workshop/ Lab	1	0 to 3	1	0 to 3	2	0 - 3	0	-
TOTAL	20	18 to 21	21	18 to 21		18 to 21	20	18 to 22

Master of Architecture

Advanced Computation in Architecture and Design

Detailed Syllabus

First Year

Semester 01

Course Name: **THEORY OF COMPUTATION IN ARCHITECTURE AND DESIGN- I**				Course Code: **PGACAD-25101**
Credits: 02 Internal Sessional –NA | External Viva- Voce -NA | Theory Paper –60 | Int Assessment - 30				
L	T	S/P	C	
0	2	0	2	

COURSE DESCRIPTION

Architecture is the physical response to the social and cultural milieu of the era. It is important that students know the intangibles that shaped the art, architecture and design disciplines since the use of computation and learn to develop their own opinion. The course is focused on the understanding of the technological, social and physical contexts that affected the way one designed the built environment coupled with the philosophical undercurrents and the disciplinary thinking that brought about a revolution at the turn of the last century. The course shall help develop critical thinking in students

COURSE INTENT

The History, Theory and Criticism of Computation in Architecture and Design (HTCCAD-I) course intends to equip the students with the role of intangibles i.e. philosophical underpinning, disciplinary thinking, socio-political events, computation and technological advancements that have shaped the profession of architecture and design.

COURSE OBJECTIVES

1. To sensitize the students how philosophical undercurrents coupled with disciplinary thinking has generated new aesthetic sensibilities in architecture.
2. To orient the students to the series of events and technological advancements that radically shifted the method of designing built environments.
3. To orient the students to the criticism around the use of computation for designing buildings.
4. To help students develop a critical discourse on the application of theories in architecture and region-specific relevance.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to demonstrate the following			
CO1	Critically appraise the under-lying philosophical underpinning and disciplinary thinking that shaped architecture at the turn of the 20th century.	PO2	PSO3,
CO2	The ability to narrate how the series of events and technological advancements radically shifted the method of designing built environments.	PO2	PSO1, PSO2
CO3	Develop an opinion on region specific understanding of the translation of philosophies in architecture.	PO3, PO10	PSO3,
CO4	Critically appraise architectural/design projects based on the new architectural vocabulary/ aesthetic principles.	PO3	PSO1, PSO2

COURSE CONTENT		HOURS	COs
UNIT - 1	Post structuralist Philosophies- Gilles Deleuze, Jaques Derrida, Felix Guattari	8	CO1
UNIT - 2	Translation of philosophy in the Architectural fraternity - Post Modernism (Regionalism and Critical Regionalism)	4	CO1
UNIT - 3	Translation of philosophy in the Architectural fraternity- Deconstructivism	4	CO1
UNIT - 4	Translation of philosophy in the Architectural fraternity - Deconstructivism -Meaning and Experience in Architecture	8	CO2
UNIT - 5	Translation of philosophy in the Architectural fraternity - Folding/ Blobism/ Parametric Design	8	CO1, CO2

SESSIONAL WORK	
1	Tests based on above units – 3
2	Tutorials based on above units
3	Quiz or Seminar or Project

(as per Examination reforms of DYPU)

DYPURECOMMENDED READINGS

Deleuze, G. (1968 1994). *Difference and Repetition.* Bloomsbury Academic.

Derrida, J. Archive Fever- A Freudian Impression (religion and Postmodern series).

Derrida, J. (1967). *Writing and Difference.* The University of Chicago Press.

Eissenam, P. (1999). *Diagram Diaries.* Thames and Hudson.

Eissenman, P. (2007). *Written into the Void.* Yale University Press.

Felix Guattari, G. D. (2004). *A Thousand Plateaus.* Bloomsburry Academic.

Frampton, K. (1980). *Modern Architecture.* London: Thames & Hudson Ltd.

Jacobs, J. (1961, 2002). *The Death and Life of great American Cities.* New York City: Random House.

Jencks, C. (1987, 2011). Language of Post Modern Architecture. Rizzoli.

Jencks, C. (1970). *Meaning in Architecture.* G. Braziller.

Lynn, G. (1999). *Animate Form.* Princeton Architectural press.

Lynn, G. (1993, 2004). *Folding in Architecture.* (G. Lynn, Ed.) Wiley Academy.

Lynn, G. (1998). *Folds, Bodies & Blobs.* La lettre voiee.

Tschumi, B. (1994). *Architecture and Disjunction.* MIT Press.

Venturi, R. (1966). Complexity and Contradiction in Architecture. Thames and Hudson.

Frampton, K. (1980). Modern Architecture. London: Thames & Hudson Ltd.

Leach, N. (Ed.). (2002). *Designing for a Digital World.* John Wiley & Sons.

Leach, N. (2014). *Parametrics Explained.* University of Southern California, Harvard GSD. Baltzer Science Publishers.

Leach, N. (1997). Rethinking Architecture: A Reader in Cultural Theory. London, NewYork: Routledge.

Lynn, G. (1993, 2004). *Folding in Architecture.* (G. Lynn, Ed.) Wiley Academy.

Neil Leach, D. T. (2004). *Digital Tectonics.* John Wiley & Sons.

Patrik Schumacher, The Autopoiesis of Architecture, Volume I

Patrik Schumacher, The Autopoiesis of Architecture, Volume II

Patrik Schumacher, Tectonism: Architecture for the 21st Century

Patrik Schumacher, Style: In Defence of Parametricism

Bernard Tschumi, Event Cities 1-5

Bernard Tschumi, Architecture and Disjunction.

Bernard Tschumi, Architecture: Concept & Notation

Bernard Tschumi, Questions of Space

Course Name: RESEARCH I	Course Code: PGACAD-25102
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	P	C
0	0	2	2

COURSE DESCRIPTION

Research is the backbone of any practice and an inherent part of academia. There are several types of research and several methods of carrying out research. It all depends on the world-view one has and the nature of domain. Students shall be introduced to research methodologies, research ethics and research writing. It is recommended that students are conveyed theory of research by involving them in the process

COURSE INTENT

To enable students in conducting methodical scientific research within the domain of Computational Architecture relevant to the local social, cultural and economic context.

COURSE OBJECTIVES

1. To equip the students in carrying out an in-depth, scientific research.
2. To orient the students to various types of research with research methodologies
3. To enable the students with the steps of carrying out research.
4. To enable the students to identify research area of their interest.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to demonstrate the following			
CO1	Write a research process for a particular topic	PO3	PSO3,
CO2	Articulate research topics, problem statement/ hypothesis and methodology for a broad area of research	PO3, PO4	PSO3, PSO5, PSO8
CO3	Articulate a brief Research Proposal for the problem identified	PO3, PO4	PSO3, PSO6

COURSE CONTENT		HOURS	COs
UNIT - 1	Introduction to the types of research and their application.	8	CO2
UNIT - 2	Introduction to research methods and methodology	8	CO2
UNIT - 3	Introduction to methods of data collection and data analysis	4	CO2
UNIT - 4	Ethics in research, plagiarism and IPR	4	CO2
UNIT - 5	Research Proposal writing	4	CO2
UNIT - 6	Experiments and Explorations	8	CO3

SESSIONAL WORK	
1	Articulating 3 varied Topics, Problem statement, hypothesis and methodologies and methods for a selected broad area of research- A journal/ report compilation- A4 size
2	A Research Proposal for a broad area of research of students own interest

RECOMMENDED READINGS

Creswell, J. W. (2003) Research Design: Qualitative, quantitative and mixed methods approaches, 2nd Ed., Thousand Oaks: Sage.

· De Vaus, D. A. (2003) *Surveys in Social Research,* Jaipur: Rawat Publications.

· Groat, L. & Wang, D. (2002) *Architectural Research Methods,* NY: John Wiley and Sons Inc.

· Kothari, C.R. (2005) *Research Methodology: Methods and Techniques,* New Delhi: Wishwa Prakashan.

· Sanoff, H. (1977) *Methods of Architectural Programming,* Dowden Hutchinson and Ross, Inc. Vol. 29, Community Development Series.

· Sanoff, H. (1991) *Visual research methods in design,* USA: Van Nostrand Reinhold.

· Michelson, William. (1982) *Behavioural Methods in Environmental Design*. Stroudsberg, Pennsylvania; Dowden, Hutchinson and Ross, Inc, 1982.

· Nachmias, C.F. & Nachmias, D. (1996) *Research Methods in Social Sciences*. Great Britan: St. Martin‟s Press Inc. Book

· Babbie, E. (1983) *The Practice of Social research.* Third edition. Belmont: Wadsworth Publishing Co. book

Course Name: ADVANCED COMPUTATION DESIGN STUDIO-I	Course Code: PGACAD-25103
Credits: 07 Internal Sessional –50 | External Viva- Voce -50 | Theory Paper –NA	

L	T	S/P	C
0	1	6	7

COURSE DESCRIPTION

The studio focuses on Generative Design processes through hands-on explorations. The intention is to learn new methods of design that are process oriented rather than just intuitive.

COURSE INTENT

The course intends to equip the students with generative design processes.

COURSE OBJECTIVES

1. To enable the students to various form-finding processes.
2. To introduce the students to the parametric world around us; e.g.- various phenomena in nature, traditional arts and crafts, traditional and vernacular architecture, materiality and industrial production, science, mathematics etc.
3. To re-establish the determinants of architectural form and its parametric nature.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to demonstrate the following...			
CO1	Decode form transformation processes in various natural and man-made objects/ phenomenon	PO1	PSO1
CO2	Represent graphically form transformations in various natural and man-made objects/ phenomenon	PO1	
CO3	Explore form finding methods in an abstract manner through various	PO2	

	hands-on tools		
CO4	Explore form finding methods for a given context and for an architectural solution	PO1, PO2, PO4	
CO5	Design an architectural solution for the identified problem through generative design processes.	PO1, PO4	PSO1, PSO3

COURSE CONTENT		**HOURS**	**COs**
UNIT - 1	Parametric Nature of Traditional art and craft practices, Parametric Nature of the natural world Study and Exploration	30	CO1
UNIT - 2	Rule Based Design, Conditional Design and Algorithm - Shape Grammar, Tessellations, Strip Morphology. Transformation and Variation for Generative Design	30	CO1, CO2
UNIT - 3	Form-finding process through Computer Explorations for a particular context- Place, People and Time.	30	CO1, CO2
UNIT - 4	Generative Design Outcome	36	CO1, CO2

SESSIONAL WORK	
1	Formal analysis based on above units – Complete graphical diagrammatic analysis along with learnings.
2	Form Explorations based on above units- Complete documentation of the step by step process as well as the final outcome.
3	Architectural Project- 01 (A pavilion or a kiosk as an outcome of above explorations)
4	Architectural Project- 02 (A functional project situated in a rich context) – Documentation of the entire process in digital format expected along with final drawings and model.

RECOMMENDED READINGS

Eissenam, P. (1999). *Diagram Diaries.* Thames and Hudson.

Eissenman, P. (2007). *Written into the Void.* Yale University Press.

Lynn, G. (1999). *Animate Form.* Princeton Architectural press.

Lynn, G. (1993, 2004). *Folding in Architecture.* (G. Lynn, Ed.) Wiley Academy.

Lynn, G. (1998). *Folds, Bodies & Blobs.* La lettre voiee.

Tschumi, B. (1994). *Architecture and Disjunction.* MIT Press.

Ball, P. (1999). *The Self-Made Tapestry: Pattern formation in nature* . Oxford, New York, Tokyo: Oxford University Press.

Burry, J., & Burry, M. (2010). *The New Mathematics in Architecture.* New York: Thames and Hudson.

Farshid Moussavi, D. L. *The Function of Form.*

Leach, N. (Ed.). (2002). *Designing for a Digital World.* John Wiley & Sons.

Leach, N. (2014). *Parametrics Explained.* University of Southern California, Harvard GSD. Baltzer Science Publishers.

Leach, N. (1997). Rethinking Architecture: A Reader in Cultural Theory. London, NewYork: Routledge.

Neil Leach, D. T. (2004). *Digital Tectonics.* John Wiley & Sons.

Patrik Schumacher, Style: In Defence of Parametricism

Bernard Tschumi, Event Cities 1-5

Bernard Tschumi, Architecture and Disjunction.
Bernard Tschumi, Architecture: Concept & Notation

Baird, Eric. Alt. Fractals: A visual guide to fractal geometry and design.Chocolate Tree Books. Norman, D. (2013). The Design of Everyday Things: Revised and Expanded Edition. New York: Basic Book.

Techniques and technologies in morphogenetic design (Architectural Design). Hoboken, NJ: John Wiley & Sons, Inc.

From control to design: Parametric/algorithmic architecture. Barcelona, Spain: Actar. Meredith, M., Aranda, B., Lasch, C. &Sasaki, M. (Eds.). (2008).

Course Name: ADVANCED COMPUTATION SKILLS AND FABRICATION I				Course Code: PGACAD-25104
Credits: 04 Internal Sessional –50 Marks. | External Viva- Voce -100 | Theory Paper –NA				
L	T	P	C	
1	1	2	4	

COURSE DESCRIPTION

Advanced Computation Skills and Fabrication I will introduce students to equip participants with advanced skills and knowledge necessary to excel in computational design. By bridging the gap between theory and practical application, students will develop a robust understanding of both traditional and innovative modeling techniques and to introduce the realm of digital fabrication and prototyping, familiarizing them with all of the most recent technological and methodology advancements in the field. In particular, the validated fabrication technologies utilized in advanced architecture and design will be shown to them. In addition to learning how to prepare the digital model and optimize the production processes, students will acquire an understanding of the machines and the course aims to foster creativity, encourage experimentation, and enhance problem-solving skills in 3D design.

COURSE INTENT

This course aims at enabling students with digital modeling and fabrication techniques and drawings.

COURSE OBJECTIVES

1. Infer Digital Fabrication Technologies and provide practical experience with essential digital fabrication techniques such as vacuum forming, CNC milling, 3D printing, and laser cutting.
2. Gain proficiency in Rhino Sub-D modeling and understand the implications of topology in design and Introduce complexity to sculpting through patterning and learn techniques for non-destructive modeling.
3. Analyze fabrication material & methods based on sustainability, material accessibility and engage in problem-solving throughout the design and fabrication process and use optimization approaches to improve production workflows in digital fabrication.
4. Learn the importance of procedural modeling in Grasshopper and how it enhances design efficiency and flexibility and to explore the distinctions between organic and hard surface modeling and the specific techniques suited for each.

COURSE OUTCOMES		POs	POs
CO1	Articulate the Fabrication Technologies and develop novel ways to employ fabrication machines.	PO6	PSO4
CO2	Articulate advanced skills in using Rhino and Maya for effective low polygon modeling.	PO7	PSO4
CO3	Emphasize Sustainability in materiality and Apply optimization techniques to enhance production workflows in digital fabrication.	PO11	PSO4, PSO7
CO4	Implement procedural modeling techniques that enhance workflow and flexibility in design processes using Grasshopper and Utilize appropriate topology in design to ensure models are efficient and suitable for various applications.	PO8	PSO4, PSO7

COURSE CONTENT		HOURS	COs
UNIT - 1	2D fabrication (Laser Engraving & Cutting)	25	CO1
UNIT - 2	Sub-D modeling in RHINO	20	CO2
UNIT - 3	3D Fabrication 1.Additive Fabrication (3D Printing) 2.Subtractive Fabrication (CNC Milling)	20	CO3
UNIT - 4	Procedural modeling, its efficiency & flexibility and optimizing streamlined workflow in Grasshopper	25	CO4

RECOMMENDED READINGS

1. Rhino NURBS 3D modeling McNeel & Associates
2. Autodesk Maya 2023 for 3D by Prof. Sham Tickoo
3. Digital Fabrications: Architectural and Material Techniques by Lisa Iwamoto
4. Digital Vernacular: Architectural principles, tools and process by James Steven and Ralph Nelson

Course Name: ENTREPRENEURSHIP-I	Course Code: PGACAD-25105
Credits: 02 Internal Sessional –NA | External Viva- Voce -NA | Theory Paper –60 | Int Assessment - 30	

L	T	S/P	C
2	0	0	2

COURSE DESCRIPTION

This introductory semester covers the fundamentals of entrepreneurship and how they relate to architecture. Students will explore basic business concepts, traditional versus entrepreneurial roles, and various business models, focusing on developing an entrepreneurial mindset tailored to architectural practice.

COURSE INTENT

To build a foundational understanding of entrepreneurship in architecture, encouraging students to transition from traditional roles to innovative business models and prepare them to consider architectural practices through an entrepreneurial lens.

COURSE OBJECTIVES

1. Introduce the basic principles of entrepreneurship and business within architecture.
2. To explore emerging trends in architecture
3. To foster an entrepreneurial mindset by encouraging students to explore the potential for innovation, risk-taking, and creative problem-solving within the architecture field.
4. Provide foundational business skills, including leadership, financial literacy, and understanding client needs.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to produce the following...			
CO1	Understand the core entrepreneurial concepts relevant to architecture.	PO10	PSO8
CO2	Recognize the differences between traditional and entrepreneurial roles in architecture.	PO10	PSO8

CO3	Demonstrate foundational business skills necessary for architectural practice.	PO10	PSO8

COURSE CONTENT		HOURS	COs
UNIT - 1	Introduction to Entrepreneurship	6	CO1
UNIT - 2	Architect as Entrepreneur	8	CO1
UNIT - 3	Business Models in Architecture	8	CO2
UNIT - 4	Essential Business Skills (financial literacy, leadership)	8	CO3

1	Tests based on above units – 3
2	Tutorials based on above units
3	Quiz or Seminar or Project

(Examination reforms DYPU)

Course Name: ELECTIVE I	Course Code: PGACAD-25106
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	P	C
0	2	0	2

COURSE DESCRIPTION

The purpose of the elective is to orient students to various disciplines within the domain of computation in architecture and design that they may take up as an expertise of their profession later in their career.

The course elaborates on a suggestive list of electives as given in **Appendix A.** The institute may offer an elective depending on the expertise that they have or the niche they wish to develop. The choice shall be given to the student to choose a subject of their choice. The course offered needs to be detailed by the individual faculty as per the standards.

COURSE INTENT

To introduce the students to inter-disciplinary ideas, experimentations and investigations within the domain of computation in architecture and design that will help enhance their profession/ practice or research.

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Posters/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

Faculty offering the elective to develop the detailed teaching plan

Course Name: VALUE ADDED COURSE I				Course Code: PGACAD-25107
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA				
L	T	P	C	
0	2	0	2	

COURSE DESCRIPTION

The purpose of the Value-Added Course is to orient students to disciplines other than architecture where their skills and proficiency could be enhanced.

The course elaborates on a suggestive list of courses as given in **Appendix B.** The institute may offer a course depending on the expertise that they have or the niche they wish to develop. The same course shall be introduced to all students. The course offered needs to be detailed by the individual faculty as per the standards.

COURSE INTENT

To introduce the students to various disciplinary ideas, experimentations and investigations outside the domain of computation in architecture and design that will **nurture their multidisciplinary thinking**

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Poster/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

To be elaborated by the faculty

Master of Architecture

Advanced Computation in Architecture and Design

Detailed Syllabus

First Year

Semester II

Course Name: THEORY OF COMPUTATION IN ARCHITECTURE AND DESIGN- II	Course Code: PGACAD-25201
Credits: 02 Internal Sessional –NA | External Viva- Voce -NA | Theory Paper –30 | Int Assessment - 30	

L	T	S/P	C
0	2	0	2

COURSE DESCRIPTION

Architecture is the physical response to the social and cultural milieu of the era. Once the use of computation was established, several theories and aesthetic principles developed around it. The multi-disciplinary nature of architecture and design took a new turn. The 2nd part of this course shall be focused in orienting students to those aspects and the narrative that developed around it. Some of the disciplines are- Science, mathematics, art and craft, phenomenology among others.

COURSE INTENT

This course intends to equip the students to the role of computation in enhancing the inter-disciplinary nature of architecture thereby developing new aesthetic sensibilities, processes and theories.

COURSE OBJECTIVES

1. To sensitize the students to the research and development happening in architectural fraternity globally and locally at the intersection of science, mathematics, art and craft, phenomenology.
2. To orient the students to the theories and aesthetic principles developed as a result of various disciplines that inform architecture/ emergent design.
3. To enable students develop a critical discourse on the application of theories in architecture and region-specific relevance

COURSE OUTCOMES		POS	PSOs
By the end of the course, the students shall be able to demonstrate the following			
CO1	Develop a rhetoric on the inter-disciplinary nature of architecture enabled by computation.	PO7, PO8	PSO1, PSO2

CO2	Critically appraise architecture and/or design projects based on the new architectural vocabulary/ aesthetic principles.	PO3	PSO1, PSO2
CO3	Critically analyze how emerging technology can help resolve region specific issues/ concerns.	PO3, PO7, PO8	PSO1, PSO2

COURSE CONTENT		**HOURS**	**COs**
UNIT - 1	Emergent Design- Orientation and Basics	4	CO1
UNIT - 2	Science- Biology/ Nature informing architecture and design- Biomimicry, Evolutionary theories, Bio-design, - Physics- Fluid dynamics, Sound etc	8	CO1
UNIT - 3	Mathematics informing design- Calculus, Algorithms, New Geometry (Surfaces, Topology, Packing, fractals etc.)	6	CO1
UNIT - 4	Digital Tectonics- Art and Craft, Material and technological explorations	6	CO1
UNIT - 5	Phenomenology and Psychology- Catering to senses, Meaning in architecture, Contextuality,	6	CO1
UNIT - 6	Theories and Aesthetic Principles- (E.g.- Complexity, Intricacy and Elegance, Continuous variation, Differance etc.)	6	CO1

1	Tests based on above units – 3 no.s (Choose one best of 3)
2	Tutorials based on above units
3	Quiz or Seminar or Project

(as per Examination reforms of DYPU)

RECOMMENDED READINGS

The reading shall not be limited to following titles- The tutor may choose relevant readings of authors of repute as per the current needs and demands

1. Anderson, D. R. (2007). Two-Dimensional Computer Generated Ornamentation using a user driven Global Planning Strategy. San Luis Obispo.

2. Ball, P. (1999). *The Self-Made Tapestry: Pattern formation in nature* . Oxford, New York, Tokyo: Oxford University Press.
3. Burry, J., & Burry, M. (2010). *The New Mathematics in Architecture.* New York: Thames and Hudson.
4. Farshid Moussavi, D. L. *The Function of Form.*
5. Frampton, K. (1980). *Modern Architecture.* London: Thames & Hudson Ltd.
6. Hansmeyer, M. (2003). *projects/l-systems_info: Michael Hansmeyer Computational Architecture*. Retrieved February 14, 2016, from Michael Hansmeyer Computational Architecture: http://michael-hansmeyer.com/projects/l-systems_info.html?screenSize=1&color=1#undefined
7. Holland, J. H. (1998). *Emergence: From Chaos to Order.* New York: Oxford University Press.
8. Kaplan, C. S. Curve Evolution Schemes for Parquet Deformations.
9. Khabazi, Z. (2012). *Generative Algorithms.* morphogenesism.
10. Leach, N. (Ed.). (2002). *Designing for a Digital World.* John Wiley & Sons.
11. Leach, N. (2014). *Parametrics Explained.* University of Southern California, Harvard GSD. Baltzer Science Publishers.
12. Leach, N. (1997). Rethinking Architecture: A Reader in Cultural Theory. London, NewYork: Routledge.
13. Lynn, G. (1993, 2004). *Folding in Architecture.* (G. Lynn, Ed.) Wiley Academy.
14. Lynn, G. (2004). The Structure of Ornament. *AD, Digital tectonics* , pp. 63-68.
15. Moussavi, F., & Kubo, M. (2006). *The Function of Ornament.* (F. Moussavi, & M. Kubo, Eds.) Barcelona: Harvard University, Graduate School of Design.
16. Neil Leach, D. T. (2004). *Digital Tectonics.* John Wiley & Sons.
17. Roudavski, S. Towards Morphogenesis in Architecture. *International Journal of architectural computing , 07* (03).
18. Schumacher, P. (2009, November/ December). Parametric Patterns. *Architectural Design-Patterns of Architecture , 79* (6).
19. Schumacher, P. (2008). Parametricism as Style - Parametrist Manifesto. *11th Architectural Biennale, Venice.* Venice.
20. Stiny, G., & Gips, J. (1975). Shape Grammars and the Generative Specification of Painting and Sculpture.
21. Terzidis, K. (2006). *Algorithmic Architecture.* Oxford: Elsevier Ltd.
22. Thompson, D. W. (1942). *On Growth and Form.* Cambridge: The University Press.

Course Name: RESEARCH II	Course Code: PGACAD-25202
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	S/P	C
0	0	2	2

COURSE DESCRIPTION

Research is required for creation of new knowledge. In architecture, it entails the application of any new findings into the spaces built for human occupation. Any good research starts by keen observation, intense reading and having a critical enquiry. This semester is focused on carrying out literature review and identifying a research gap. Faculty is supposed to introduce various tools to carry out Literature review like mind-map, matrix and any other deemed suitable.

COURSE INTENT

This course aims to enable students in identifying a research gap by carrying out literature review, critical thinking, by being aware of issues relevant to the region.

COURSE OBJECTIVES

1. To sensitize the students to the importance of a Literature Review for gaining holistic understanding in a particular domain.
2. To orient the students to method of conducting a Literature Review.
3. To equip the students to identify research gap
4. To equip students in articulating a research proposal.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to demonstrate the following			
CO1	Articulate a detailed Literature Review based on the area of inquiry	PO3	PSO3, PSO5
CO2	Articulate a problem statement/ hypothesis	PO4	PSO3,

			PSO5
CO3	Articulate Research Proposal for the identified topic based on the area of inquiry	PO4	PSO3, PSO5

COURSE CONTENT		**HOURS**	**COs**
UNIT - 1	Importance of Literature Review and steps for carrying out a literature review-	4	CO1
UNIT - 2	Steps for identifying the readings and effective reading techniques	4	CO1
UNIT - 3	Cataloguing and summarizing the readings	4	CO1
UNIT - 4	Literature-map: Drawing critical connections and gap identification in content and methods.	4	CO1
UNIT - 5	Articulating the narration- Final Literature Review Technical writing, citations, references, bibliography-	4	CO1
UNIT - 6	Research Proposal writing	4	CO2
UNIT - 7	Abstract writing	4	CO2, CO3
UNIT - 8	Final presentation	4	CO1, CO2, CO3

SESSIONAL WORK	
1	Catalog of readings – A matrix
2	Summary writing – As deemed necessary
3	Literature Review – Technically complete

4	Research Proposal

RECOMMENDED READINGS

Creswell, J. W. (2003) Research Design: Qualitaitve, quantitative and mixed methods approaches, 2nd Ed., Thousand Oaks: Sage.

· De Vaus, D. A. (2003) *Surveys in Social Research,* Jaipur: Rawat Publications.

· Groat, L. & Wang, D. (2002) *Architectural Research Methods,* NY: John Wiley and Sons Inc.

· Kothari, C.R. (2005) *Research Methodology: Methods and Techniques,* New Delhi: Wishwa Prakashan.

· Sanoff, H. (1977) *Methods of Architectural Programming,* Dowden Hutchinson and Ross, Inc. Vol. 29, Community Development Series.

· Sanoff, H. (1991) *Visual research methods in design,* USA: Van Nostrand Reinhold.

· Michelson, William. (1982) *Behavioural Methods in Environmental Design*. Stroudsberg, Pennsylvania; Dowden, Hutchinson and Ross, Inc, 1982.

· Nachmias, C.F. & Nachmias, D. (1996) *Research Methods in Social Sciences*. Great Britan: St. Martin‟s Press Inc. Book

· Babbie, E. (1983) *The Practice of Social research.* Third edition. Belmont: Wadsworth Publishing Co. book

Course Name: ADVANCED COMPUTATION DESIGN STUDIO-II	Course Code: PGACAD-25203
Credits: 06 Internal Sessional –50 | External Viva- Voce -50 | Theory Paper –NA	

L	T	S/P	C
0	1	6	7

COURSE DESCRIPTION

This studio focuses on the shift from hands-on exploration to computer exploration for form finding processes. It begins with exploratory nature moving on to designing a fully functional architectural project. The course shall be based on the theories taught in Theories of Computation in Architecture and Design.

COURSE INTENT

The course intends to equip the students to designing using advanced digital design processes like evolutionary design, genetic algorithms along with complex mathematical ideas

COURSE OBJECTIVES

1. To introduce the students with advanced design processes like biomimicry, evolutionary design and genetic algorithms
2. To equip the students with the process of setting design parameters.
3. To equip the students at writing algorithms and its translation to visual scripting for generating design iterations.
4. To enable the students to use digital tools to carry out design analysis for the set design parameters

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to demonstrate the following...			
CO1	Ability to carry out multiple explorations based on studying behavior, processes and systems in nature.	PO1, PO2, PO8	PSO1

CO2	Ability to set parameters for a particular context	PO1, PO2	PSO2, PSO3
CO3	Design an algorithm and a script for a given set of parameters	PO1, PO2	PSO2, PSO3
CO4	Design an architectural solution for the given context through generative design processes.	PO1, PO2	PO3, PO4

COURSE CONTENT		**HOURS**	**COs**
UNIT - 1	New mathematics of Architecture and advanced geometry	5	CO1
UNIT - 2	biomimicry, evolutionary design and genetic algorithms and all related concepts.	5	CO1, CO2
UNIT - 3	Identifying parameters, Concept and use of geometry	25	CO1, CO2
UNIT - 4	Writing Algorithms and scripting (Grasshopper and Rhino)	25	CO1, CO2
UNIT - 5	Design Explorations - Generative Design Processes	25	CO1, CO3
UNIT - 6	Design Analysis and Outcome selection (Genetic algorithms)	25	CO3
UNIT - 7	Final Design representation - Communication	25	CO3

SESSIONAL WORK	
1	Process documentation- exploring the concept
2	Understanding the design- Setting design parameters
3	Process documentation- exploration in writing algorithms and visual scripting with design iterations and prototyping wherever necessary.

4	Process documentation- Digital analyses for the parameters set to selection of final outcome
4	Final Design outcome- to be presented in an engaging manner, communication all aspects of design

RECOMMENDED READINGS

Eissenam, P. (1999). *Diagram Diaries.* Thames and Hudson.

Eissenman, P. (2007). *Written into the Void.* Yale University Press.

Lynn, G. (1999). *Animate Form.* Princeton Architectural press.

Lynn, G. (1993, 2004). *Folding in Architecture.* (G. Lynn, Ed.) Wiley Academy.

Lynn, G. (1998). *Folds, Bodies & Blobs.* La lettre voiee.

Tschumi, B. (1994). *Architecture and Disjunction.* MIT Press.

Ball, P. (1999). *The Self-Made Tapestry: Pattern formation in nature* . Oxford, New York, Tokyo: Oxford University Press.

Burry, J., & Burry, M. (2010). *The New Mathematics in Architecture.* New York: Thames and Hudson.

Farshid Moussavi, D. L. *The Function of Form.*

Leach, N. (Ed.). (2002). *Designing for a Digital World.* John Wiley & Sons.

Leach, N. (2014). *Parametrics Explained.* University of Southern California, Harvard GSD. Baltzer Science Publishers.

Leach, N. (1997). Rethinking Architecture: A Reader in Cultural Theory. London, NewYork: Routledge.

Neil Leach, D. T. (2004). *Digital Tectonics.* John Wiley & Sons.

Patrik Schumacher, Style: In Defence of Parametricism

Bernard Tschumi, Event Cities 1-5

Bernard Tschumi, Architecture and Disjunction.
Bernard Tschumi, Architecture: Concept & Notation

Baird, Eric. Alt. Fractals: A visual guide to fractal geometry and design.Chocolate Tree Books. Norman, D. (2013). The Design of Everyday Things: Revised and Expanded Edition. New York: Basic Book.

Techniques and technologies in morphogenetic design (Architectural Design). Hoboken, NJ: John Wiley & Sons, Inc.

From control to design: Parametric/algorithmic architecture. Barcelona, Spain: Actar. Meredith, M., Aranda, B., Lasch, C. &Sasaki, M. (Eds.). (2008).

Course Name: ADVANCED COMPUTATION SKILLS AND FABRICATION II				Course Code: PGACAD-25204
Credits: 04 Internal Sessional –50 Marks. | External Viva- Voce -100 | Theory Paper –NA				
L	T	P	C	
1	1	2	4	

COURSE DESCRIPTION

This course provides an in-depth introduction to Python, one of the most versatile and widely-used programming languages in the world, alongside an introduction to ArcGIS, a leading geographic information system (GIS) platform. Designed for beginners and intermediate learners, the course emphasizes Python's syntax, structure, and capabilities, while demonstrating its integration with ArcGIS for spatial data analysis and geoprocessing. Applications span across diverse fields such as web development, data analysis, artificial intelligence, automation, and geographic information science. Additionally, the curriculum emphasizes the interaction between Robotics and live data from sensory inputs such as sound, light, and motion, providing a rich context for understanding the relationship between human and machine behavior. It also focuses on Fabricating through robotic arms, offering hands-on experience in robotics and advanced automation

COURSE INTENT

This course aims to provide a solid foundation in Python programming, GIS applications, and Robotics. Students will learn to think programmatically, solve problems, and create efficient code. It covers both theoretical and practical aspects of Robotics, including prototyping, sensor and actuator selection, and GIS-based analysis. Through hands-on projects, the course promotes creativity and innovation, preparing students for advanced studies or careers in technology and geospatial fields while considering real-world implications.

COURSE OBJECTIVES

1. To understand the basic syntax and structure of Python programming.
2. To gain proficiency in writing, debugging, and executing Python programs.
3. To explore Python libraries and frameworks for real-world applications.
4. To develop problem-solving skills using Python for computational and geospatial tasks, leveraging the capabilities of ArcPy.

5. To introduce the principles of using digital and analog sensors and actuators in robotic design, fostering skills in electronic prototyping.

6. To optimize code for robotic systems, exploring the interplay between material properties, geometry, and assembly in robotic construction.

COURSE OUTCOMES		**POs**	**PSOs**
CO1	Write Python scripts for basic and intermediate programming tasks, including geoprocessing and spatial data manipulation using the ArcGIS platform	PO7	PSO4
CO2	Apply Python libraries such as NumPy, pandas, matplotlib, and ArcPy to solve problems in data analysis, visualization, and GIS-based workflows.	PO6	PSO4
CO3	Utilize ArcGIS tools independently to analyze, visualize, and manage spatial data for real-world applications.	PO10	PSO4
CO4	Create small-scale projects that demonstrate real-world applications, integrating Python programming and GIS for data-driven solutions or using GIS as a standalone platform.	PO10	PSO4
CO5	Design and program robotic prototypes by integrating digital and analog sensors, actuators, and effective code while adhering to established design rules and practices	PO11	PSO7
CO6	Integrate robotic fabrication techniques in architectural design and construction, leveraging automation to create precise, innovative, and efficient building components and structures.	PO11	PSO7
CO1	Write Python scripts for basic and intermediate programming tasks, including geoprocessing and spatial data manipulation using the ArcGIS platform	PO7	PSO7

COURSE CONTENT		HOURS	COs
UNIT - 1	Introduction to Python: Python installation and environment setup and Python syntax, variables, and data types Control Structures: Conditional statements (if, elif, else) and Looping constructs (for, while) Functions and Modules: Writing and using functions and importing and creating modules.	15	CO1
UNIT - 2	Data Structures: Lists, tuples, dictionaries, and sets and Comprehensions and data manipulation. File Handling Reading and writing files and Working with CSV and JSON data.	15	CO2
UNIT - 3	Understanding geographic information systems and spatial data. Data visualization and mapping, Geospatial analysis tools, Managing and editing spatial data. Working with raster and vector data, performing geoprocessing tasks such as buffering, overlay, and spatial joins, Creating thematic maps and visualizations. Introduction to cloud-based GIS solutions and creating interactive maps.	15	CO3
UNIT - 4	Automating GIS Workflows with Python: Using ArcPy for geoprocessing and spatial data manipulation. Customizing GIS Tools: Developing Python scripts to extend ArcGIS functionality. Spatial Data Analysis: Performing advanced GIS analysis using Python and ArcGIS	15	CO4
UNIT - 5	Learn principles of robotics prototyping, robotic fabrication techniques, and integration of digital and analog sensors and actuators, emphasizing material selection, geometry, structural integrity, and best practices for architectural and design application	15	CO5
UNIT - 6	Explore robotics, swarm intelligence, and robotic fabrication in design and architecture, focusing on coding fundamentals,	15	CO6

COURSE CONTENT		HOURS	COs
UNIT - 1	Introduction to Python: Python installation and environment setup and Python syntax, variables, and data types Control Structures: Conditional statements (if, elif, else) and Looping constructs (for, while) Functions and Modules: Writing and using functions and importing and creating modules.	15	CO1
UNIT - 2	Data Structures: Lists, tuples, dictionaries, and sets and Comprehensions and data manipulation. File Handling Reading and writing files and Working with CSV and JSON data.	15	CO2
	optimizing swarm behaviors, and programming individual and collective logic for robotic systems.		

RECOMMENDED READINGS

1. Think Python: How to Think Like a Computer Scientist by Allen B. Downey
2. Effective Python: 90 Specific Ways to Write Better Python by Brett Slatkin
3. Deep Learning,Adaptive Computational & Machine Learning by An MIT Press book Ian Goodfellow and Yoshua Bengio and Aaron Courville
4. Flexible Electronics from Materials to Devices by Guozhen Shen & Zhiyong Fan
5. Mastering ROS for Robotics Programming Second Edition by Lentin Joseph,Jonathan Cacace

Course Name: ELECTIVE II	Course Code: PGACAD-25206
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	P	C
0	2	0	2

COURSE DESCRIPTION

The purpose of the elective is to orient students to various disciplines within the domain of computation in architecture and design that they may take up as an expertise of their profession later in their career.

The course elaborates on a suggestive list of electives as given in **Appendix A.** The institute may offer an elective depending on the expertise that they have or the niche they wish to develop. The choice shall be given to the student to choose a subject of their choice. The course offered needs to be detailed by the individual faculty as per the standards.

Students should take up a wide array of elective. None should be repeated.

COURSE INTENT

To introduce the students to inter-disciplinary ideas, experimentations and investigations within the domain of computation in architecture and design that will help enhance their profession/ practice or research.

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Posters/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

To be elaborated by the faculty

Course Name: VALUE ADDED COURSE II				Course Code: PGACAD-25207
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA				
L	T	P	C	
0	2	0	2	

COURSE DESCRIPTION

The purpose of the Value-added course is to orient students to disciplines other than architecture where their skills and proficiency could be enhanced.

The course elaborates on a suggestive list of courses as given in **Appendix B.** The institute may offer a course depending on the expertise that they have or the niche they wish to develop. The same course shall be introduced to all students. The course offered needs to be detailed by the individual faculty as per the standards.

COURSE INTENT

To introduce the students to various disciplinary ideas, experimentations and investigations outside the domain of computation in architecture and design that will **nurture their multidisciplinary thinking**

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Poster/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

To be elaborated by the faculty

Course Name: ENTREPRENEURSHIP-II				Course Code: PGACAD-25208
Credits: 02 Internal Sessional –50 | External Viva- Voce -50 | Theory Paper –NA				
L	T	S/P	C	
2	0	0	2	

COURSE DESCRIPTION

This semester focuses on building strategic skills necessary for architectural entrepreneurship. Students learn to integrate design thinking, brand building, and sustainability within an entrepreneurial framework, positioning their practice in a competitive market.

COURSE INTENT

To develop skills in brand building, strategic planning, preparing students to market their architectural ventures effectively and create value-driven design solutions.

COURSE OBJECTIVES

1. Teach brand development, marketing, and digital presence for architectural practices.
2. Introduce strategic thinking for scaling and sustaining architectural businesses.
3. Explore the intersection of sustainability, social responsibility, and architectural entrepreneurship.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to produce the following...			
CO1	Create an architectural brand effectively.	PO10	PSO8
CO2	Apply strategic thinking	PO10	PSO8
CO3	Integrate sustainability and ethics into architectural practice.	PO10	PSO6

COURSE CONTENT		HOURS	COs
UNIT - 1	Design Thinking and Innovation in Architecture	9	CO1
UNIT - 2	Building a Brand (portfolio, digital presence)	9	CO1
UNIT - 3	Entrepreneurial Strategy and Risk Management	9	CO2
UNIT - 4	Sustainability and Social Responsibility in Architecture	9	CO3

SESSIONAL WORK	
1	Tests based on above units – 3 nos (best one)
2	Tutorials based on above units
3	Quiz or Seminar or Project

(as per Examination reforms of DYPU)

Recommended Readings

To be elaborated by the faculty

Master of Architecture

Advanced Computation in Architecture and Design

Detailed Syllabus

Second Year

Semester III

Course Name: DISSERTATION RESEARCH				Course Code: PGACAD-25301
Credits: 06 Internal Sessional –50 | External Viva- Voce -50 | Theory Paper –NA				
L	T	S	C	
0	1	5	6	

COURSE DESCRIPTION

Dissertation is a report of an extensive and rigorous research on a particular topic of interest. Graduates are encouraged to adopt a multi-disciplinary approach and explore how integrating computation can achieve better built environments and/ or for the betterment of living conditions. The findings of the dissertation shall aid in defining Design Dissertation. The student is free to place their research in the following categories i.e.

a,) Theoretical exploration

b.) Design Processes and Concepts

c.) Experimental

Any of the accepted approaches or strategies may be adopted under the guidance of a faculty mentor. Focused research shall help in bring out innovation. While the process is important, equally important is the final outcome. A detailed project report in the form of a black book is expected.

Students are encouraged to make use of Computer Labs, Digital fabrication labs including robotics and AR-VR labs for exploration, experimentation and/or testing. They are encouraged to explore advanced software, coding and scripting too.

COURSE INTENT

To enable students in conducting methodical research within the domain of Computational Architecture relevant to the local social, cultural and economic context. The course shall cater to the graduate's individual capacities and capabilities or intuitive bend of mind.

COURSE OBJECTIVES

1. To encourage graduates to explore and experiment on a topic of their interest.
2. To equip the graduates in carrying out in depth methodical research.
3. To encourage the students to come up with a small innovation in design solution/tool/concept/ method/ script/ code/ app that can be explored in Design Dissertation.
4. To equip the students in communicating the research in a correct technical manner.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to demonstrate the following			
CO1	Ability to situate research in the larger interest of society in the regional context	PO3	PSO3, PSO6, PSO8
CO2	Carry out in depth, scientific research for an identified topic within the domain of computation design.	PO4	PSO5, PSO6, P SO7,
CO3	Ability to create new knowledge for the identified problem	PO10	PSO3, PSO5, PSO8
CO4	ability to communicate research process and findings in a technical manner as per the established standards	PO3	PSO3

COURSE CONTENT		HOURS	COs
UNIT - 1	Refining the Research Proposal- a. Designing data collection formats- Questionnaire, Tables, Observation framework, Base maps etc.- Student and Topic specific. b. Designing Data analysis methods	6	CO1
UNIT - 2	Primary Data Collection	6	CO1
UNIT - 3	Data analysis. Conclusion	6	CO2
UNIT - 4	Final Report writing	6	CO2
UNIT - 5	Final presentation	6	CO2

SESSIONAL WORK	
1	Experimental/ Exploratory models or AR/VR environments/ Theoretical diagrams/

	frameworks or Tools/scripts/ coding or innovative fabrication method/ innovative use of material
2	A detailed report in the form of a Black Book
3	Design Dissertation Proposal

RECOMMENDED READINGS

Creswell, J. W. (2003) Research Design: Qualitative, quantitative and mixed methods approach, 2nd Ed., Thousand Oaks: Sage.

· De Vaus, D. A. (2003) *Surveys in Social Research,* Jaipur: Rawat Publications.

· Groat, L. & Wang, D. (2002) *Architectural Research Methods,* NY: John Wiley and Sons Inc.

· Kothari, C.R. (2005) *Research Methodology: Methods and Techniques,* New Delhi: Wishwa Prakashan.

· Sanoff, H. (1977) *Methods of Architectural Programming,* Dowden Hutchinson and Ross, Inc. Vol. 29, Community Development Series.

· Sanoff, H. (1991) *Visual research methods in design,* USA: Van Nostrand Reinhold.

· Michelson, William. (1982) *Behavioural Methods in Environmental Design*. Stroudsberg, Pennsylvania; Dowden, Hutchinson and Ross, Inc, 1982.

· Nachmias, C.F. & Nachmias, D. (1996) *Research Methods in Social Sciences*. Great Britan: St. Martin‟s Press Inc. Book

· Babbie, E. (1983) *The Practice of Social research.* Third edition. Belmont: Wadsworth Publishing Co. book

Course Name: ADVANCED COMPUTATION DESIGN STUDIO-III	Course Code: PGACAD-25302
Credits: 9 Internal Sessional –50 | External Viva- Voce -50 | Theory Paper –NA	

L	T	S/P	C
0	1	8	9

COURSE DESCRIPTION

This studio focuses towards the application of digital and scripting tools in resolving design issues at the urban scale. The students will explore the multi-layered and multi-dimensional challenges faced by cities and its residents by applying urban design parameters. The studio may collaborate with Urban Design studio and aim at giving computational solutions for resolving issues at urban scale. The studio shall be open to absorb new tools and theories in a constantly evolving digital landscape.

COURSE INTENT

The course intends to enable students at understanding the limits and possibilities of computation in designing interventions at an urban scale.

COURSE OBJECTIVES

1. To analyze a selected urban area using GIS
2. To enable students at identifying urban scale design challenges
3. To resolve urban scale design challenges through algorithms/ scripts/ plug-ins, e.g. swarm behavior, simulations and any other deemed suitable.
4. To introduce the students to the use of generative and algorithmic design for place-making and enhancing the social-ability of an urban environment.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to produce the following...			
CO1	Multiple explorations based on studying behavior, processes and systems in nature.	PO1, PO7,	PSO1

		PO12	
CO2	Design an algorithm and a script for a given context of time, place and people, Generate multiple Design solutions.	PO2, PO7, PO12	PSO2, PSO3
CO3	Design an architectural solution for the given context through generative design processes.	PO2, PO4, PO12	PSO3, PSO4

COURSE CONTENT		**HOURS**	**COs**
UNIT - 1	Analysis of a selected urban area based on Urban Design Parameters	40	CO1, CO2
UNIT - 2	Generative and algorithm driven design solution	60	CO2, CO3
UNIT - 3	Design Development	40	CO3, CO4
UNIT - 4	Final Design representation - Communication	20	CO4

SESSIONAL WORK	
1	Report of the analysis
2	Explorations of scripting tools and suggested solutions
3	Final Design Outcome

RECOMMENDED READINGS

Eissenam, P. (1999). *Diagram Diaries.* Thames and Hudson.

Eissenman, P. (2007). *Written into the Void.* Yale University Press.

Tschumi, B. (1994). *Architecture and Disjunction.* MIT Press.

Burry, J., & Burry, M. (2010). *The New Mathematics in Architecture.* New York: Thames and Hudson.

Leach, N. (Ed.). (2002). *Designing for a Digital World.* John Wiley & Sons.

Leach, N. (2014). *Parametrics Explained.* University of Southern California, Harvard GSD. Baltzer Science Publishers.

Neil Leach, Millennium Culture

Patrik Schumacher, Style: In Defence of Parametricism

Bernard Tschumi, *Event Cities 1-5*

Bernard Tschumi, Architecture and Disjunction.

Bernard Tschumi, Architecture: Concept & Notation

Hoboken, NJ: John Wiley & Sons, Inc. Techniques and technologies in morphogenetic design (Architectural Design).

Actar. Meredith, M., Aranda, B., Lasch, C. &Sasaki, M. (Eds.). (2008).From control to design: Parametric/algorithmic architecture. Barcelona, Spain: Mario Carpo, Beyond Digital: Design and Automation at the End of Modernity

Areti Markopoulou, IAAC Bits 10 – Learning Cities: Collective Intelligence in Urban Design

IAAC, Lucas Capelli, et al., elf-Sufficient City: Envisioning the Habitat of the Future (3rd Advanced Architecture Contest)

Mario Carpo, The Second Digital Turn: Design Beyond Intelligence

Mario Carpo, Beyond Digital: Design and Automation at the End of Modernity

Andrew Kudless, Drawing Codes : Experimental Protocols of Architecture

Branco Kolarevic, Architecture in Digital Age

Any other reading deemed suitable by the faculty team

Course Name: INDUSTRY LED PROJECT	Course Code: PGACAD-25303
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	P	C
0	0	2	2

COURSE DESCRIPTION

This course enables students to critically analyze and document the integration of computational tools and sustainable practices in architectural firms. Through an in-depth study of an architectural practice, students will explore how advanced computational tools and strategies are employed for design, production, and sustainability.

COURSE INTENT

The course aims to provide students with a comprehensive understanding of how architectural firms implement computational techniques and sustainable practices in real-world scenarios. The objective is to develop analytical, research, and reporting skills by studying the methods, projects, and philosophies of a selected firm.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to produce the following...			
CO1	Articulate how sustainable design approaches using computation in current design practices	PO5	PSO7, PSO8
CO2	Articulate social aspects resolved through the use of computation	PO7	PSO7
CO3	Demonstrate ability to work in multi-disciplinary environments.	PO7, PO8	PSO8

COURSE CONTENT		HOURS	COs
UNIT - 1	Awareness of current digital design practices and explore specialty of each practice	9	CO1, CO2
UNIT - 2	Group Discussion and Student presentation	27	CO1, CO2

SESSIONAL WORK	
1	Understand the role of computational tools in contemporary architectural practice.
2	Produce a detailed, well-researched project report on a selected architectural firm/ firms.

RECOMMENDED READINGS

As deemed suitable for the project student is working on

Course Name: ELECTIVE III	Course Code: PGACAD-25305
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	P	C
0	2	0	2

COURSE DESCRIPTION

The purpose of the elective is to orient students to various disciplines within the domain of computation in architecture and design that they may take up as an expertise of their profession later in their career.

The course elaborates on a suggestive list of electives as given in **Appendix A.** The institute may offer an elective depending on the expertise that they have or the niche they wish to develop. The choice shall be given to the student to choose a subject of their choice. The course offered needs to be detailed by the individual faculty as per the standards.

Students should take up a wide array of elective. None should be repeated.

COURSE INTENT

To introduce the students to inter-disciplinary ideas, experimentations and investigations within the domain of computation in architecture and design that will help enhance their profession/ practice.

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Posters/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

To be elaborated by the faculty

Course Name: VALUE ADDED COURSE III				Course Code: PGACAD-25306
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA				
L	T	P	C	
0	2	0	2	

COURSE DESCRIPTION

The purpose of the Value added course is to orient students to disciplines other than architecture where their skills and proficiency could be enhanced.

The course elaborates on a suggestive list of courses as given in **Appendix B.** The institute may offer a course depending on the expertise that they have or the niche they wish to develop. The same course shall be introduced to all students. The course offered needs to be detailed by the individual faculty as per the standards. **Following is a suggestive list**

COURSE INTENT

To introduce the students to various disciplinary ideas, experimentations and investigations outside the domain of computation in architecture and design that will **nurture their multidisciplinary thinking**

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Poster/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

To be elaborated by the faculty

Master of Architecture

Advanced Computation in Architecture and Design

Detailed Syllabus

Second Year

Semester IV

Course Name: DESIGN DISSERTATION				Course Code: PGACAD-25401
Credits: 14 Internal Sessional –50 | External Viva- Voce -50 | Theory Paper –NA				
L	T	S/P	C	
0	2	12	14	

COURSE DESCRIPTION

This studio focuses on the shift from hands-on exploration to digital exploration for form finding processes. It begins with exploratory nature moving on to designing a fully functional architectural project.

COURSE INTENT

The course intends to enable a student to conceptualize and develop an architectural design project within the domain of computation and generative design.

COURSE OBJECTIVES

1. To conceptualize an architectural project based on the dissertation carried out in the earlier semester.
2. To develop a project proposal, space and area program along with the qualitative requirement of the same.
3. To design the said project using computational tools/ fabrication methods and/ or analyze using the right computational tools.

COURSE OUTCOMES		POs	PSOs
By the end of the course, the students shall be able to demonstrate the following...			
CO1	Demonstrate a design solution that shows a coherent integration of algorithmic design thinking, generative design processes and advanced computation.	PO1, PO2, PO12	PSO1, PSO7
CO2	The skill of applying research that integrates two or more	PO6,	PSO4,

	disciplines while utilizing the knowledge of advanced computation in design.	PO7, PO8	PSO5, PSO6, PSO8
CO3	Develop a narrative for conveying the role of computation in offering contextual, socially responsible and sustainable design solutions	PO3, PO4, PO11	PSO3, PSO5
CO4	Develop a narrative for situating design in the forever expanding theoretical landscape in the realm of computation	PO7, PO8	PSO2, PSO7
CO5	Develop a prototype demonstrating the application of tool/ system or theory.	PO5	PSO3, PSO5
CO6	Communicate research and design process and final outcome in an engaging and effective manner using the right technological tools	PO4, PO12	PSO4

COURSE CONTENT		**HOURS**	**COs**
UNIT - 1	Context identification	14	CO1
UNIT - 2	Refining the problem statement	14	CO1, CO2
UNIT - 3	Tool or theory development	28	CO1, CO2
UNIT - 4	Design exploration	42	CO1, CO2
UNIT - 5	Prototype Workshop	28	CO5
UNIT - 6	Project development	42	CO1, CO2
UNIT - 7	Project detailing	28	CO1, CO2
UNIT - 8	Final Design representation and process documentation	56	CO3, CO4, CO6

SESSIONAL WORK	
1	A project report explaining the a. need of the project and conveying the role of computation for the same b. demonstrating the process of design exploration c. process of prototype development
2	Prototype of the design explorations, demonstrating the efficacy of the findings.
3	A comprehensive Architectural Design Portfolio, report and models sufficient to explain the learnings of the 4 semesters based on computational tools, theoretical perspective and/ or fabrication. The documentation of the process is equally important as the final outcome

RECOMMENDED READINGS

Eissenam, P. (1999). *Diagram Diaries.* Thames and Hudson.

Eissenman, P. (2007). *Written into the Void.* Yale University Press.

Lynn, G. (1999). *Animate Form.* Princeton Architectural press.

Lynn, G. (1993, 2004). *Folding in Architecture.* (G. Lynn, Ed.) Wiley Academy.

Lynn, G. (1998). *Folds, Bodies & Blobs.* La lettre voiee.

Tschumi, B. (1994). *Architecture and Disjunction.* MIT Press.

Ball, P. (1999). *The Self-Made Tapestry: Pattern formation in nature* . Oxford, New York, Tokyo: Oxford University Press.

Leach, N. (Ed.). (2002). *Designing for a Digital World.* John Wiley & Sons.

Leach, N. (2014). *Parametrics Explained.* University of Southern California, Harvard GSD. Baltzer Science Publishers.

Neil Leach, D. T. (2004). *Digital Tectonics.* John Wiley & Sons.

Bernard Tschumi, Event Cities 1-5

Bernard Tschumi, Architecture and Disjunction.
Bernard Tschumi, Architecture: Concept & Notation

Baird, Eric. Alt. Fractals: A visual guide to fractal geometry and design.Chocolate Tree Books. Norman, D. (2013). The Design of Everyday Things: Revised and Expanded Edition. New York: Basic Book.

Hoboken, NJ: John Wiley & Sons, Inc., Techniques and technologies in morphogenetic design (Architectural Design).

Actar. Meredith, M., Aranda, B., Lasch, C. &Sasaki, M. (Eds.). (2008), From control to design: Parametric/algorithmic architecture. Barcelona, Spain:

Mario Carpo, Beyond Digital: Design and Automation at the End of Modernity

Areti Markopoulou, IAAC Bits 10 – Learning Cities: Collective Intelligence in Urban Design

IAAC, Lucas Capelli, et al., elf-Sufficient City: Envisioning the Habitat of the Future (3rd Advanced Architecture Contest)

Mario Carpo, The Second Digital Turn: Design Beyond Intelligence

Andrew Kudless, Drawing Codes : Experimental Protocols of Architecture

Branco Kolarevic, Architecture in Digital Age

Any other reading deemed suitable by faculty and students

Course Name: ELECTIVE IV	Course Code: PGACAD-25402
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	P	C
0	2	0	2

COURSE DESCRIPTION

The purpose of the elective is to orient students to various disciplines within the domain of computation in architecture and design that they may take up as an expertise of their profession later in their career.

The course elaborates on a suggestive list of electives as given in **Appendix A.** The institute may offer an elective depending on the expertise that they have or the niche they wish to develop. The choice shall be given to the student to choose a subject of their choice. The course offered needs to be detailed by the individual faculty as per the standards.

Students should take up a wide array of elective. None should be repeated.

COURSE INTENT

To introduce the students to inter-disciplinary ideas, experimentations and investigations within the domain of computation in architecture and design that will help enhance their profession/ practice or research.

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Posters/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

To be elaborated by the faculty

Course Name: ELECTIVE V	Course Code: PGACAD-25403
Credits: 02 Internal Sessional –30 | External Viva- Voce -30 | Theory Paper –NA	

L	T	P	C
0	2	0	2

COURSE DESCRIPTION

The purpose of the elective is to orient students to various disciplines within the domain of computation in architecture and design that they may take up as an expertise of their profession later in their career.

The course elaborates on a suggestive list of electives as given in **Appendix A.** The institute may offer an elective depending on the expertise that they have or the niche they wish to develop. The choice shall be given to the student to choose a subject of their choice. The course offered needs to be detailed by the individual faculty as per the standards.

Students should take up a wide array of elective. None should be repeated.

COURSE INTENT

To introduce the students to inter-disciplinary ideas, experimentations and investigations within the domain of computation in architecture and design that will help enhance their profession/ practice or research.

SESSIONAL WORK	
1	The faculty may choose a medium most suitable to the course offered. It must offer sufficient flexibility to the student to represent their understanding. Faculty may choose any one or combination of below mentioned nature of assignments and are open to newer ways of representation. ● Portfolio/ Posters/ Journal ● Model- Explorations and Process ● Video/ Film ● Essay/ Narrative
2	The outcome may be group or individual depending on the need of the course and student dynamics.

RECOMMENDED READINGS

To be elaborated by the faculty

APPENDIX A

LIST OF ELECTIVES

The following is a pool of streams for electives that can be offered to students. This list ensures that students have a multiple array of courses that ensure focussed learning on a particular domain within the larger paradigm of use of computation in architecture. The student may follow one stream while selecting the elective in order to develop an expertise or choose from different streams; however, the school shall ensure that no elective is repeated during the course of the programme by the individual student. The elective may be conducted as a vertical course catering to students of both years.

The list below is in no manner exhaustive. The school may introduce more electives and streams as deemed suitable in further years.

Codes for Stream A	Stream A: BIM	Codes for Stream B	Stream A: Skilling and Design Tools	Codes for Stream C	Stream C: Interdisciplinary Applications
A1	BIM -I	B1	Digital Crafting Tools- Maya	C1	AI and Machine Learning in Architecture
A2	BIM-II	B2	Digital Crafting Tools- ZBrush	C2	GIS and Spatial Data Analysis for Design
A3	BIM-III	B3	Digital Crafting Tools- Blender	C3	Mechanics and Electronics for Responsive Architecture- Arduino
A4	BIM-IV	B4	Digital Crafting Tools- Houdini	C4	Robotics
A5		B5	Game Engines- Unity/ Unreal Engine	C5	IOT and Machine Learning
		B6	C#		

APPENDIX B

LIST OF VALUE-ADDED COURSES

The purpose of the Value-added course is to orient students to disciplines other than architecture where their skills and proficiency could be enhanced.

The course elaborates on a suggestive list of courses as given in Appendix B. The institute may offer a course depending on the expertise that they have or the niche they wish to develop. The same course shall be introduced to all students. The course offered needs to be detailed by the individual faculty as per the standards.

	Phenomenology		Coding and App development
	Aesthetics		Robotics
	Traditional Indian Knowledge Systems		UI UX
	Cultural Landscapes		Game Design
	AR/ VR		Traditional Arts and Crafts-
	Genetics, Bio-engineering		Textile and Fabric
	Design for Space/ Space Architecture		Origami and Weaving
	GIS as an allied field		Design for Space/ Space Architecture