ANNA UNIVERSITY, CHENNAI
NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY
M. ARCH. (DIGITAL ARCHITECTURE) FULL-TIME PROGRAMME
REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULA AND I SEMESTER SYLLABUS

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	DG4101	Computational Design and Architecture I	PCC	3	0	0	3	3
2.	DG4102	Digital Fabrication	PCC	3	0	0	3	3
3.	DG4103	Modular Architecture	PCC	3	0	0	3	3
4.	MH4151	Society, Culture, Media and Technology	PCC	3	0	0	3	3
5.		Audit Course I*	AC	2	0	0	2	0
THEORY CUM STUDIO								
6.	DG4121	Advanced Manufacturing and 3D Printing	PAEC	1	0	3	4	4
STUDIO								
7.	DG4111	Digital Studio I : Process Based Design	PCC	0	0	10	10	10
			TOTAL	**15**	**0**	**13**	**28**	**26**

* Audit Course is optional

SEMESTER II
(Prerequisite- Pass in Digital Studio I : Process based design)

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	RM4251	Research Methodologies for Built Environment	RMC	3	0	0	3	3
2.	DG4201	Computational Design and Architecture II	PCC	3	0	0	3	3
3.	DG4202	Metatexts in Architecture	PCC	3	0	0	3	3
4.		Audit Course II*	AC	2	0	0	2	0
THEORY CUM STUDIO								
5.	MH4221	Geographical Information Systems for Built Environment	PAEC	1	0	3	4	4
STUDIO								
6.	DG4211	Digital Studio II : Parametric Architectural Design	PCC	0	0	10	10	10
			TOTAL	**12**	**0**	**13**	**25**	**23**
PROFESSIONAL ELECTIVE								
7.		Professional Elective I	PEC	X	X	X	3	3
			TOTAL				**28**	**26**

* Audit Course is optional

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SEMESTER III
(Prerequisite- Pass in Digital Studio II : Parametric Architectural Design)

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	DG4301	Digital IoT apps	PCC	3	0	0	3	3
2.	DG4302	Sustainable Architecture and Environmental Modelling	PCC	3	0	0	3	3
STUDIO								
3.	DG4311	Dissertation	PCC	0	0	4	4	4
4.	DG4312	Digital Studio III : Urban Computational Design	PCC	0	0	10	10	10
			TOTAL	6	0	14	20	20
PROFESSIONAL ELECTIVE								
5.		Professional Elective II	PEC	X	X	X	3	3
6.		Professional Elective III	PEC	X	X	X	3	3
INTERNSHIP TRAINING								
7.	DG4313	Internship Training	PAEC	X	X	X	X	2
							TOTAL	28

SEMESTER IV
(Prerequisite- Pass in Digital Studio III : Urban Computational Design)

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
STUDIO								
1.	DG4411	Thesis Project	PCC	0	0	20	20	20
			TOTAL	0	0	20	20	20
PROFESSIONAL ELECTIVE								
2.		Professional Elective IV	PEC	X	X	X	3	3
						TOTAL	23	23

Total No. of Credits: 103

PROFESSIONAL CORE COURSES (PCC)

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	DG4101	Computational Design and Architecture I	PCC	3	0	0	3	3
2.	DG4102	Digital Fabrication	PCC	3	0	0	3	3
3.	DG4103	Modular Architecture	PCC	3	0	0	3	3
4.	MH4151	Society, Culture, Media and Technology	PCC	3	0	0	3	3
5.	DG4111	Digital Studio I : Process Based Design	PCC	0	0	10	10	10
6.	RM4251	Research Methodologies for Built Environment	RMC	3	0	0	3	3

2

7.	DG4201	Computational Design and Architecture II	PCC	3	0	0	3	3
8.	DG4202	Metatexts in Architecture	PCC	3	3	0	0	3
9.	DG4211	Digital Studio II : Parametric Architectural Design	PCC	0	0	10	10	10
10.	DG4301	Digital IoT apps	PCC	3	0	0	3	3
11.	DG4302	Sustainable Architecture and Environmental Modelling	PCC	3	0	0	3	3
12.	DG4311	Dissertation	PCC	0	0	4	4	4
13.	DG4312	Digital Studio III : Urban Computational Design	PCC	0	0	10	10	10
14.	DG4411	Thesis Project	PCC	0	0	20	20	20

PROFESSIONALELECTIVE COURSES(PEC)

SEMESTER II, ELECTIVE I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	UR4071	Culture of Public Spaces	PEC	3	0	0	3	3
2.	DG4001	Advanced Graphics and Interface Architecture	PEC	3	0	0	3	3
3.	DG4002	Digital Media	PEC	3	0	0	3	3
4.	MH4073	Soft Skills	PEC	2	0	1	3	3

SEMESTER III, ELECTIVE II & III

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	UR4191	Social Theory and the City	PEC	3	0	0	3	3
2.	UR4072	Quantitative Techniques and Data Representation	PEC	3	0	0	3	3
3.	DG4003	User Interface and User Experience Design (UI / UX)	PEC	3	0	0	3	3
4.	DG4004	Advanced BIM and Building Services	PEC	3	0	0	3	3
5.	DG4005	Materials and Tectonics in DA	PEC	3	0	0	3	3
6.	DG4006	Advanced Coding for Urban Design	PEC	1	2	0	3	3
7.	MH4074	Psychology of Learning and Development	PEC	3	0	0	3	3

SEMESTER IV, ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	DG4007	Ecology and Digital Architecture	PEC	2	1	0	3	3
2.	DG4008	Bio – Mimetic Architecture	PEC	3	0	0	3	3
3.	DG4009	Advanced Structures and Modular systems	PEC	3	0	0	3	3
4.	MH4075	Theory of Architectural Education	PEC	3	0	0	3	3

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PROFESSIONAL ABILITY ENHANCEMENT COURES (PAEC)

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	DG4121	Advance Manufacturing and 3D Printing	PAEC	1	0	3	4	4
2.	MH4221	Geographical Information Systems for Built Environment	PAEC	1	0	3	4	4
3.	DG4313	Internship Training	PAEC	X	X	X	X	2

AUDIT COURSES (AC)
Registration for any of these courses is optional to students

SL. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lecture	Tutorial	Practical		
1.	AX4091	English for Research Paper Writing	2	0	0	0	1/2
2.	AX4092	Disaster Management	2	0	0	0	
3.	AX4093	Constitution of India	2	0	0	0	
4.	AX4094	நற்றமிழ் இலக்கியம்	2	0	0	0	

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DG4101   **COMPUTATIONAL DESIGN AND ARCHITECTURE I**   **L T P/S C**
                                                                     3 0   0   3

OBJECTIVES

- To provide understanding of the role of technology and digital media in contemporary architecture.
- To give knowledge about parametric design and generative / algorithmic design and the differences between them through case studies.

UNIT I   INTRODUCTION   9

Investigation of contemporary theories of media and their influence on the perception of space and architecture. Technology and Art, Technology and Architecture, Technology as Rhetoric, Digital Technology and Architecture. Aspects of Digital Architecture – Design and Computation, Difference between Digital Process and Non-Digital Process, Architecture and Cyber Space, Qualities of the new space, Issues of Aesthetics and Authorship of Design, Increased Automation and its influence on Architectural Form and Space.

UNIT II   PARAMETRIC DESIGN   9

Diagrams, Diagrammatic Reasoning, Diagrams and Design Process, Animation and Design, Digital Hybrid Design Protocol, Concept of Emergence – Problematization, variable, constraints application.

UNIT III   GENERATIVE AND ALGORITHMIC DESIGN   9

Delineating design parameter- deconstructing work flows. Fractal Geometry and their properties - Architectural applications, Works of Zvi Hecker. Shape Grammar - Shapes, rules and Label. Shape Grammar as analytical and synthetic tools, Combining Shape grammar and Genetic algorithm to optimize architectural solutions. Hyper Surface – Introduction to Hyper surface and concepts of Liquid architecture, Cellular Automata and Architectural applications. Genetic algorithms and Design Computation

UNIT IV   DIGITAL MEDIA   9

Interactivity and connectivity to virtual data and digital information. Augmented reality - virtual to production. Digital fabrication, virtual collaboration.

UNIT V   CASE STUDIES   9

Case studies- Study, understanding and analysis of known examples at the national and international levels which demonstrates the contemporary theories of media and their influence on the perception of space & architecture, contemporary design processes and its relation to computation.

                                                                TOTAL: 45 PERIODS

OUTCOMES

- An understanding of the effects of contemporary theories of media on contemporary architectural design.
- An understanding of various contemporary design processes and their relation to computation

REFERENCES

1. Marcos Novak, invisible Architecture: An Installation for Greek Pavilion, Venice Biennale, 2000
2. Contemporary Techniques in Architecture, Halsted Press, 2002
3. Ali Rahim, Contemporary Process in Architecture, John Wiley & Sons, 2000
4. A. Menges, S. Ahlquist (Eds.), AD Reader: Computational Design Thinking, John Wiley & Sons Ltd, (2011)
5. W. Jabi, Parametric Design for Architecture Laurence King Publishing Ltd, London, UK (2013)
6. M. Bernal, J.R. Haymaker, C. Eastman, on the role of computational support for designers in action Des. Stud., 41 (2015)

7. B. Kolarevic (Ed.), Architecture in the Digital Age: Design and Manufacturing, Taylor & Francis, New York (2003)
8. Work of Architecture in the Age of Mechanical Reproduction, Differences MIT press, 1997
9. William J Mitchell, the Logic of Architecture: Design, Computation & Cognition. MIT Press, 1995
10. C. Barrios, Transformations on parametric design models: a case study on the Sagrada Familia columns instances of a parametric model Proceedings of the 11th International Conference on Computer Aided Architectural Design Futures (2005)

DG4102	DIGITAL FABRICATION	L	T	P/S	C
		3	0	0	3

OBJECTIVES
- To give exposure to various digital production tools to build artefacts as part of creative design process.
- To give knowledge about utilizing prototyping and modelling as a design medium that supports the full spectrum of digital design as a paperless process.
- To give knowledge about fabrication process in Digital Architecture as a way to bring software models into reality.

UNIT I   MATERIALS AND PROPERTIES   9
Plastics & Composites- Polymers, Thermoplastics, Honeycomb materials.
Wood and Fibrous Materials - Case Studies and Application, Laminated wood products, Veneers, Steam bent members.
Metals and Ceramics - Case Studies and Applications - Steel, Aluminium, Alloys - Ceramic Hybrids - Production and Fabrication Standards.

UNIT II   ADDITIVE FABRICATION PROCESSES   9
Additive Fabrication Processes Case Studies - Fused Deposition Processes - Injection Molding, Roto-Molding- Casting Technologies - 3D Printing (SLA, SLS, FDM)

UNIT III   SUBTRACTIVE FABRICATION PROCESSES   9
Subtractive Fabrication Processes Case Studies - Laser Cutting [vaporization cutting and industrial manufacturing] - Water Jet Processes - CNC 3, 5, & 7 Axis Milling, Cutting, Planing, Drilling.

UNIT IV   TRANSFORMATIVE FABRICATION & MASS PRODUCTION MANUFACTURING PROCESSES   9
Transformative Fabrication Processes Case Studies- Methods of Factory-Based production

UNIT V   EXPERIMENTAL FABRICATION PROCESSES   9
Experimental Fabrication Processes Case Studies - Biological Growth Formation - Crystal Structure Formation - Explosion Forming - Muscle Wire and Self-Assembling Structures

TOTAL: 45 PERIODS

OUTCOMES
- Awareness to the machines, different methods of fabrication and the workability with materials.
- Ability to correlate between the design processes and Digital Prototype or Model attribute.

REFERENCES

1. BrankoKolarevic and Kevin Klinger, Manufacturing Material Effects: Rethinking Design and Making in Architecture, 2014
2. Digital Fabrication, Paul Andersen, David Salomon, Sanford Kwinter, David Carson, Architecture of Patterns, W. W. Norton & Co, 2010
3. Heino Engel, Structure Systems, 1997
4. Lisa Iwamoto, Digital Fabrications: Architectural and Material Techniques, Princeton: Princeton Architectural Press, 2009
5. BrankoKolarevic, Architecture in the Digital Age: Design and Manufacturing, London: Taylor & Francis, 2005
6. Bob Shiel, Ruairi Glynn, Fabricate: Making Digital Architecture, Toronto: Riverside Architectural Press, 2011
7. Emergent Design Group, Morphogenetic Design Strategies AD, 2004
8. FarshidMoussavi, Daniel Lopez, Garrick Ambrose, Ben Fortunato, Ryan R. Ludwig and AhmadrezaSchricker, The Function of Form
9. Rivka Oxman and Robert Oxman, The New Structuralism: Design, Engineering and Architectural Technologies
10. Michael Weinstock, Michael Hensel, Achim Menges (eds.), Emergence: Morphogenetic Design Strategies, AD, Vol 74, No. 3, May/June 2004

MH4151	SOCIETY, CULTURE, MEDIA AND TECHNOLOGY	L	T	P/S	C
		3	0	0	3

OBJECTIVES

- To introduce the interdisciplinary field of research, science, technology and society studies.
- To create awareness of the interface between science, technology and society from a theoretical perspective.

UNIT I   SOCIOLOGY OF SCIENTIFIC KNOWLEDGE   9

Relationship between science and the social, Conventional view of philosophers and historians of science, Sociology of Science (Karl Manheim-Robert K. Merton), Social Function of Science (Joseph Bernal).The Radical Science Movement- the Kuhnian intervention.Science as a social activity: Strong Program, Laboratory Studies/ethnography of science, Actor Network Theory (Bruno Latour).Communicating science to peers, scientific controversies, public engagement with Science &Technology -the changing configuration of science, mode II knowledge production.

UNIT II   TECHNOLOGY – SOCIETY INTERFACE I   9

Techno science and the Interpenetration of Science & Technology

Questioning of the traditional boundary between science (knowing) and technology (doing). How science and technology together shape the ways in which knowledge is constructed. Technological Determinism, Power and the Politics of Knowledge Production.

UNIT III   TECHNOLOGY – SOCIETY INTERFACE II   9

Technology in Context: Perspectives in Science, Technology and Society (STS) Studies.

Various perspectives on Technology in Science, Technology and Society (STS) studies; Social Shaping of Technology - Social Construction of Technology, Actor Network Theory, Transition in Socio-Technical Systems. Multi-Level Perspective, Critical Theory of Technology. Contributions of Trench, Lewenstein, Jasanoff & Vishvanathan--governance and ethical issues in the context of emerging technologies. Influence of local contexts —democratisation and 'up-stream' public engagement with technology.

7

UNIT IV NEW MEDIA 9
The new communication paradigm brought about by digital technologies. Digitality (Digital versus Analogue Media) – Interactivity, Extractive versus immersive navigation, Registrational Interactivity and Interactive communication – Hypertextuality - Networked Media -Virtuality

UNIT V VISUAL CULTURE 9
Introduction and definitions of Visual Culture- Visual Culture Studies - New ways of seeing – Decoding Images – Visual Cultural Perspectives – High and low culture – Images and Power – Images and Ideology – Picture Theory – Representation – Image and Meaning – The myth of the Image – Medium is the Message

TOTAL: 45 PERIODS

OUTCOMES
* Understanding of trends that problematised production of scientific knowledge and the sociology of scientific knowledge
* Familiarity with the technology-society interface from a wide range of theoretical standpoints such as social shaping of technology, social constructionist and actor network theoretical perspectives.
* Understanding of science and technology as socially and culturally embedded activities.

REFERENCES
1. Collins, Harry and Pinch, Trevor 1993. The Golem: What Everyone should Know about Science. Cambridge: Cambridge University Press.
2. Hess, David J. 1995. Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artefacts. New York: Columbia Press.
3. Hess, David J. 1997. Science Studies: An Advanced Introduction. New York: NewYork University Press.
4. Jasanoff, Sheila et al. (eds.). 1995. Handbook of Science and Technology Studies. Thousand Oaks, CA: Sage Publications.
5. MacKenzie, Donald and Judy Wajcman 1999 (eds.). The Social Shaping of Technology, 2nd edition, Open University Press.
6. Sismondo, Sergio 2010. An Introduction to Science and Technology Studies (2nd edition). Chichester: Wiley-Blackwell.
7. Mirzoeff, Nicholas, An Introduction to Visual Culture, Routledge
8. Bijker, Wiebe E. et al. 1989. The Social Construction of Technological Systems. Cambridge, MA: MIT Press.
9. Bloor, David 1976. Knowledge and Social Imagery, second edition, London: Routledge and Kegan Paul.
10. Mccluhan, Marshall, The Medium is the Message, From Understanding Media: The Extensions of Man.

DG4103	MODULAR ARCHITECTURE	L	T	P/S	C
		3	0	0	3

OBJECTIVES
* To introduce the idea of mass production and advance building technologies in architecture
* To introduce advanced materials and pre-fabricated modules.

UNIT I INTRODUCTION 9
Introduction to prefabrication, manufacturing, modular, flat pack modular, volumetric modular - Modular co-ordination, standardization and tolerances - Moulds –construction design, maintenance techniques. Utopian concepts, principles and ideology on modular construction like pug in cities etc., - Philosophies of fuller, Corbusier, Eames, Scott Brown, Timberlake etc.,

UNIT II TECHNIQUES AND INDUSTRIAL STRUCTURES 9

Modular casting techniques - Planning, analysis and design considerations - Handling techniques - Transportation Storage and erection of structures.Tectonic strategies- structural core systems – Delivery strategies - Joints -Curing techniques - skeletal and large panel constructions.

UNIT III DESIGN PRINCIPLES AND APPLICATION 9

Disuniting of structures - design of cross section-based efficiency of material – problems in design because of joint flexibility – allowance for joint deformation – joints for different structural connections – modular technology for low cost and mass housing schemes. Small products like door frames, shutters in housing - Water tank service core unit. Quality control - Repairs and economical aspects on prefabrication.

UNIT IV DIGITAL FABRICATION 9

Study of various industrial mass production systems - CNC cutting and milling (for mass customization)- Laser Cutting -3D Printing (SLS & FDM) & 3D Scanning **-** 3Axis CNC cutting & milling on non-planar surfaces. Digital & analogue experiment on various materials and their challenges.

UNIT V BEST PRACTICES 9

Understanding and exploring the various successful project at national and international level on the aspects of Material, Mass Production, Finance / project costing, climate response and energy efficiency.

TOTAL: 45 PERIODS

OUTCOMES
- Knowledge about modular construction techniques in architecture.
- Knowledge of various structural and design principle thorough various case studies.

REFERENCES
1. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.
2. Hand Book on Construction Safety Practices, SP 70, BIS 2001.
3. John Fernandez, Material Architecture, Architectural Press, UK.
4. Peurifoy, R.L., Ledbette. W.B., Construction Planning, Equipment and Methods, McGraw Hill Co., 2000.
5. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997
6. Peters, S.(2010) Material Revolution : Sustainable And Multi-Purpose Materials For Design And Architecture. Birkhäuser Architecture
7. Borden, G P. Matter: Material Processes In Architectural Production. Routledge
8. Lindsey, B. (2001) Digital Gehry: Material Resistance Digital Construction. Birkhäuser Basel

DG4121	ADVANCED MANUFACTURING AND 3D PRINTING	L	T	P/S	C
		1	0	3	4

OBJECTIVES
- To impart design thinking, knowledge and skills related to advanced manufacturing (additive manufacturing and 3D printing technologies).
- To provide familiarity with tools, material and equipment related to additive manufacturing and 3D printing.

UNIT I INTRODUCTION 10

Introduction to Advanced manufacturing types and processes. Emergence of 3D printing and AM, additive manufacturing. Differences between AM, additive manufacturing design process vs. conventional DTM, design theory and methodology, with respect life-cycle objectives. Additive manufacturing applications for rapid prototyping to the end-of-use product manufacturing process. Additive Manufacturing Application Domains: Aerospace, Electronics, Health Care, Defense, Automotive, Construction, Food Processing,

UNIT II ADDITIVE MANUFACTURING AND 3D PRINTING ENABLED DESIGN PROCESS 10

Design thinking and advanced manufacturing. Parametric design and additive manufacturing.Rapid prototyping, rapid tooling and Rapid manufacturing. Design and shape complexity, material complexity, hierarchical complexity, and functional complexity in additive manufacturing. Function integration and structure optimization in additive manufacturing. Impact of AM on conventional DTM and manufacturing, in terms of design for manufacturing (DFM), design for assembly (DFA) and Design for Performance (DFP).Story boarding additive manufacturing process.

UNIT III ADDITIVE MANUFACTURING TECHNIQUES, MATERIALS AND EQUIPMENT 10

Stereo- Lithography, LOM, FDM, SLS, SLM, Binder Jet technology. Process, Process parameter, Process Selection for various applications.Machine Tools.Materials- Polymers, Metals, Non-Metals, Ceramics.Various forms of raw material- Liquid, Solid, Wire, Powder; Powder Preparation and their desired properties, Polymers and their properties.Materials and Equipment.

UNIT IV ADDITIVE MANUFACTURING CODING, TOOLS AND PARAMETRIC DESIGN 15

CAD Data formats, Data translation, Data loss, STL format. C and tools for additive manufacturing. Coding, visual scripting and software tools for parametric design and additive manufacturing

UNIT V ADDITIVE MANUFACTURING PROJECT 15

Design methodologies, parametric processes and tools of additive manufacturing will be deployed in a parametric design and additive manufacturing project.

TOTAL: 60 PERIODS

OUTCOMES

* An understanding of additive manufacturing design process and wide scope of application.
* Knowledge on appropriate tools, materials and equipment for additive manufacturing and 3D printing process
* Knowledge of design process and skill sets for parametric design and additive manufacturing.
* Ability to process 3D models using tools and coding to the required formats in order to transfer them for production

REFERENCES

1. Lan Gibson, David W. Rosen and Brent Stucker, "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.
2. Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Hanser Publisher, 2011.
3. CK Chua, Kah Fai Leong, "3D Printing & Rapid Prototyping- Principles & Applications", WS, 2017.
4. Digital processes, planning, design and production - Haus Child and Kareem, Birkhauser, 2011
5. J.D. Majumdar and I. Manna, "Laser-Assisted Fabrication of Materials", Springer Series in Material Science, 2013.
6. L. Lu, J. Fuh and Y.S. Wong, "Laser-Induced Materials and Processes for Rapid Prototyping", Kulwer Academic Press, 2001.

7. Zhiqiang Fan And Frank Liou, "Numerical Modelling of the Additive Manufacturing (AM) Processes of Titanium Alloy", InTech, 2012.
8. Daniel G. Parolek, Karen Parolek, Paucl C. Cram, Form Based Codes, John Wiley 2000

DG4111	DIGITAL STUDIO I : PROCESS BASED DESIGN	L	T	P/S	C
		0	0	10	10

OBJECTIVES

- To give understanding of importance of diagramming and translating the ideas into geometry.
- To give exposure to the various processes of user centric designs and computer exploration of form finding for smaller scale spaces or products.
- To give understanding of principles behind product design, explore tools and techniques for prototyping.
- To give exposure to the various methods of manual or 3D printed prototyping

CONTENT

This course will emphasise on designing and prototyping a product or small scale space. The design process involves identifying the user needs, analyzing the product attributes such as function, emotions, Diachronic, Synchronic, parallel situations, future situations etc.

Analyze selective products to understand its geometry, mathematical principles, materials and technique behind manufacturing the product, ergonomics user analysis, techniques behind its prototyping and also analyze its packing and display designs. After the user centric analysis the concept of translating ideas into geometry and form generation or form finding can be made with the help of Computer Explorations of Fractals, Chaos, Complex Systems, Shape grammar, generative iterations and exploring the 3D lattice and structures.

The design detailing can be based on modularity and modular systems for mass production, study on various materials for prototyping and algorithm of packing design and display system of the designed product. The design output can be any product not limited to furniture /kiosk / bus-stop or bus shelter / street furniture/ packaging design/ book shelf/ workstations/speaker design/mouse/ other small products. The final design output should be explored with different types of prototype fabrications. The prototype fabrications can be either of manual or 3d printing.

OUTCOMES

- Understanding of the concepts and basics of mathematics (Geometry) behind computational design.
- Basic knowledge of 3D Modelling and prototyping techniques.

TOTAL: 150 PERIODS

REFERENCES
1. Coelho, Denis, ed. Industrial Design: New Frontiers. BoD–Books on Demand, 2011.
2. Ulrich, Karl T. Product design and development.Tata McGraw-Hill Education, 2003.
3. Gary William Flake: The Computational Beauty of Nature: Computer Explorations of Fractals, Chaos, Complex Systems, and Adaptation.MIT Press 1998.
4. Falconer, Kenneth (2003). Fractal Geometry: Mathematical Foundations and Applications. .
5. John Maeda: Design by Numbers, MIT Press 2001.
6. Hekkert, P.; Schifferstein, H. (2008). Product experience. Amsterdam: Elsevier Science Limited.
7. Baird, Eric. Alt. Fractals: A visual guide to fractal geometry and design.Chocolate Tree Books.
8. Norman, D. (2013). The Design of Everyday Things: Revised and Expanded Edition. New York: Basic Book.

AX4091	ENGLISH FOR RESEARCH PAPER WRITING	L T P C
		2 0 0 0

OBJECTIVES

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT I   INTRODUCTION TO RESEARCH PAPER WRITING   6

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II   PRESENTATION SKILLS   6

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III   TITLE WRITING SKILLS   6

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV   RESULT WRITING SKILLS   6

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V   VERIFICATION SKILLS   6

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission

TOTAL: 30 PERIODS

OUTCOMES

CO1 – Understand that how to improve your writing skills and level of readability
CO2 – Learn about what to write in each section
CO3 – Understand the skills needed when writing a Title
CO4 – Understand the skills needed when writing the Conclusion
CO5 – Ensure the good quality of paper at very first-time submission

REFERENCES

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

AX4092   **DISASTER MANAGEMENT**   **L T P C**
                                                                                            2 0 0 0

OBJECTIVES
- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT I   INTRODUCTION   6
Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II   REPERCUSSIONS OF DISASTERS AND HAZARDS   6
Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III   DISASTER PRONE AREAS IN INDIA   6
Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

UNIT IV   DISASTER PREPAREDNESS AND MANAGEMENT   6
Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V   RISK ASSESSMENT   6
Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

                                                                                TOTAL : 30 PERIODS
OUTCOMES
  CO1: Ability to summarize basics of disaster
  CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
  CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
  CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
  CO5: Ability to develop the strengths and weaknesses of disaster management approaches

REFERENCES
1. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2. NishithaRai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'NewRoyal book Company,2007.
3. Sahni, PardeepEt.Al. ," Disaster Mitigation Experiences And Reflections", Prentice Hall OfIndia, New Delhi,2001.

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AX4093   **CONSTITUTION OF INDIA**   **L T P C**
                                                                          2 0 0 0

OBJECTIVES

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
- Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917and its impact on the initial drafting of the Indian Constitution.

UNIT I   HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History, Drafting Committee, (Composition & Working)

UNIT II   PHILOSOPHY OF THE INDIAN CONSTITUTION

Preamble, Salient Features

UNIT III   CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT IV   ORGANS OF GOVERNANCE

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT V   LOCAL ADMINISTRATION

District's Administration head: Role and Importance, ⬜Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI   ELECTION COMMISSION

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

                                                                          TOTAL: 30 PERIODS

OUTCOMES

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

SUGGESTED READING

1. The Constitution of India,1950(Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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AX4094	நற்றமிழ் இலக்கியம்	L T P C
		2 0 0 0

UNIT I   சங்க இலக்கியம்   **6**

1. தமிழின் துவக்க நூல் தொல்காப்பியம்

    – எழுத்து, சொல், பொருள்

2. அகநானூறு (82)

    - இயற்கை இன்னிசை அரங்கம்

3. குறிஞ்சிப் பாட்டின் மலர்க்காட்சி

4. புறநானூறு (95,195)

    - போரை நிறுத்திய ஒளவையார்

UNIT II   அறநெறித் தமிழ்   **6**

1. அறநெறி வகுத்த திருவள்ளுவர்

    - அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புறவு அறிதல், ஈகை,
    புகழ்

2. பிற அறநூல்கள் - இலக்கிய மருந்து

     – ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை (தூய்மையை
     வலியுறுத்தும் நூல்)

UNIT III   இரட்டைக் காப்பியங்கள்   **6**

1. கண்ணகியின் புரட்சி

    - சிலப்பதிகார வழக்குரை காதை

      சமூகசேவை இலக்கியம் மணிமேகலை

    - சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை

UNIT IV   அருள்நெறித் தமிழ்   **6**

1. சிறுபாணாற்றுப்படை

    - பாரி முல்லைக்குத் தேர் கொடுத்தது, பேகன் மயிலுக்குப் போர்வை
    கொடுத்தது, அதியமான் ஒளவைக்கு நெல்லிக்கனி கொடுத்தது,
    அரசர் பண்புகள்

2. நற்றிணை

    - அன்னைக்குரிய புன்னை சிறப்பு

3. திருமந்திரம் (617, 618)

    - இயமம் நியமம் விதிகள்

4. தர்மச்சாலையை நிறுவிய வள்ளலார்

5. புறநானூறு

    - சிறுவனே வள்ளலானான்

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6. அகநானூறு (4)   - வண்டு

   நற்றிணை (11)   - நண்டு

   கலித்தொகை (11)   - யானை, புறா

   ஐந்திணை 50 (27)   - மான்

   ஆகியவை பற்றிய செய்திகள்

UNIT V   நவீன தமிழ் இலக்கியம்   **6**

1. உரைநடைத் தமிழ்,

   - தமிழின் முதல் புதினம்,

   - தமிழின் முதல் சிறுகதை,

   - கட்டுரை இலக்கியம்,

   - பயண இலக்கியம்,

   - நாடகம்,

2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும்,

3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும்,

4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும்,

5. அறிவியல் தமிழ்,

6. இணையத்தில் தமிழ்,

7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்.

                                                                            TOTAL : 30 PERIODS

<u>தமிழ் இலக்கிய வெளியீடுகள் / புத்தகங்கள்</u>

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University)- www.tamilvu.org

2. தமிழ் விக்கிப்பீடியா (Tamil Wikipedia)-https://ta.wikipedia.org

3. தர்மபுர ஆதின வெளியீடு

4. வாழ்வியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

5. தமிழ்கலைக் களஞ்சியம் - தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)

6. அறிவியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்