भारतीय प्रौद्योगिकी संस्थान जोधपुर
Indian Institute of Technology Jodhpur

॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

अभिषद
SENATE

32वीं बैठक के कार्यवृत्त
Minutes of 32nd Meeting

20th December, 2022 (Tuesday)
3:00 P.M.
Senate Room, IIT Jodhpur

This page is left blank, intentionally

Indian Institute of Technology Jodhpur

Minutes of 32nd Meeting

20th December, 2022 (Tuesday) at 3:00 P.M.
Senate Room, IIT Jodhpur

The following members were present in-person /through Webex:		
1.	Prof. Santanu Chaudhury Director, IIT Jodhpur	Chairman
2.	Prof. S.R. Vadera Deputy Director, IIT Jodhpur	Member
3.	Dr. Sanjeev Misra Vice-Chancellor, Atal Bihari Vajpayee Medical University Lucknow & Former Director, AIIMS Jodhpur	Member
4.	Prof. Purnima Singh Deptt. of Humanities & Social Sciences IIT Delhi	Member
5	Prof. Mitali Mukerji, Deptt. Of BB	Member
6.	Prof. Ajay Agarwal, Deptt. of EE	Member
7.	Prof. Manoj Choudhary, Deptt. of EE	Member
8.	Prof. Somitra K. Sanadhya, AIDE	Member
9.	Prof. Sangeeta Sahney, SME	Member
10.	Prof. Manoj Choudhary, Dean (International Relations, Alumni Relations and Corporate Relations)	Member
11.	Prof. Somitra K. Sanadhya, Dean (Digital Transformation)	Member
12.	Head, Department of Bioscience and Bioengineering	Member
	Prof. Mitali Mukerji	
13.	Head, Department of Chemical Engineering	Member
	Prof. P.K. Tewari	
14.	Head, Department of Chemistry	Member
	Dr. Ramesh K. Metre	
15.	Head, Department of Electrical Engineering	Member
	Prof. Ajay Agarwal	

16.	Head, Department of Mathematics	Member
	Dr. Puneet Sharma	
17.	Head, Department of Mechanical Engineering	Member
	Dr. Suril V. Shah	
18.	Head, Department of Metallurgical & Materials Engineering	Member
	Dr. K.R. Ravi	
19.	Head, Department of Physics	Member
	Dr. Ashutosh Kumar Alok	
20.	Head, Department of Civil & Infrastructure Engineering	Member
	Dr. Ranju Mohan	
21.	Head, School of Management & Entrepreneurship (SME)	Member
	Prof. Sangeeta Sahney	
22.	Head, School of Liberal Arts (SoLA)	Member
	Dr. Farhat Naz	
23.	Head, Centre for Technology Foresight & Policy	Member
	Dr. Krishna K Balaraman	
24.	Department of Bioscience and Bioengineering	Member
	Dr. Indranil Banerjee, AD (Hostel Affairs)	
25.	Department of Chemistry	Member
	Dr. Atul Kumar, AD (Academics- PG Programs)	
26.	Department of Civil & Infrastructure Engg.	Member
	Debanjan Guha Roy, Assistant Professor	
27.	Department of Computer Science & Engineering	Member
	Dr. Gaurav Harit, AD (Academics- UG Programs)	
28.	Department of Mathematics	Member
	Dr. Gaurav Bhatnagar, AD (IRO)	
29.	Department of Electrical Engineering	Member
	Dr. Deepak M. Fulwani, AD (PRG)	

30.	Prof. C. Venketesan Professor-in-charge (Faculty)	Special Invitee
31.	Dr. Kaushal Desai, Faculty-in-charge (Executive Education)	Special Invitee
32.	Dr. Somnath Ghosh, Faculty-in-charge (Curriculum Implementation)	Special Invitee
33.	Dr. Anil Kumar Tiwari	Special Invitee
34.	Prof. Nimish Vohra	Special Invitee
35.	Sh. P.G. Basak, Advisor (Admin.)	Special Invitee
36.	General Secretary, ACAC	Special Invitee
37.	Dr. Hari Om Yadav, Registrar	Secretary

The following members could not attend the Meeting		
1.	Prof. H.P. Khincha, Chairman Karnataka State Innovation Council, Bangalore	Member
2.	Dr. Jitendra Balakrishnan, CTO-Products, Sterlite Technologies Ltd.	Member
3.	Prof. Mayank Vatsa, Dean (R&D)	Member
4.	Prof. Richa Singh, Head Dept of CS&E	Member
5.	Prof. Neeraj Jain, Deptt. Of BB and Head School of Artificial Intelligence & Data Science (AIDE)	Member
6.	Prof. Surajit Ghosh, Deptt. of BB	Member
7.	Dr. Anand K. Plappally, Head, Center for Emerging Technologies for Sustainable Development & Associate Professor, Department of Mechanical Engineering	Member
8.	Dr. Mahesh Kumar, Head, Center for Research & Development of Scientific Instruments	Member
9.	Dr. S.C. Bose, Head & Chairperson, IRC_IDRP, Inter-Disciplinary Research Platform (IDRP)	Member
10.	Dr. Deepak Arora, Dept of Chemical Engineering and AD (R&D)	Member
11.	Dr. Satyajit Sahu, Associate Professor, Deptt. of Physics	Member

12.	Dr. Abir Bhattacharyya, Assistant Professor, Department of Metallurgical & Materials Engineering	Member
13.	Dr. Sankalp Pratap, Associate Professor, School of Management & Entrepreneurship	Member
14.	Dr. Dipanjan Roy, Associate Professor, School of Artificial Intelligence & Data Science	Member
15.	Dr. Ankita Sharma, AD (Student Affairs) and Associate Professor, School of Liberal Arts	Member
16.	Prof. Amitava Mitra, Professor-in-charge (Infrastructure Engineering)	Special Invitee
17.	Dr. Shankar Manoharan, Faculty-in-charge (Alumni Relations)	Special Invitee
18.	Vice President, Board of Academic Interaction	Special Invitee
19.	General Secretary, Student Senate	Special Invitee

The following are the recommendations of the Senate:

S.No.	Items
32.1	**Welcome address by the Chairman, Senate**
	The Chairman, Senate welcomed all the members to the 32nd Meeting of the Senate.
32.1.1	**Confirmation of Minutes of the 31st Meeting of the Senate held on 7th November, 2022**
	The Senate confirmed the Minutes of the 31st Meeting of the Senate, as circulated.
32.1.2	**Report on Action Taken on decisions of the 31st Meeting of the Senate held on 7th November, 2022**
	The Senate noted the Action Taken Report on decisions of the 31st Meeting of the Senate held on 7th November, 2022. The Senate was also apprised that the Senate approved the Policy for setting up Thematic Centres for Science and Technology Research through donation/CSR funds from corporates, individuals and similar other entities in its last Meeting. Subsequently, the same was placed before the Finance Committee and the Board of Governors for approval. The same was approved by the BoG. The Director briefed the Senate that the Institute has also identified an Industry partner(s) namely, Rishabh Instruments Ltd. and Ivaan Foundation for Setting up of a Centre for Clean Energy with substantial fund of approximately Rs.70.00 Crores. The Agreement for the same is being finalized and signed soon.

32.2	**Discussion Items**
32.2.1	**Proposal of a new Master Programme, M.DeS. in XR / Immersive Media hosted by School of Liberal Arts (SoLA), to be started from Semester-I, AY 2023-24**
	Dr. Nimish Bohra, Professor of Practice, School of Liberal Arts (SoLA) presented a detailed Concept Note on the new 2-year Master Programme, M.DeS. in Extended Reality (XR) / Immersive Media to be hosted by the School of Liberal Arts before the Senate. The Senate after a detailed discussion suggested exploring the fee structure of the programme with other IITs and guidelines for weightage of the **Common Entrance Examination for Design (CEED)** conducted by the IIT Bombay for the admission. The Assistantship for this programme would be at par with the M.Tech. Programmes. The Senate approved the proposal placed as **Annexure I** and emphasized that the detailed course curriculum and admission criteria have to be framed and placed for discussion in the ensuing meeting of the Senate. The Senate further suggested starting a Ph.D. program in the future for further growth of faculty members / Institute.
32.2.2	**Proposal for an Exit Policy for Ph.D. and M.Tech. Students**
	The Associate Dean (Academics -PG program) presented the Exit Policy for Ph.D. and M.Tech. Students before the Senate who are not able to satisfy the candidacy / graduation requirements. The Senate after a detailed discussion recommended that if the students are not able to complete the candidacy requirements as per the timeline of their programme then the students should be put on academic probation with the recommendation of SRC and Supervisor for 1st Semester. The student must be given periodic warning by the Supervisor and SRC if his / her performance is not up to the standards. The Senate further recommended that a warning letter has to be issued to such student(s) by the Head of Department(s) on the recommendation of SRC and Supervisor. During the said warning period/academic probation, students have to be paid full Assistantship. The Senate further advised that after the warning period is over and if the student's performance is not improved then the student must be put on an exit path with the recommendation of the SRC and Supervisor. The decision of SRC for the exit clause will be binding on the student. In such a scenario, the Assistantship would be stopped on completion of the academic probation period. Students with CGPA / DGPA of at least 6.5 can opt for the exit plan. Such student(s) will be required to successfully complete at least 24 Credits through coursework and 36 Credits through project work with a satisfactory grade at the completion of the project. The students must complete these requirements within 1.5 years after the academic probation period. The project work must be worthy of the standards of an M.S. (Research) Degree as evaluated by the Supervisor, SRC, and one External Examiner outside the Institute.

The Senate also suggested that if a student is awarded 'U' grades in two consecutive semesters then, a Standing Committee constituted by the Head of the Department will review such case(s) for termination of the Ph.D. Program. The exit option in no case guarantees an M.S. (Research) Degree and the award of degree will depend on the performance of the student. Ph.D. students satisfying the candidacy requirements with satisfactory performance in Thesis will not be eligible for the exit option.

The Senate also approved the following exit policy for M.Tech. students as presented in the Agenda:

"An M.Tech. Student not meeting the graduation requirements may be allowed to exit the program with a Diploma if he / she has completed at least 24 Credits of course work satisfactorily."

32.2.3 Proposal to revise the Ph.D. Course Work Credit Structure for School of Management & Entrepreneurship (SME)

Prof. (Ms.) Sangeeta Sahney, Head (SME) presented the revised Ph.D. Course Work Credit Structure for the SME before the Senate. The Senate after detailed discussion approved the proposal as the Course Work Credit Structure is in line with the other Ph.D. programmes of the Institute, placed as **Annexure II**.

32.2.4 Proposal for New Courses from various Dept./School/Centre.

The proposal(s) for new Courses was presented by the Head(s) of various Department /School and Center before the Senate. The Senate recommended on the proposal(s) as below:

SN	Particulars	Dept. / IDRP/School	Annexure AP 32-5	Senate Recommendations
1.	Proposal of new course - Plant Genetic Engineering and Functional Genomics	Bioscience & Bioengineering	Plant Genetic Engineering and Functional Genomics	The Head, Department of Bioscience & Bioengineering presented the course. The Senate after discussion approved the proposed course.
2.	Proposal of a new 700 level course- Rock Mechanics and Rock Engineering Laboratory	Civil and Infrastructure Engineering;	Rock Mechanics and Rock Engineering Laboratory	The Head, Department of Civil and Infrastructure Engineering presented the course. The Senate after discussion suggested that the Lab component should be combined with the already approved theory course.

3.	Proposal of new 700 level courses for PhD students	School of Management & Entrepreneurship	1. Qualitative Methods for Management Research 2. Technological Perspectives in Management Research 3. Quantitative Research Methods	The Head, School of Management & Entrepreneurship presented the proposed courses. The Senate after discussion suggested placing the revised proposal with the feedback of IITs and IIMs experts in the ensuing meeting of the Senate. Further, courses at 1 and 3 need to be revised as per the State-of-the-Art Courses. **Action: Head, SME**
4	Proposal of new courses for MBA	School of Management & Entrepreneurship	1. Market Structures and Strategy 2. Personal Financial Planning 3. Strategizing for Indian Bazaars 4. Revenue & Pricing Management 5. Supply Chain Modeling and Behavioural Operations 6. Statistics of Management 7. Industrial Relations & Labour Law	The Head, School of Management & Entrepreneurship presented the proposed courses. The Senate after discussion recommended the following courses: 1.Market Structures and Strategy 2.Personal Financial Planning 3. Revenue & Pricing Management 4. Supply Chain Modeling and Behavioural Operations 5. Industrial Relations & Labour Law. The Senate recommended the course 'Strategizing for Indian Bazaars' with minor modifications. The modified course needs to be presented in the ensuing Academic Committee meeting. The Course Statistics of Management will be revised and presented in the ensuing meeting of the Senate. **Action: Head, SME**
5	Proposal of new 700 level courses	School of Liberal Arts (SoLA)	1. Sociology of Education 2. Sentence	The Head, SoLA presented the proposed courses before Senate.

				Structure 3. Time and Literary Narratives 4. Language and Linguistics 5. Applied Time Series Modelling in Economics and Finance	The Senate after discussion recommended that the Courses 'Sociology of Education', 'Sentence Structure' will be submitted with the revision in the ensuing meeting of the Senate. The Senate suggested that the course 'Time and Literary Narratives' requires minor modification in terms of fractals. The Senate recommended that the course 'Language and Linguistics' can be redesigned with the help of faculty working in conversant areas. The Case studies can also be included wherever possible. The Senate recommended that the course 'Applied Time Series Modelling in Economics and Finance' be discussed with faculty working in AIDE, Mathematics and SME. The course can be presented again in the ensuing meeting of the Senate. **Action: Head, SoLA**

The Senate further suggested that the Departments / Schools / Centers / Divisions while proposing a new Course must include the following in the proposals:

1. Consultation notes of Faculty members having similar expertise across Departments / Schools / Centers / Divisions;
2. Plan for running already approved courses vis-a-vis faculty load;
3. To ensure the requisite infrastructure for running labs; and
4. Ensure that all guidelines for a course approval are followed.

Action: All Heads

32.2.5	**Consideration of a 4 Credit Course (Fundamental of Machine Learning) to 1 Credit as Program Core and 3 Credit as Program or Open Elective.**
	Dr. Suril V. Shah, Head, Department of Mechanical Engineering presented the proposal for Consideration of a 4 Credit Course (*Fundamental of Machine Learning)* as 1 Credit Program Core and 3 Credit Program or Open Elective to the Senate. The Senate after detailed discussion recommended that *Fundamentals of Machine Learning* can be restructured in terms of the fractal courses to cater the needs of different departments. **Action: Head, ME**

32.4	**Reporting, Adopting and Noting Items**
32.4.1	**Academic recommendations of 26th ECS Meeting held on 14th December, 2022**
	The Senate accepted the academic recommendation of the 26th ECS meeting held on 14th December, 2022. **Action: All Heads / Concerned**
32.5	**Ratification Items**
32.5.1	**Approvals accorded by the Chairman, Senate**
	The Senate ratified the approvals accorded by the Chairman, Senate on behalf of the Senate, as presented in the Agenda.
32.6	**Any other Item with the prior permission of the Chairman**
32.6.1	**Credit underload in the 8th semester for students who withdraw from the specialization/Minor**
	The Associate Dean (Academics-UG programs) informed the Senate that some students who had earlier opted for a specialization / minor in their 6th Semester have decided to withdraw from the opted specialization during the 7th Semester. These students overloaded themselves in the 6th and 7th semester to do the specialization courses. Since they are now withdrawing from the specialization, their earned credits through specialization courses get transferred to the Program Elective or Open Elective category. Therefore, these students have less than 12 credits remaining to earn in their final semester. The Senate resolved that these students need to register for at least 12 credits in the 8th semester and may opt some courses to meet the minimum credit registration requirement of 12 credits in a semester for UG students. **Action: AD (Academics –UG)**

The Meeting concluded with thanks to the Chairman and all the Members & Invitees.

31/12/2023

(Dr. Hari Om Yadav)
Registrar & Secretary, Senate

(Prof. Santanu Chaudhury)
Director & Chairman, Senate IIT Jodhpur

॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

Concept note for

Master of Design (MDes) in XR/Immersive Media

Two-year full-time degree program

With a focus on

AR/VR, Gaming, Animation, Visual Effects and Comics

(In tune with GoI's AVGC policy)

School of Liberal Arts

Indian Institute of Technology Jodhpur

December 2022

Introduction

Design is an activity focused on solving problems and creating functional and aesthetically pleasing solutions. The output of the activity–also called a design–is a product or an experience that is deeply informed by the context of the problem which would be social, economic, or technological.

Design is a value-enhancing activity. Apple is the most valuable company in the world due to its focus on design. Google's capture of the search market can be attributed in no small measure to its iconic homepage. Automobile companies, like any other company creating products that have the same function, constantly differentiate themselves on the basis of their designs.

Design education in India has undergone hockey-stick growth in the last decade. From just two design institutes at the turn of the millennium–NID and IDC, IITB–we now have at least 100 institutes offering degree programs in design, which include four new NIDs (Vijaywada, Kurukshetra, Bhopal and Jorhat), five additional IITs (Guwahati, Delhi, Kanpur, Hyderabad and Gandhinagar), as well as the introduction of design specialisation at IIITs (Jabalpur and Delhi).

Design is a dynamic field, constantly evolving in response to new technologies, materials, and cultural and societal trends. IITJ with its focus on modern and futuristic technologies and situated in the heart of traditional crafts, just when the Government of India's AVGC (animation, visual effects, gaming and comics) policy is being rolled out, is in a unique position to create a differentiated program in design.

We can prepare the new generation of students to research and define human experience and interactions in the ever-growing world of AR/VR/MR (XR/Immersive Media) while extending the global reach of the Indian AVGC Industry. Currently, only a handful of institutes are offering specialized courses and programs relevant to the AVCG sector.

India has the potential to capture 5% (~$40 billion) of the global AVGC market share by the year 2025 and create over 1,60,000 new jobs annually[1].

Given the strong practice orientation of design, the program at IITJ would be created in close consultation with key stakeholders who represent the industry bodies such as FICCI, ADI, etc.

The objective of the program

The program aims to *create future-ready students* through an industry-backed program that will aim at taking forward the industry to enable it to contribute in a big way to the global AR/VR, gaming, animation market and associated fields. These contributions can come

---

1 https://www.outlookindia.com/business/while-india-s-got-talent-the-gaming-industry-struggles-to-find-it-news-200287

through research, explorations, setting up labs, training students in these fields, and creating future teachers who sow such seeds in other institutions.

We aim to *fill the gap in design education and practice in Rajasthan* since there are no other design institutes of repute in the state. The program would engage with the local industry and society to identify problems and help find solutions. Through various interactions with students of schools and colleges, the program would sow the seeds of design in young minds.

Uniquely located in the heart of craft production, the program would endeavour to reach out to local artisans and work with them to *economically invigorate the artisan families through design and digital literacy projects.*

Expected graduate attributes

At the end of the program the students will be well versed with the *methodology of design*–understanding context and stakeholders (empathy), problem definition, ideation, prototyping, and testing–and its application to a wide range of problems solving.

The students will gain sensibilities pertaining to elements and principles of design - form, colour, balance, rhythm, etc - and their aesthetic critique and use.

Working with a wide variety of *futuristic technologies and their application* for different use cases will be at the core of the program. Such technologies include AR/VR, gaming engines, real-time animation and video, holography, IoT, etc.

Data-driven design is the future that the students will be expected to imbibe. The practice of design is expected to change given the access to real-time data usage. Cities, stores, products, and experiences will be in a state of constant evolution, responding to the data that is collected.

Collaborating with people and contexts to identify and solve a problem, borrowing from the fields of psychology, anthropology and other disciplines.

Learning outcome

The graduating students will work in the industry to contribute solutions to environmental problems, redefine the future of work and interactions, and reimagine communication in an increasingly globalised world.

They will take up roles that will help cut the time to take products to market through simulations, prototyping, and applying human-centred design principles.

Students will be able to solve environmental problems by developing an empathetic attitude to all life forms, understanding constraints, and defining viable goals.

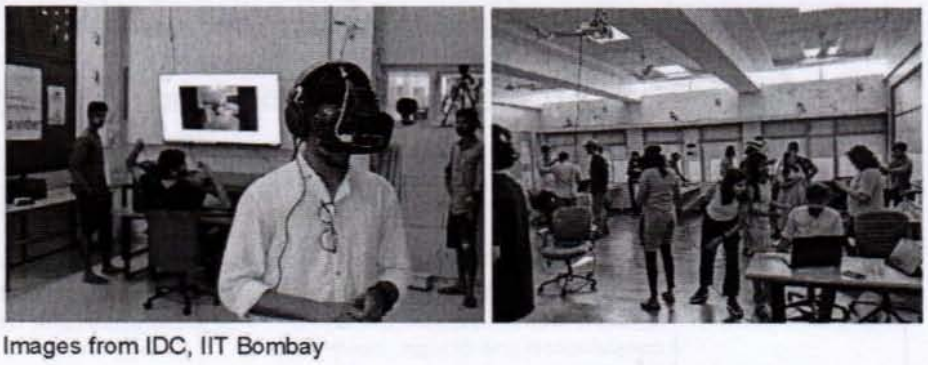
Students will work at the forefront of developing new interfaces of communication in the ever-changing world of new devices and interaction paradigms.

The future of work will be redefined by the graduating students through their reimagining of working experiences enabled by tools that fit into the new environment.

Pedagogy

Design is learnt through hands-on project-based problem solving by explorations and experimentation. The solutions follow an innovative design process of observation, need-finding, research, analysis, creative alternatives, prototyping and validation. *So instead of classrooms, the space is turned into a studio* suitable for collaborative activities, trying out prototypes and getting feedback.

Most assessments should be through presentations to jury about actual work rather than written examinations.



Images from IDC, IIT Bombay

Admissions

Admissions will be through a combination of CEED* score and interview.

Persons with a valid CEED score will be invited to apply. Top CEED score applicants will be called for an interview (online or in-person) where they will need to present their portfolio. Selection will be based on a final score calculated by giving 30% weightage to CEED score and 70% to interview.

An additional test might be conducted by IITJ if deemed necessary.

A total of twenty students will be taken in for the July 2023 batch.

*The Common Entrance Examination for Design is conducted by IIT Bombay: https://www.ceed.iitb.ac.in/2023/downloads/CEED2023_Brochure.pdf

Scholarship

GATE and CEED are considered at par by AICTE for a scholarship. Please see here[2].

Other IITs on scholarship to MDes students:

IIT Guwahati: "All regular candidates with GATE/CEED score are entitled to scholarship and will have to perform teaching /lab assistance duties in addition to pursuing their research."[3]

IDC, IIT Bombay: "Teaching Assistantship Rs.12400/- p.m. for two years."[4]

IIT Hyderabad: "MHRD seats - The qualifying exam is the Common Entrance Examination for Design (CEED). The candidate will be shortlisted based on the CEED score."[5]

Curriculum framework (work in progress)

Note: different IITs have different ways of calculating credits. What might be 4 credits at IITB or IITG is counted as 2 credits at IITJ.

Graduating attributes mapped to topic cloud and courses (work in progress)

Graduating attributes	Topic cloud	Courses
Understanding the context	Evolution of art over the centuries; from craft to mass production; mass consumption and design; movements in art and design; emergence of immersive media (AR/XR); application of immersive media in medical, education, entertainment domains	Evolution of art, design and immersive media (2-0-0) Applications of immersive media (3-0-0)
Learning the methodology of design	Problem identification, stakeholders, empathy, context, constraints, problem statement, ideation, low and high fidelity prototyping, testing, feedback, implementation	Design methodology (2-0-2)
Gaining an aesthetic sensibility	Line, form, color, perspective, texture, fields, balance, repetition, symmetry, rhythm; application to 2D and 3D spaces	Elements and principles of design (3-0-0)

[2] https://www.aicte-india.org/content/applications-are-invited-post-graduate-gategpatceed-scholarship-ay-2022-23

[3] https://www.iitg.ac.in/design/Admissions.html

[4] http://www.idc.iitb.ac.in/admission/assistantships

[5] https://design.iith.ac.in/admissions/mdes-admission/

Communicating ideas visually	Idea sketches, drawing in 2D, anatomy, character design, poses, animatics, Adobe Photoshop & Illustrator, modelling in 3D space, basic textures, lighting, camera, 3DS Max, Unity, Blender, InstaVR	Sketching (0-0-4) Advanced Illustration (1-0-2) 3D visualisation (0-0-4) Photo and imaging (1-0-2)
Working with text on screens and virtual spaces	Type for digital screens, readability from a distance & with movement or color; reproducibility on static and moving screens; type hierarchy; multilingual type for interfaces	Typography for media (2-0-0)
Communicating ideas in an engaging manner	Wants and needs, character arc, unique perspective, dramatic narrative, emotions and metaphors, rapport and trust, cultural contexts, interactive experiences, 360 narratives; Genre, backstory, PoV; chronology, agency, causality; Color temperature & correction; stereo & surround sound; wide & tele, depth of field; etc.	Storytelling and narratives (2-0-0) Lights, sound, camera (1-0-2)
Understanding basics of interacting with electronic media	Interaction points, clues, errors, feedback, response; physical and cognitive ergonomics	Interaction design (for Immersive media?) (3-0-0)
Creating realistic and fantastic virtual worlds with tools or through code	Visualising 3D space; textures and lighting; physics-based interaction; Color temperature & correction; stereo & surround sound; wide & telephoto lens, depth of field; etc.; physics-based interaction	Architecture and environment (1-0-4) Coding for XR (2-0-2)
Engagement of users through gamification	Motivational design, behaviourism, reward structures and schedules	Principles of game design (2-0-2)
Manipulating screens, images and objects to create realistic or fantastic worlds	Layering, mattes, green-screen, digital graphics, rotoscopy, stabilization, lighting, scripting	Basics of visual effects (2-0-2)
Working with moving elements for compelling	Squash & stretch, anticipation, staging, follow-through; 2D, 3D, hand drawn, digital, stopmotion, claymation, puppets,	Animation principles and techniques (2-0-2)

engagement	etc.; 2D and 3D; scanning and modeling; motion capture; Scripting, editing, direction	Character design (2-0-2) Film making (2-0-2)
Advanced topics	Motion sensors, projection mapping, audio-reactive installations, etc.	Special topics in XR (2-0-2)

Electives (work in progress)

Course	L-T-P/St	Credits
Photo and imaging	1-0-2	2
Light, sound, camera	1-0-2	2
Advanced illustration	1-0-2	2
Principles of game design	2-0-2	3
Basics of visual effects	2-0-2	3
Animation principles and techniques	2-0-2	3
Character design	2-0-2	3
Film making	2-0-2	3
Special topics in XR	2-0-2	3
Coding for XR	2-0-2	3

Suggested course breakup by semester (work in progress)

Semester 1	Type 1	Type 2	L	T	P/St	Credits
Evolution of Art, Design and XR	Compulsory	Graded	3	0	0	3
Design methodology	Compulsory	Graded	2	0	0	2
Elements and principles of design	Compulsory	Graded	3	0	0	3
Sketching (Representation and visualization?)	Compulsory	Graded	0	0	4	2
3D Visualization	Compulsory	Graded	0	0	4	2
Typography for media	Compulsory	Graded	2	0	0	2

Communication skills	Compulsory	Non-graded				1
Graded subtotal						*14*
Non-graded subtotal						*1*
Subtotal						**15**

Semester 2	Type 1	Type 2	L	T	P/St	Credits
Storytelling and narratives	Compulsory	Graded	2	0	0	2
Interaction design for XR	Compulsory	Graded	2	0	2	3
Appreciation of XR	Compulsory	Graded	1	0	2	2
Appreciation of gaming	Compulsory	Graded	1	0	2	2
Appreciation of software and hardware for XR	Compulsory	Graded	1	0	0	1
Elective	Elective	Graded	2	0	0	2
Elective	Elective	Graded	2	0	0	2
Professional ethics	Compulsory	Non-graded				1
Graded subtotal						*14*
Non-graded subtotal						*1*
Subtotal						**15**

Semester 3	Type 1	Type 2	L	T	P/St	Credits
Elective 1	Elective	Graded	2	0	2	3
Elective 2	Elective	Graded	2	0	2	3
Elective 3	Elective	Graded	2	0	2	3
Elective 4	Elective	Graded	2	0	2	3
Project	Project	Graded			6	3
Graded subtotal						*15*
Non-graded subtotal						*0*
Subtotal						**15**

Semester 4	Type 1	Type 2	L	T	P/St	Credits
Project	Project	Graded			26	13
Innovation and IP management	Compulsory	Non-graded				1

Graded subtotal						*13*
Non-graded subtotal						*1*
Subtotal						**14**

Credit distribution (work in progress)

Course type	Credits
Compulsory	24
Electives	16
Project	16
Sub-total	***56***
Non graded	3
Total	**59**

Lab equipment and spaces

Equipment

Equipment/Software	Units	Per unit cost	Total cost (INR)
Highend workstations	20	2,00,000	40,00,000
VR headsets - Quest Pro	4	1,50,000	6,00,000
VR headsets - HTC Vive	2	2,00,000	4,00,000
MR headsets (holo lens)	2	3,00,000	6,00,00
360 camera	2	2,50,000	5,00,00
360 audio	1	50,000	50,000
Lights, greenscreen, etc.			8,50,000
Total			**70,00,000**
Unity, Unreal,	20	Free for students	

Autodesk suite			
Blender	20	Free	
Adobe creative cloud	25	30,000 per year	7,50,000 per year
Total			**7,50,000 per year**

Spaces

- Empty hall space for VR (at least 5m x 5m)
- Studio with greenscreen facility
- Photo studio for stop motion

Acknowledgement

We are greatly thankful to the following experts for devoting their time to help conceptualize the program and this document:

- **Prof Ravi Poovaiah:** Professor emeritus at IDC, IIT Bombay, areas of interest being Digital Resources for Learning; Collaborative Environments; Design, Technology and Culture; among many others
- **Dr Ajanta Sen:** Specializes in the disciplines of Interaction Design (chip-based products that work interactively in a computing environment), Social Computing (bringing real-life user experiences to computing environments through proxies), and the evolution of industrial design as a co-evolution of technology.
- **Prof Keyur Sorathia:** Associate Professor at IIT Guwahati, areas of interest being Human-Computer Interaction (HCI), Virtual Reality, Novel Interaction Methods
- **Prof Jayesh Pillai:** Associate Professor at IDC, IIT Bombay, areas of research being Immersive Media Design, Virtual Reality (VR) & Augmented Reality (AR), Visual & Interactive Storytelling, and Interaction Design
- **Mr Ahish Kulkarni:** Part of the government's AVGC task force, Ashish is the founder of Punnaryug; as the CEO of Reliance Animation he launched Little Krishna, Shaktiman, etc.
- **Mr Rajat Ojha:** a veteran in the field of video games, serious gaming and simulation industry, Rajat is co-founder and CEO of Gamitronics, Chief Builder at Partynite--India ka apna metaverse.

SME PhD Program

Background Note

- In view of students from diverse academic backgrounds applying for the PhD program at SME IIT Jodhpur, the School is proposing to rationalize the coursework to allow for different course buckets for candidates with management and non-management backgrounds as well as level of education (masters vs. undergraduate education). These changes would help students to chart out their coursework and research trajectories in alignment with their prior backgrounds.

PhD Coursework and Pathways for July 2022

Category	Category Definition	Minimum Credits Recommended	Description
Category - 1	Students with MBA degree / diploma	12 credits of compulsory courses	Coursework details as appended in Table - 1
Category - 2	Students with M Tech degree or equivalent	20 credits	In addition to the courses appended in Table 1, scholars will credit four MBA courses from the list of first-year MBA core courses. These four extra courses will be recommended by the SRC based on the student's previous qualifications and current research interests
Category - 3	4 years Bachelor degree, 5 Years MSc or equivalent	30 credits	In addition to courses appended in Table, SRC will recommend relevant MBA courses to be credited by individual scholars

Table 1: List of Compulsory Courses for July 2022

Compulsory Courses	**Credits**
Literature Review, Theory Building and Publication Process	2
Evolution of Management Thought – Interdiscipoinary Approach	2
Qualitative Research Methods and Lab	3
Quantiative Research Methods and Lab	3
Technological perspectives in Management Research	2
Technical Communication	Non-Graded

Proposed PhD and Coursework Pathways from January 2023

Category	Category Definition	Minimum Credits Recommended
Category 1	Students with MBA/M. Tech. and Equivalent	12 Credits
Category 2	4 Year Bachelor Degree/5 Year MSc or equivalent	24 Credits

Coursework to be recommended by DRC/SRC.

D: 31/01/23
No: 4330

L.N.
D. 06/02/23
No. 70