Mobility and Vehicle Design Course Content

1st Semester

DE 601 Introduction to Studio Photography

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):
Lens, Focal Length, Exposure (Shutterspeed, Aperture, ISO), Depth of Field, Histogram, Picture Styles, Raw image, Digital Imaging, Sensor, Crop Factor, Light Meter (Incident, Reflected), Studio Lighting, Flash Photograph, Tabletop Photography.

Texts/References

DE 627 Indian thought and tradition

Course Content (List of the topics/sub-topicstobecoveredinthelectures/practicals/assignments):
This is an exposure course to Indian thought and traditions which will cover various domains like Indian visual art, oral traditions, music, dance, theatre, science, health and architecture and society that make India stand out uniquely as a nation because of its diversity of cultures, languages, religions and customs

Visual Art - Traditional and contemporary schools of Indian Art, folk art
Oral Traditions from the ancient to the present
Music - Classical (Hindustani & Carnatic), Semi-classical, Folk, Fusion
Dance - Classical, Folk, Contemporary
Theatre - Traditional (Natyashastra), Contemporary, Puppet Theatre
Science - An understanding of the scientific approach to everything and the holistic approach to it and how it influenced all aspects like health, architecture, management and even the arts.
Post independence understanding of India as a nation and bridging the wealth of the past with the potential of the future.
Reflection of this exposure to the question - What is or what can be called ‘Indian’ Design.
DE 653 Material and Manufacturing

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- Properties and usage of thermoplastics, thermosetting plastics. Process of selection and applications of plastics for Mobility Products. Design limitations in application of Plastics in Mobility.
- Assembly Processes and Decorative techniques for Automotive Trims. Design, Limitations and Selection of materials, Manufacturing processes and assembly techniques for Ferrous and non-ferrous metals in mobility applications.

Texts/References

- Cleminshaw D., Design in Plastics, Rockport, MA USA 1989.
DE 655 Automobile Engineering and Technology

Course Content: (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- Exposures to systems in a vehicle - power system: Gasoline, diesel, bio-diesel, electrical, hybrids, etc.
- Transmission system: clutch, gear trains, differential. Suspension, steering, breaks etc.
- Controls: Clutch, gear, accelerator. Dash board displays. HVAC
- Vehicle structure-Body On Frames, mononcoque.
- Modern assembly (robotic) and finishing technologies
- Packaging & Integrating Methodology, aerodynamics, ergonomics, Seating Systems, Trim Systems, Safety & Homologation,
- Reading and seminars. Visit to auto plants and use of interactive soft wares.

Texts/References

- Seth Leitman, Bob Brant, Leitman Seth: Build your Own Electric Vehicle: Publisher: McGraw-Hill Companies. 2008

DE 657 Vehicle Ergonomics

Course Content: (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- Introduction to Ergonomics / human factors
- The concept of System Design. How to look at the design issues
- Use of Anthropometry in vehicle design
- Biomechanics and vehicle design
- Principle of automobile Chair Design
- Neural Systems.
- Communication in Automobile system
- Vehicle for the special people
- Final design Assignment
Texts/References

- Sanders, Mark S; McCormick, Ernest J; Human factors in engineering and design, McGraw Hill (1993)
- B. Peacock, Waldemar Karwowski; Automobile ergonomics Publisher: CRC; 1 edition, 1993
- Don Harris (Editor): Engineering Psychology and Cognitive Ergonomics: 8th International conference. Publisher: Springer; 20-Jul-2015

DE 659 Forms Space and Order

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- Rectilinear and Curvilinear Volumes
- Two dimensional and Three dimensional Planes
- Lines in space
- 2 and 3D Form transition. Exploration of form to develop imagination and insight.
- Use of metaphors to generate new forms. Concept of family of forms.
- Use of combinatrics as a method of 3D form generation.
- Exploration of surface textures in different materials.
- Form, material and process relationship.

Texts/References

- Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997
- Byers, Mel; The Design Encyclopedia, Publisher: John Wiley & Sons Publications, 1994
- Livio, Mario; The Golden Ratio: The Story of PHI, the World’s Most Astonishing Number, Publisher: Broadway, 2008
**Course Content** (List of the topics/sub-tops to be covered in the lectures/practicals/assignments):

- Understanding context related problems, User research—customer’s explicit needs and latent needs.
- Aesthetics, trends, style Analysis
- Product planning, development of product brief. Concept generation, creativity and innovation.
- Evaluation techniques. Peer reviews.
- Understanding of the packaging concept and the problems connected with travelling space, technology, ergonomics and aesthetics / styling.
- Reading and exercises in mobility related topics.
- Tasks/small projects related to this topic

**Texts/References**

- Cagan, Jonathan; Vogel, Craig M.; Creating Breakthrough Products: Innovation from Product Planning to Program Approval, Publisher: Financial Times Prentice Hall; 2002
DE663 Sketching 1

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- Exercises on lines, curves to improve the hand mind coordination.
- 1, 2 and 3 point perspective. Theory and examples from nature.
- Drawing of objects from outdoor.
- Exercises for improving observation and visual memory.

Texts/References

- Edwards, Betty; New Drawing on the Right Side of the Brain, Publisher; Tarher; 1 Nov. 2012
- Powell, Dick; Design Rendering Techniques: A Guide to Drawing and Presenting Design Ideas, Publisher: North Light Books, 1986
- Pogany, Willy; The Art of Drawing, Publisher: Madison Books, 1996

DE 665 Model Making 1

Course Content(List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- ‘Quick and dirty prototypes’ depicting the idea. Use of papers, wire, wood, POP.
- Exploratory and form mock-ups. Use of Polystyrene foam, Polyurethane foam, woood, metal.
- Finished model: Vacuum Forming, Polystyrene sheet, acrylic sheets.
- Workshop / Studio Safety
- Fabrication : Cutting, Welding
- Painting the models.
- Exercises and tasks to gain competency n model making that they can apply in future courses and projects.
Texts/References

- Yasusato YAMADA; CLAY MODELING Techniques for Giving Three – dimensional Form to Idea; Osami SUZUKI San’eiShobo Publishing Co., Ltd., Japan; 1993
- Roberto Lucci & Paolo Orlandini; Product Design Models; Van Nostrnd Reinhold; New York; 1990.
- Criss B. Mills; Designing with Models; John Wiley & Sons, Inc.; New Jersey; 2011
- Rob Thompson; Prototyping and Low-volume Production; Thames & Hudson; United Kingdom; 2011.
- Bjarki Hallgrimsson; Prototyping and Modelmaking for Product Design (Portfolio Skills), Laurence King Publishing, UK, 3 Oct. 2012
- Rob Thompson; Manufacturing Processes for Design Professionals; Thames & Hudson; United Kingdom; 2007.

2nd Semester
DE 612 Design Issues

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- This course will contain two predominant approaches. The first is reflective which will help students to ponder on the very basic yet subjective questions like what makes a good designer.
- It will address understanding perceptions & paradigms which enable students to 'think outside the box' by identifying the boxes one creates inadvertently while designing.
- It will deal with the tangible and intangible relevance of broadening one's perspectives in Arts Aesthetics, Science and Technology to design. The second is an exposure to different thoughts and perspectives, concerns and issues in the context of design.
- The challenges in design, layers or user experience, design process
- Design for the real world
- It will also expose the students to emerging areas of design.
- Relevance of design in the context of India,
- Importance of sustainable design practices, preserving traditional practices & designing for the undeserved communities.
- Lastly it will provide an exposure to the design process.
**Texts/References**

- Covey, S. The Seven Habits of Highly Effective People. Simon & Schuster, 1990
- Athvankar, Uday, Mental Imagery as a Design Tool, Cybernetics and Systems, Vol 28, No 1, Jan-Feb, 1997, pp 25-42.
- Poovaiah, Ravi and Sen, Ajanta. Design by People within Culturally-rooted Idioms – the new ‘cool’ in a globalised world: - paper at ICSID Educational Conference at Copenhagen, Sept. 2005

**DE614 Design Workshop**

**Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):**

- An independent on week workshop which involves working on actual design problems with practicing professionals. Study of various techniques used in Design execution like Calligraphy, Pottery and Ceramics, Printmaking, Theatre, Film and Video, Performing Arts Sculpture, Painting, Story Telling and Narrative, Toy Design, Book Design, Sound Design, Exhibition Design, Information Graphics and Way finding, Environment etc.

**Texts/References**

NONE
## DE 644 Exposure to grid systems in visual design

**Course Content**

- Brief introduction to typography
- Understand the relationship of space and content, type and image
- Exposure to application of elements and principles of design in relation to space
- Introduction of grid as a system to arrange elements to create order and hierarchy to the content
- Creation of grid and its applications through studio tasks

**Texts/References**

- Josef Muller Brockmann; *Grid Systems*, Arthur Niggli; Bilingual edition, 1996

## DE 646 CAID modelling for automotive design

**Course Content**

- Modelling with Curves and Surfaces. Introduction to curves, Degrees of Curves, Extrude curves, duplicate curves, Curvature evaluation, joining curves. Skin between curves, Birail, Squares, Revolve.

**Texts/References**

- Sham Tickoo; *Learning Autodesk Alias design 2010*; CADCIM Technologies, USA, 10 Jan. 2010
- Karen E. Goulekas; *Visual effects in a Digital World*; Morgan Kaufmann, 2001
DE 648 History of Transportation and Automobile Design

Course Content (List of the topics/sub-topicstobecoveredinthelectures/practicals/assignments):

- Brief history of evolution of the present day vehicles personal and public mobility.
- Great cars and Great designers who had deep influence in today's car industry.
- Innovation in energy sources and its impact on design.
- Presentations based on the above topic.

Texts/References

- Beverly Rae Kimes: Pioneers, Engineers & Scoundrels- The dawn of the automobile in America by (SAE) 2005
- Michael W. R. Davis: General Motors: A Photographic History (MI) (Images of Motoring) . Publisher: Arcadia Publishing 1999
- Larry Edsall: Masters of Car Design (Genius) [ILLUSTRATED], Publisher: White Star; illustrated edition, 26 Feb.2008

DE 650 Studies in 3D Form

Course Content (List of the topics/sub-topicstobecoveredinthelectures/practicals/assignments):

- Theory of colours and perception
- Form language for vehicles.
- Form abstraction, form expression, Form transition-use of metaphors.
- Treatment of large surfaces and volumes.
- Interpolation and blending of forms.
- Advanced radii manipulation: Filleting, Chamfers, varying fillets and radii.
- Tangential and non tangential curves. Interior / Space experience.
DE 652 Mobility Design 2

Course Content:
- Understanding mobility issues at system level
- Sustainable mobility - ecology/environment, culture, technology, legislation, safety, Mass transportation, Urban, Semi-urban, rural transport systems & mobility needs,
- Rapid and intelligent transport systems.
- Future technologies for mobility

Tasks:
- Technology watch, Scenario creation for integrated systems, Strategic approach to mobility design

Texts/References
- Frederic Sharf: Future Retro, Publisher: MFA Publications, 2005
**DE 654 Sketching 2**

**Course Content** *(List of the topics/sub-topics to be covered in the lectures/practicals/assignments):*

- Perspectives and Object drawing
- Light and Shadow
- Renderings
- Live sketching of people, object, animals
- Exercises in studio lighting

**Texts/References**

- Edwards, Betty; *New Drawing on the Right Side of the Brain*, Publisher: Tarcher; 2002
- Pogany, Willy; *The Art of Drawing*, Publisher: Madison Books, 1996

**DE 656 Model Making 2**

**Course Content** *(List of the topics/sub-topics to be covered in the lectures/practicals/assignments):*

- Introduction to Tools and equipments for clay modelling. Armature making for clay modelling.
- Clay Film application
- Modelling with Fiber reinforced plastic. Mould making. Finishing the models. Painting
- Workshop / Studio Safety
- Exercises and tasks to gain competency in model making that they can apply in future courses and projects.
Texts/References

- Yasusato YAMADA; CLAY MODELING Techniques for Giving Three dimensional Form to Idea; Osami SUZUKI San’eiShobo Publishing Co., Ltd.; Japan; 1993
- Roberto Lucci& Paolo Orlandini; Product Design Models; Van Nostrand Reinhold; New York; 1990
- Criss B. Mills; Designing with Models; John Wiley & Sons, Inc.; New Jersey; 2011
- Rob Thompson; Prototyping and Low-volume Production; Thames & Hudson; United Kingdom; 29 March 2011
- BjarkiHallgrimsson; Prototyping and Modelmaking for Product Design (Portfolio Skills), Laurence King Publishing, UK, 3 Oct. 2012
- Rob Thompson; Manufacturing Processes for Design Professionals; Thames & Hudson; United Kingdom; 30 Oct. 2007.

3rd Semester

DE 703 Arts design and society 1

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

- Analysis of history of Design. Bauhaus, Ulm.
- Analysis of history of Design in India. Analysis of design in the context of India.
- Cultural studies. Discourse analysis.
- An Introduction to Theatre.
- An introduction to Documentary Films.
- Critical writing in Art, Design, Theatre and Film.
- An Introduction to Humanities and Social Sciences.
- Qualitative methods-ethnographic, historical, philosophical, case study and interview.
Texts/References

- Mario, Bussagli; Sivaramamurti, C.; 5000 Years of Art in India, L.N. Abrams, NY, 1971
- Eames, Charles and Ray; The India Report, NID, 1958
- Neil, Gershenfield; When Things Start to Think, Hodder and Stoughton, London, 10 June, 2014
- Gropius, Walter (Author); Pick, Frank (Introduction); Shand, P. Morton; The New Architecture and The Bauhaus, The MIT Press, 1965
- Papanek, Victor; Design for the Real World, Thames and Hudson, London, 1995
- Meggs, Philip; A History of Graphic Design, John Wiley & Sons, 1998
- Trivedi, Kirti (ed.); Indian Symbology, IDC, 1987
- Spitz, Rene; The Ulm School of Design: A View Behind the Foreground, Publisher: Edition Axel Menges, 20 August, 2002
- Lupton, Ellen; Miller, J. Abbott (Editor); The ABC’s of Bauhaus, The Bauhaus and Design Theory, Publisher: Princeton Architectural Press, 2000

DE 713 Seminar and Critical Writing

Course Content (List of the topics/sub-topics to be covered in lectures/practicals/assignments):

- Encouraging students to prepare a seminar presentation and write an academic report on vehicle design related or any topic from wide variety of areas like technology, design, architecture, humanities, arts etc.
- Demands and conventions of academic reading and writing.
- Analyzing tests, using evidence and secondary source material
- Citations and referencing.
- From prewriting exercises through rough drafts and revisions.
Texts/References

- George, Dianna (Ed.), Trimbur, John (Ed.), Reading Culture: contexts for critical reading and writing, 6th ed, New York ; Pearson / Longman, 2007

DEP 701 M.Des Project 1

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

The summer internship provides an opportunity for you to work in rural or urban scenarios, based on your preferences and it hopes let you explore the impact design can have on our society, given the backdrop of socio-economic and cultural context of our country.

The duration of the project is four weeks.

All the students will have to make a presentation after they have completed their internships.

Texts /References
As per project choices.

DEP 703 M.Des Project 2

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

The communication design projects are chosen in areas that include film and video, typography, information design, graphic design, illustrated books and book design, animation and interaction design. This is the equivalent of the final dissertation project leading to the degree of M.Des in Communication Design.

- Duration: 4 months from July– Nov.
- This project will be an extension of the project III and should include development of the final design concept. The defence presentations will be held during the month of April and time given till the end of June to complete the jury feedback, final drawings and finer detailing of the project.
- The evaluation of the Stage 2 of Project III is done by a panel of examiners appointed by DPGC. The panel will consist of external jury member along with an internal examiner, the guide and the chairman (A Professor or an Associate Professor from another Department of IIT Bombay)
**Texts / References**

As per project choices.

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### 4th Semester

**DE 702 Arts design and society 2**

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<th>Course Content</th>
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<td>• Key issues in visual arts (painting and installation art, photography, films), performing Arts public art.</td>
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<td>• Concepts and concerns, and discourse on contemporary arts practice.</td>
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<td>• The course involves talks by visiting artists, writers, film-makers, theatre artists as well as site visits to organizations and institutions that support arts-based activities and education.</td>
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<td>• Subramanyan K. G.; Moving Focus: Essays on Indian Art, Seagull Books, Kolkata, 2006 ISBN Number : 81 7046 199 5</td>
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<td>• Subramanyan K.G.; The Living Tradition, Seagull, 1987 ISBN Number: 8170460220</td>
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DEP 702 M.Des Project 3

Course Content (List of the topics/sub-topics to be covered in the lectures/practicals/assignments):

The communication design projects are chosen in areas that include film and video, typography, information design, graphic design, illustrated books and book design, animation and interaction design. This is the equivalent of the final dissertation project leading to the degree of M.Des in Communication Design.

- Duration: 5 months from December – May.
- This project could be an extension of the previous project (if the scope of the project justifies the extension) or it could be an independent project with one of the following focus:
  - Design project of student interest and / or faculty interest and / or industry project
  - Re-design project that relooks at an existing problem or situation
  - Research project, delving into methodological or pedagogic issues
  - Exploration project, exploring application possibilities in a new technology or medium or variations
- The evaluation of the Stage 1 of Project III is done internally with a panel appointed by the DPGC in consultation with the guide. The panel will consist of the guide and two other faculty members.

Texts / References

As per project choices.