

Ahmedabad
University

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ISP

INDEPENDENT STUDY PERIOD



ABOUT THE INDEPENDENT STUDY PERIOD

Students often have diverse passions but no means to explore them, especially if it is not related to their specialisation. The Independent Study Period (ISP) is a flagship programme that offers students a chance to explore their passion, dive deeply into a field of interest, gain rich, immersive experience and go beyond the classroom, making their academic learning truly interdisciplinary and their conceptual understanding more experiential.

ISP courses are rooted in disciplines like Literature, Sociology, Design, Science, Technology, Heritage, Humanities, Languages, and more but cut across areas and specialisations. Rather than following the regular curricular period format, these courses are offered in an 8-hours-a-day format, enabling concentrated learning for students through block courses, studio-inspired experiential courses, perspective, skill-building and field courses, innovative experiments in teaching, and more.

The courses are designed and taught by experts, practitioners, and pioneers in various fields from across the world, including faculty at the University.

An ISP course has the following features:

- It is designed around a passion or interest which can be used to solve the “grand challenges of the society” or a real-life problem. These challenges can be based on everyday issues such as water, food production, health, climate, international relations, etc.
- It surpasses disciplinary boundaries. It can be a blend of two or more disciplines.
- It has theoretical depth. The academic concepts taught through the course should be enumerated clearly.
- It implements a hands-on learning methodology.
- It has a tangible physical output at the end, which will be displayed at the ISP Expo every year.
- ISP is spread over two weeks with 40-45 hours of faculty-student engagement. Additionally, students work (in groups or individually) for about 5-6 hours every day on the physical output or solution to the grand challenge.

COURSE CATALOGUE

2023

COURSE CODE	COURSE NAME	FACULTY
ISP076	Learn How to Make an Impactful Documentary	Tanmay Shah
ISP067	Clues 'The Truth Finder' Solving the Crime	Ritesh Shukla
ISP097	Ocean Explorers: Concerns and Solutions	Shefali Naik and Janki Teli
ISP116	Biodiversity: Prototyping Fauna Habitat in Urban Areas	Priyanka Kanhare Patel
ISP122	Paperwise Crafting Sustainability in Paper Pulp	Snehal Kashikar
ISP117	Building a Fluidic Neurocomputer	Adarsh Ganesan
ISP124	Ultimate Course on Drone Building and Flying	Tarun Rijwani
ISP115	Thermodynamics from Historical Wars	Dharamashi Rabari
ISP127	Exploring Soil-less Farming to Address Global Food Security	Aditya Parekh
ISP129	Biomimicry: Learning to Learn from Nature! 'Unpack' Nature's Wisdom to Create Sustainable Packaging	Prashant Dhawan

LEARN HOW TO MAKE AN IMPACTFUL DOCUMENTARY



TANMAY
SHAH

INSTRUCTOR

Tanmay Shah, Founder and CEO, FridayFictionFilms. He holds a Limca Book of Records, India Book of Records, Asia Book of Records and Golden Book Of World Records, for making 52 short films in 52 weeks in 2015. His short documentary Pinch of Salt has

won 17 international film festival awards and was screened in more than 10 countries. He also has a short film Woo, to his credit. FridayFictionFilms has served more than 100 clients under his direction.

ABSTRACT

Students will learn the basics of documentary filmmaking. They will be introduced to why documentaries are made and how they serve the society in general. The course will provide students with an introduction to the pre-production, production, and post-production of documentary

filmmaking. They will be introduced to shooting and sound capturing techniques. The post-production topic will be covered in detail, and students will learn how to make a comprehensive narrative in post-production by doing film editing.

What is the grand challenge or real-life problem students will try to solve through the course?

The films will be based on subtle day-to-day Sustainable Development Goals (SDG) challenges that we all encounter during our discourse with ourselves and our engagement with society. It will be an opportunity to touch upon various grand challenges not just in the present, but also in the future. The course will allow creative ideas to be implemented in terms of a strong problem-solving framework through thought provoking films.



METHODOLOGY

ACADEMIC CONCEPTS

Visual communication, storytelling and a brief discussion on SDGs.

LEARNING OUTCOME

Basic investigative style narrative building, shooting techniques, production planning, sound recording, and film editing.

TANGIBLE OUTCOME

Documentary films



CLUES “THE TRUTH FINDER” SOLVING THE CRIME



RITESH
SHUKLA

INSTRUCTOR

Ritesh Shukla, Associate Professor, School of Arts and Sciences, Ahmedabad University. He holds a PhD in Toxicology. He is a trained fingerprint expert from Directorate of Forensic Science, Forensic Science Laboratory, Gandhinagar, Gujarat.

His research interest is focused on Forensic Biotechnology and Food Forensic. He has more than 50 research papers, 3 books, and 18 book chapters to his credit.

ABSTRACT

Forensic Science is a fine observation to recognise evidence and navigate it to solve intentionally or unintentionally executed crimes. This definition itself delineates the vital role of Forensic Science in the criminal investigation process. In this course,

students will learn how to recognise, detect, and identify the different types of evidence using various approaches and establish its link with the crime scene, suspect, or victim.

What is the “grand challenge” or real-life problems students will try to solve through the course?

This course will provide an awareness among the students about the significance of Forensic Science and its role in an investigation process. It will help students to improve personal and public safety and protect themselves from malicious intentions or actions and threats. It will encourage students to explore their interest in the field of Forensic or Security Services.



METHODOLOGY

ACADEMIC CONCEPTS

Basic knowledge of Forensic Science and instrument handling. Observation, comprehensive interaction, logical reasoning, creativity, and developing a culture of working in a cohesive unit.

LEARNING OUTCOME

Students will learn to perceive clues using different scientific approaches and link them to the crime, suspect, or victim. They will learn to develop an investigative and innovative mind by creating a mock crime scene investigation process. They will also be made aware of the important role of Forensic Science in security as well as the judiciary system.

TANGIBLE OUTCOME

Digitised Poster or Model of Crime Investigation Procedure; Model of Fingerprint Analysis.



OCEAN EXPLORERS - CONCERNS AND SOLUTIONS



SHEFALI
NAIK



JANKI
TELI

INSTRUCTORS

Shefali Naik, Assistant Professor, School of Engineering and Applied Science, Ahmedabad University. She is the author of Concepts of Database Management System. She has published

and presented papers in various national and international journals and conferences. Apart from academics, she also has a deep interest in wildlife and bird watching.

Janki Teli, a Naturalist working in the field of wildlife research, conservation, and education for

the last 15 years. She has a passion for creating awareness about nature conservation.

ABSTRACT

Our planet Earth is made up of 70% water and 30% land. Of the 70% of water covering the Earth, more than 90% is marine water or salt water in oceans, forming a complex web of ecosystems known as Marine Ecosystems. There is more life in these ecosystems than anywhere on the land, and a lot of it is unique, unexplored, and unknown.

These oceans are a significant source of oxygen and instrumental in the storage of carbon dioxide. They are home to innumerable animals and plant species. This course is designed to give a glimpse of these exclusive and exceptional ecosystems and how they are important for the survival of mankind.

What is the “grand challenge” or real-life problems students will try to solve through the course?

This course will provide understanding and awareness regarding how to tackle the problem of sedimentation. How to curb oil spills and minimise the damage quickly? How to develop an app for fishermen to help them sell their catch better nationwide?



METHODOLOGY

ACADEMIC CONCEPTS

Knowledge of coastal and oceanic ecosystems, environmental variables affecting biological communities, and ecological interactions. Introduction to topical research issues on biodiversity, global climate change, and the evolution of life in the oceans. The basics of Geographic Information System Mapping.

LEARNING OUTCOME

The students will learn about the conservation of oceans and seas. They will learn the impact of urban habitations, industrial growth, ports, and urban livelihood activities on coastal ecosystems. They will also gain an understanding of coastal/marine issues in the local and global context, and learn the differences and similarities in cross-country approaches for addressing these issues. They will develop skills in research, documentation, and monitoring of marine biodiversity.

TANGIBLE OUTCOME

GIS-based maps, documentary on marine ecosystems, algal cards for preservation and identification of marine algae, and photographic posters with key messages of conservation.



BIODIVERCITY: PROTOTYPING FAUNAL HABITAT IN URBAN AREAS



PRIYANKA
KANHARE PATEL

INSTRUCTOR

Priyanka Kanhare Patel, Academician and Practising Landscape Architect. She is a Visiting Faculty at Navrachana University, Vadodara, and CEPT University, Ahmedabad. She completed her Bachelor of Architecture in 2013, followed by Master of Landscape Architecture in 2015 at CEPT University, Ahmedabad. She is currently pursuing

her PhD in Landscape Architecture at the School of Planning and Architecture, New Delhi. Her research interest lies in reading and documenting ecological and cultural manifestations along natural systems (rivers). She also conducts workshops on ways to Represent and Document the Intangible Cultural Heritage of People and Places.

ABSTRACT

Biodiversity within urban environments allows individuals to engage with natural elements and foster a sense of respect towards the natural world. Through classroom interactive sessions, field excursions, and hands-on activities, students will understand the abundant biodiversity found

in urban settings and the valuable functions that natural ecosystems can provide inside cities. Upon completing this course, students will construct a tangible model of an urban fauna habitat and implement it in their educational institutions or other urban settings.

What is the “grand challenge” or real-life problems students will try to solve through the course?

Since humans have become permanent occupants of urban green spaces, there has been a pressing need to provide appropriate habitats for species residing in urban environments. As a result of excessive infrastructure-related endeavors, many species are experiencing habitat loss which leads to their confinement in fragmented areas. In this course, students will design structures and installations that will enhance the habitat for various fauna species and help integrate them into the urban green areas of Ahmedabad.



METHODOLOGY

ACADEMIC CONCEPTS

Knowledge of preserving and protecting urban biodiversity, understanding of environmental systems, evidence-based reasoning, creative and imaginative problem solving, and two-dimensional concepts and sketches.

LEARNING OUTCOME

Students will learn to communicate natural patterns and processes through graphical representations of biodiversity such as maps, storyboards, and other visual narratives. They will transform the 2D drawings of their idea into physical 3D models and installations. They can also suggest ideas to increase the biodiversity quotient.

TANGIBLE OUTCOME

Physical prototype models for a chosen fauna species and its installations either in the institute or gardens, parks, ponds, riverside, etc. Display of documentation such as maps, storyboards, photographs, videos, and basic sketches in different mediums.

PAPERWISE CRAFTING SUSTAINABILITY IN PAPER PULP



SNEHAL
KASHIKAR

INSTRUCTOR

Snehal Kashikar, Ceramic Artist, Ahmedabad. She is currently the Principal Artist at the handmade ceramics initiative Mogra, and practices from her studio. She is also an instructor in various reputed institutes in the city. She received her Diploma in Textile Design in 2002 from the Department of Textile Engineering, VJTI, Mumbai. After receiving

a Diploma in Ceramics and Pottery in 2007 from LS Raheja Institute, Mumbai, she began her creative journey in clay. Her key interest areas are explorations of handbuilt techniques, form appreciation, glaze and surface development in the earthenware ceramics range.

ABSTRACT

Paper manufacturing has a significant environmental impact, particularly in terms of deforestation. Only 20% of waste paper in India is collected, and the rest ends up in landfills. To address this issue, the course proposes solutions that eliminate the use of wood in the production of paper, by using alternative materials like denim, sugarcane, grass etc. The course focuses on finding

innovative methods to make handmade paper and investigating alternative materials for paper production in three dimensions, with the aim of expanding the conventional boundaries of paper. Students will also learn about the ancient art of papermaking, its historical significance, and its relevance in the development of art.

What is the “grand challenge” or real-life problems students will try to solve through the course?

Providing solutions for paper waste in society.



METHODOLOGY

ACADEMIC CONCEPTS

Implement the collective potential and competency of the group to work on a campaign and actively find resolutions for it. Develop a broader perspective on societal problems and conflicts. Develop creative, innovative, and action-oriented resolutions.

LEARNING OUTCOME

Learn and understand the aesthetics, history, science and sustainability of recycled paper materials. Apply, practice, and develop basic skills required for creation of hand paper and blocks in paper pulp. Learn to creatively construct 2D and 3D paper forms.

TANGIBLE OUTCOME

Bricks and blocks made from recycled materials. Products made of recycled materials such as tables and benches in a public sitting area. Handmade paper samples from recycled denim, jute, sugarcane waste, pineapple waste, corn waste, banana fiber paper, lemon straw grass, neem leaves, coir, and cotton fabric wastes. Pin up presentation of the creative process.



BUILDING A FLUIDIC NEUROCOMPUTER



ADARSH
GANESAN

INSTRUCTOR

Adarsh Ganesan, Assistant Professor, School of Engineering and Applied Science. During his PhD at Cambridge University, Professor Ganesan reported the first experimental evidence for phononic frequency combs, wherein an array of equidistant frequencies stems from a single drive tone. These phononic combs represent a new class of phenomena in the domain of mechanical

vibrations. The American Physical Society recognised these combs as a notable advance. As a faculty at Ahmedabad University, he intends to establish the field of phononic frequency combs building on research done during his doctoral and postdoctoral work.

ABSTRACT

The students will review the history of computing and reaction-diffusion systems. This includes the study of Charles Babbage's Difference Engine and Alan Turing's Mathematical Model for Morphogenesis. Following this, the students will seek the convergence of chemical reactions and computing. To this end, the recent developments

of chemical computers will be reviewed, and henceforth, a robust plan for the follow-on experimental activities will be charted out. Along the way, the students will learn the technical aspects required to complete the project.

What is the “grand challenge” or real-life problems students will try to solve through the course?

Alternative Computing



METHODOLOGY

ACADEMIC CONCEPTS

Critically analyse the opportunities and challenges in the current computing approaches. Developing a multidisciplinary and out-of-box thinking to solve problems by seeking ideas and opportunities from various disciplines – for instance, applying techniques from life sciences to solve a computer science problem. Experiment using laboratory-based and computer-based techniques. Understanding and developing a neurocomputer.

LEARNING OUTCOME

Understand the historical context of computing. Learn the basics of fluid mechanics, chemical reactions, digital logic, and differential equations. Apply MATLAB and COMSOL to solve differential equations and fluid mechanics, respectively. Harness laser cutting and 3D printing for building fluidic devices. Experiment with fluids and chemicals. Perform a SWOT analysis and formulate commercialisation strategies.

TANGIBLE OUTCOME

Report on The Need for Alternative Computing Neurocomputer, Comparison of Harvard and Stanford Neurocomputer. To find out how we can be different. Prototype of Neurocomputer. Finding a commercialisation strategy for Ahmedabad University Neurocomputer.



ULTIMATE COURSE ON DRONE BUILDING AND FLYING



TARUN
RIJWANI

INSTRUCTOR

Tarun Rijwani, CEO, Rudrabots Pvt Ltd and a Technology Enthusiast. He has a background in Mechanical engineering and has six years of experience working in the 3D printing industry. Rudrabots Pvt Ltd manufactures indigenously developed 3D Printers for their use in engineering and medicine fields. Mr Rijwani has created the Multi Material FDM system, Modified Core-XY

Mechanism, and FDM-based Metal Additive Manufacturing (FAM), to improve the effectiveness and cost-effectiveness of 3D printing. Additionally, he has worked on many DIY projects such as robotic arms, aerial robotics, CNC automation etc. He has a hobby of seeking opportunities to use his knowledge in this domain.

ABSTRACT

The course is designed to impart knowledge and skills related to Aerial Robotics and its applications in various sectors. It involves theoretical and practical exposure to Aerial Robotics along with

drone making and flying. The goal is to develop holistic thinking for problem solving and utilising the skills of drone building and flying to solve real-life problems.

What is the “grand challenge” or real-life problems students will try to solve through the course?

There are several applications for drones in real-world situations, including surveillance, sprinkling fertilisers on farms, mapping places, firefighting, and conducting rescue operations. Drones are also capable of giving humanitarian aid during disasters. During the course, we provide the students with adequate knowledge and tools and emphasise that they come up with a problem they want to solve by using Aerial Robotics.



METHODOLOGY

ACADEMIC CONCEPTS

Basics of Electronics and Physics, Mechanics and Dynamics, and Python programming.

LEARNING OUTCOME

Understand various concepts of Aerial Robotics. Implement theoretical knowledge to solve real-life problems. Basics of electronics, propulsion systems, unmanned vehicles, and drone configurations. Implement the knowledge gained in this course to develop other DIY projects.

TANGIBLE OUTCOME

Development of various types of drones and their diverse applications.



THERMODYNAMICS FROM HISTORICAL WAR



DHARAMASHI
RABARI



APARAJITH
RAMNATH

INSTRUCTORS

Dharamashi Rabari, Assistant Professor, School of Engineering and Applied Sciences. He has over 12 years of teaching experience. He uses his experience of project-based learning to teach Thermodynamics and other courses.

Aparajith Ramnath (Invited Speaker), Associate Professor, School of Arts and Sciences. He teaches various courses about the history of science. Professor Ramnath will deliver talks during a couple of sessions for this course.

ABSTRACT

The course covers several historical events and relates them to the concept of Thermodynamics. It includes the stories of the Napoleonic Wars, the Jin-Song Wars, the Anglo-Mysore Wars, and the World Wars. Different concepts of Thermodynamics, such as entropy, the heat of reaction, the first law of thermodynamics, and phase equilibrium, are

linked with specific historical events. The content is designed in such a way that all undergraduate programmes will find it interesting. (Engineering and Non-Engineering). The course contains many activities, namely making simple rockets, fire lances, heat engines, thermometers, etc.

What is the “grand challenge” or real-life problems students will try to solve through the course?

Students will realise the importance of energy. How much energy is wasted by humans every day? Can the consumption of energy be minimised without compromising efficiency for future generations, and how? Students will apply the knowledge of Thermodynamics to solve these questions. Additionally, students will select a historical event (not covered in this course) and relate it to the thermodynamics concept. The work will be presented in class on the last day of the programme.



METHODOLOGY

ACADEMIC CONCEPTS

- The students will present the working models of Fire Lance and Rockets.
- The students will also present the posters of the Grand challenge.

LEARNING OUTCOME

Understand the basic concepts of Thermodynamics. Analyse the mentioned historical events with a technical viewpoint, especially with thermodynamics.

TANGIBLE OUTCOME

Present the working models of Fire Lance and Rockets. Also, prepare and present posters for the Grand Challenge.



EXPLORING SOIL-LESS FARMING TO ADDRESS GLOBAL FOOD SECURITY



ADITYA
PAREKH

INSTRUCTOR

Aditya Parekh, Co-Founder, FaFaFo Project. He has an undergraduate and postgraduate degree in Microbiology and Biochemistry from the University of Calcutta. He has PhD from IIT, Kharagpur, in cancer multidrug resistance. He was also a Fullbright Scholar and did part of his research at Johns Hopkins University, USA. He pursued his postdoctoral research in muscle development at the National Centre for Biological Sciences,

Bengaluru. As a Professor at Anant National University, he designed and taught many courses, such as Food Systems: A Sustainable Perspective; Sustainable Agriculture (Theory and Live Action Project); Urban Agriculture; Build Environment and Health. Thereafter, he served as an Associate Director of IndiaBioscience. Currently, at FaFaFo Project, he tries to strengthen the connection of people with food systems.

ABSTRACT

The food you consume has a significant impact on the climate. You would be surprised to know that nearly 1/3rd of the total global greenhouse gases are accounted for by the food systems. While food is a major contributor to global warming, it is also affected by changes in climate patterns. Through theory, exercises, and activities, this course will

give insight into how food and climate change are strongly linked and how individuals can leverage food and human behaviour to mitigate climate change. The course will also discuss topics like the future of food, health and Sustainable Development Goals.

What is the “grand challenge” or real-life problems students will try to solve through the course?

How can we feed the growing human population by 2050 without compromising the health of the planet and people?



METHODOLOGY

ACADEMIC CONCEPTS

Issue of global food insecurity and sustainability. Understanding how the food system is both a threat and a solution for climate change. Sustainable solutions for the future using science, technology, and nature.

LEARNING OUTCOME

Understand how different components of the food system are linked to greenhouse gas emissions and, thus, climate change. Evaluate the carbon footprint and environmental impacts of food processes and systems. Create sustainable solutions using science at the individual, community, or system level to tackle the threat of global food insecurity. Develop a futuristic, holistic, and empathetic approach towards a global problem.

TANGIBLE OUTCOME

Present models and posters at the ISP expo. Demonstrating different ways of tackling the problem of food security and sustainability.



BIOMIMICRY: LEARNING TO LEARN FROM NATURE! 'UNPACK' NATURE'S WISDOM TO CREATE SUSTAINABLE PACKAGING



PRASHANT
DHAWAN

INSTRUCTOR

Prashant Dhawan, Co-Founder, Biomimicry India Network and Biomimicry India. It is a company which designs and delivers learning experiences and undertakes consultancy and research in the field of biomimicry. He was the first person from India to obtain an MS degree in Biomimicry in 2015 from Arizona State University, USA (Biomimicry 3.8 Institute, USA). He also holds a degree in Architecture from the School of Planning and Architecture,

Delhi and an MBA from ISB, Hyderabad. With over 27 years of work experience (including 8 years of designing and delivering learning experiences in Biomimicry), he has had the opportunity to work with IDEO and also in the corporate sector. He is also a two-time TEDx speaker. Mr Dhawan calls himself an amateur researcher on issues related to sustainable happiness and well-being.

ABSTRACT

Biomimicry is a discipline that looks at nature for ideas to help solve human challenges. As part of the course, students will learn about the amazing designs and solutions in nature. They will go out

in nature, play learning games, work in groups, and make models. They will learn to apply nature's design principles using the latest biomimicry tools and methodology.

What is the “grand challenge” or real-life problems students will try to solve through the course?

They will get to explore and develop nature inspired solutions to solve challenges of eliminating and minimising waste (Food waste /Water waste/Food packaging waste). They will also create a model/ prototype of the idea.



METHODOLOGY

ACADEMIC CONCEPTS

Theories of operating conditions of planet earth and life’s unifying patterns. Learn how to integrate Biology into Design. Explore and understand how and why there is no waste in nature. Lastly, apply the Biomimicry approach to come up with solutions.

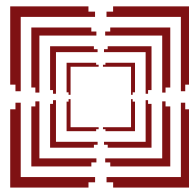
LEARNING OUTCOME

Understand and apply the Biomimicry approach in order to solve problems. The focus would be on eliminating or minimising food, water, and food packaging waste. Understand how to explore and learn from nature at various levels of products, processes, and systems. Reconnect with nature and observe and understand nature by its function.

TANGIBLE OUTCOME

Physical prototype of the design solution.





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