

# Booklet of Common Courses Offered by USS

**Guru Gobind Singh Indraprastha University**



**Common Courses (MDC/IDC, SEC, AEC and  
VAC) Scheme and Syllabus  
(First Semester)**

# Content

<b>S. No.</b>	<b>Details</b>	<b>Page Range</b>
<b>1.</b>	<b>Outline of the Courses</b>	<b>4-8</b>
<b>2.</b>	<b>Multidisciplinary Courses (MDC)</b>	<b>10-45</b>
	1. History and Literature	
	2. Society and Politics	
	3. Society and Culture	
	4. Introduction to Gender Studies	
	5. Film Appreciation	
	6. Basics Statistics for Economics	
	7. Digital Innovation and Social Media Marketing	
	8. Design Thinking and Innovation	
	9. Mass Spectrometry in Action: from theory to practice	
	10. Food commodities	
	11. Discrete Mathematics	
	12. Mathematical Data Science	
	13. Bio Statistics	
	14. R-SHINY WEB APP	
	15. NONLINEAR DYNAMICS	
	16. Unit Operations in Process Industries	
	17. ENVIRONMENTAL POLLUTION AND HEALTH	
	18. PCB Design	
	19. Introduction to Manufacturing Process	
	20. Signals and Systems	
<b>3.</b>	<b>Skill-Enhancement Courses (SEC)</b>	<b>46-70</b>
	1. History of Science and Technology in India (IKS)	
	2. Gender and Development	
	3. Understanding Indian Society Through Cinema	
	4. Entrepreneurship Mindset**	
	5. Communication Skills	
	6. Basics of Excel & Data Analysis	
	7. New Product Development in Biotechnology	
	8. Protein Footprinting	
	9. Food Preservation	

10. The Story of Science
11. Excel I
12. Latex I
13. Scientific Writing
14. Maple
15. Fractal Geometry
16. Air and Water Quality Analysis
17. Python Programming
18. Web Development

**4. Ability Enhancement Courses (AEC)**

**71-96**

1. Story of Indian Food
2. Legislative Management and Support
3. Reading Folklore
4. English Language and Grammar –I
5. Punjabi – I
6. French - I
7. German - I
8. Hindi I
9. Use of Generative Artificial Intelligence
10. Scientific communication and writing
11. Emerging Technologies in Food Industry

**5. Value-Added Courses (VAC)**

**97-109**

1. Environmental Studies
2. Introduction to Indian Philosophy (IKS)
3. IT Tools for Statistics in Economics-I
4. Bioentrepreneurship
5. Regulatory affairs in Biotechnology
6. AI in Environment

# Outline of the Common Courses

## SEMESTER I

### Multi-Disciplinary Courses (MDC) \*

S. No.	Course Code	Course Title	Offered By	Credit	Mode Of Examination
1.	To be Generated	History and Literature	USLA	3	UES
2.	To be Generated	Society and Politics	USLA	3	UES
3.	To be Generated	Society and Culture	USLA	3	UES
4.	BAENG123	Introduction to Gender Studies	USHSS	3	UES
5.	BAENG125	Film Appreciation	USHSS	3	UES
6.	BAECO107	Basics Statistics for Economics	USHSS	3	NUES
7.	MS-MDC 101	Digital Innovation and Social Media Marketing	USMS	3	UES
8.	BT-161	Design Thinking and Innovation	USBT	3	
9.	BT-163	Mass Spectrometry in Action: from theory to practice	USBT	3	
10.	BT-165	Food commodities	USBT	3	
11.	BSID 101	Discrete Mathematics	USBAS		
12.	BSID201	Mathematical Data Science	USBAS	3	UES
13.	BSID301	Bio Statistics	USBAS		
14.	BSID401	R-SHINY WEB APP	USBAS	3	UES
15.	BSID501	NONLINEAR DYNAMICS	USBAS		
16.	CT-103	Unit Operations in Process Industries	USCT	3	
17.	BSCES-107	ENVIRONMENTAL POLLUTION AND HEALTH	USEM	3	

18.	ICT-111	PCB Design	<b>USICT</b>	3	
19.	ICT-115	Introduction to Manufacturing Process	<b>USICT</b>	<b>3</b>	
20.	ICT-117	Signals and Systems	<b>USICT</b>	3	

**\*Student will be required to opt for MDC Courses out of their respective Schools**

### Skill Enhancement Courses

<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Offered By</b>	<b>Credit</b>	<b>Mode Of Examination</b>
1.	To be Generated	History of Science and Technology in India (IKS)	<b>USLA</b>	3	UES
2.	To be Generated	Gender and Development	<b>USLA</b>	3	UES
3.	To be Generated	Understanding Indian Society Through Cinema	<b>USLA</b>	3	UES
4.	To be Generated	Entrepreneurship Mindset**	<b>USLA</b>	3	UES
5.	BAENG127	Communication Skills	<b>USHSS</b>	3	NUES
6.	BAECO109	Basics of Excel & Data Analysis	<b>USHSS</b>	3	NUES
7.	BT-171	New Product Development in Biotechnology	<b>USBT</b>	3	UES
8.	BT-173	Protein Footprinting	<b>USBT</b>	3	UES
9.	BT-175	Food Preservation	<b>USBT</b>	3	UES
10.	BSEC131	The Story of Science	<b>USBAS</b>	3	UES
11.	BSSEC101	Excel I	<b>USBAS</b>	3	UES
12.	BSSEC201	Latex I	<b>USBAS</b>	3	UES
13.	BSSEC301	Scientific Writing	<b>USBAS</b>	3	UES
14.	BSSEC401	Maple	<b>USBAS</b>	3	UES
15.	BSSEC501	Fractal Geometry	<b>USBAS</b>	3	UES

<b>16.</b>	BSCES-111	Air and Water Quality Analysis	<b>USEM</b>	3	
<b>17.</b>	ICT-104	Python Programming	<b>USICT</b>	3	
<b>18.</b>	ICT 305	Web Development	<b>USICT</b>	3	

## Ability-Enhancement Courses (AEC)

<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Offered By</b>	<b>Credit</b>	<b>Mode Of Examination</b>
1.	To be Generated	Story of Indian Food	<b>USLA</b>	<b>2</b>	<b>NUES</b>
2.	To be Generated	Legislative Management and Support	<b>USLA</b>	<b>2</b>	<b>NUES</b>
3.	To be Generated	Reading Folklore	<b>USLA</b>	<b>2</b>	<b>NUES</b>
4.	BAENG107	English Language and Grammar –I	<b>USHSS</b>	<b>2</b>	<b>NUES</b>
5.	BAENG109	Punjabi – I	<b>USHSS</b>	<b>2</b>	<b>NUES</b>
6.	BAENG111	French - I	<b>USHSS</b>	<b>2</b>	<b>NUES</b>
7.	BAENG113	German - I	<b>USHSS</b>	<b>2</b>	<b>NUES</b>
8.		Hindi I		<b>2</b>	
9.	BT-181	Use of Generative Artificial Intelligence	<b>USBT</b>	<b>2</b>	
10.	BT-183	Scientific communication and writing	<b>USBT</b>	<b>2</b>	
11.	BT-185	Emerging Technologies in Food Industry	<b>USBT</b>	<b>2</b>	

## Value-Added Courses

<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Offered By</b>	<b>Credit</b>	<b>Mode Of Examination</b>
1.	To be Generated	Environmental Studies	<b>USLA</b>	<b>2</b>	<b>NUES</b>
2.	BAENG121	Introduction to Indian Philosophy (IKS)	<b>USHSS</b>	<b>2</b>	<b>NUES</b>
3.	BAECO111	IT Tools for Statistics in Economics-I	<b>USHSS</b>	<b>2</b>	<b>NUES</b>
4.	BT-191	Bioentrepreneurship	<b>USBT</b>	<b>2</b>	
5.	BT-193	Regulatory affairs in Biotechnology	<b>USBT</b>	<b>2</b>	
6.	BSCES-113	AI in Environment	<b>USEM</b>	<b>1</b>	

# **Detailed Syllabus**

# **Multi-Disciplinary Courses (MDC)**

## *University School of Liberal Arts (USLA)*

### **History and Literature**

**Nature of the Course:** MDC

**Course Code:**

**Semester:** First (I)

**Credits:** 3 (L2:T1)

**Mode of Examination:** UES

**Course ID:**

**Marks:** 100 (40+60)

**Internal Evaluation:** 40

**External Evaluation:** 60

### **Course Objective**

This course will examine the texts; place them in historical contexts and help students to use them as tools for history writing.

### **Course Outcome**

**CO1 (Knowledge):** To differentiate historical texts from other forms of available literature.

**CO2 (Understanding):** Understand the various perspectives to study history.

**CO3 (Synthesis):** To examine various texts associated with different religious traditions.

**CO4 (Application):** Evaluate historical literature and its relevance in contemporary times.

### **Course Content**

#### **Unit I: Ancient Indian Literature**

- a. Sanskrit literature- Vedas and Itihasa Purana traditions.
- b. Normative texts- Manusmriti and Arthashastra
- c. Biographical accounts- Harshacharita and Vikramankadevacharita.
- d. Ancient Tamil texts- Sangam literature, Silapaddikaram.
- e. Pali-Prakrit literature- Jatakas and Agamas.
- f. Historical texts- Rajatarangini.

#### **Unit II: Medieval period literature**

- a. Persian literature- Abul Fazl- Akbarnamah, Badauni- Muntakhab-ut-Tawarikh, Mir Khwand's- Rauzat us Safa, Mohsin Fani's- Dabistan-i-Mahsib.
- b. Women writers- Lalleshwari (Lal Ded), Gulbadan Bano Begum, Zeb-un-Nisa.
- c. Urdu Literature- Raskhan's Pand Mahim Suniya's story collection.

### **Unit III: Modern Indian Literature – Any four texts**

- a. Rabindranath Tagore- Gitanjali.
- b. Bankim Chandra Chattopadhyaya – Ananda Math.
- c. Prem Chand- Godan.
- d. Sadat Hassan Manto- Khol Do.
- e. Amrita Pritam- Pinjar.
- f. Rajaram Aatram- Ughda Darwaza.

### **Unit IV: Poetics and Literature**

- a. Kalidasa- Raghuvamsa and Kumarasambhava.
- b. Sangam Literature- Akam and Puram poems.
- c. Persian Poet- Amir Khusrau.
- d. Bhakti poems- Mirabai, Tulsidas, Bulle Shah.
- e. Urdu poetry- Ghalib.
- f. Modern Indian poetry- City of Palaces by James Atkinson, My Native Land- Shashee Chander Dutt.

### **Pedagogy**

- Classroom lectures/project work.
- Class assignment: a review of the unabridged version of any book related to pre-colonial literature.
- Classroom debate on the change in literary forms after colonial rule and the influence of Western ideas in Indian writing.

### **Textbooks**

1. Pollock, Sheldon, ed., *Literary Cultures in History: Reconstruction from South Asia*, Delhi Oxford University Press, 2003.
2. Sharma, T.R.S., ed. *Ancient Indian Literature: An Anthology (3 vols)* New Delhi: Sahitya Akademi, 2000.
3. Kane, P.V., *History of Dhramashastra*, Bhandarkar Oriental Research Associate, Poona, 1941.
4. Olivelle, Patrick, *Manu's Code of Law*, Oxford University Press, 2005.

### **Recommended Readings**

1. Shamashatry, R., trans., *Kautilya's Arthashastra*, 1950.
2. Sen, Ksitimohan, *Medieval Mysticism in India*, London, 1936.

## Society and Politics

**Nature of the Course:** MDC

**Course Code:**

**Semester:** First (I)

**Credits:** 3 (L2:T1)

**Mode of Examination:** UES

**Course ID:**

**Marks:** 100 (40+60)

**Internal Evaluation:** 40

**External Evaluation:** 60

### Course Objective

Society and Politics is an interdisciplinary course that explores questions through the intersection of political science and sociology and analyses various political processes and social transformations both at the macro level of national and internal politics and at the micro level.

### Course Outcome

**CO1 (Knowledge):** This course will give an idea about the intrinsic relationship between the social and political.

**CO2 (Understanding):** It will enable an understanding of state, nation, citizenship, and democracy.

**CO3 (Synthesis):** The student can analyze the functioning of civil society institutions.

**CO4 (Application):** The student will be able to explore the relationship between the process of globalization with the polity and how it impacts society.

### Course Content

#### Unit I: Understanding the Concepts

- a. Conceptualising Politics: Definition, Perspectives of Politics-Classical, Liberal, Marxist, Feminist
- b. Society: Definitions, Characteristics, State and Society Distinctions
- c. Civil and Political Society

#### Unit II: Theories of Social Stratification

- a. Marxian Approaches to Social Stratification
- b. Weberian Approach to Social Stratification

#### Unit III: Socio-Political Identities in India

- a. Caste in Indian Polity: Reservation, Second Democratic Upsurge in India
- b. Gender and Institutional Interventions in India: Defining Gender, National Report on the Role and Status of Women (1980), Vishakha Guidelines and the POSH Act (2013)

#### Unit IV: Democracy and Globalisation

- a. Democracy: Conceptualising Democracy, Definitions, Procedural and Deliberative Democracy
- b. Globalisation, Civil Society, Global Poverty

## **Pedagogy**

- Lectures
- Classroom discussion/Interaction
- Project and Assignment
- Documentary/ Movies
- Minor Test

## **Text Books**

1. Bottomore, Tom. *Political Sociology*. London: Hutchinson, 1979.
2. Chakrabarty, Bidyut. *Indian Politics and Society Since Independence: Events, Processes, and Ideology*. Paperback. Taylor and Francis Ltd., 2008.
3. Kohli, Atul, ed. *The Success of India's Democracy*. Cambridge University Press, 2001.
4. Bardhan, Pranab. "The Impact of Globalization on the Poor." *Brookings Trade Forum: Globalization, Poverty, and Inequality* (2004): 271–284. Washington, DC: Brookings Institution Press.

## **Recommended Readings**

1. Bardhan, P. *The Political Economy of Development in India*. Oxford: Blackwell, 1984.
2. Chatterjee, Partha. "Democracy and Economic Transformation in India." *EPW*, Vol. 43, No. 16 (April 19-25, 2008), pp. 53-62.
3. Fuller, and Benei, eds. *Everyday State and Society in Modern India*. Delhi: Social Science Press, 2001.
4. Heywood, Andrew. *Key Concepts in Politics*. New York: Palgrave, 2000.
5. Janoski, Thomas, Robert Alfred, Alexander Hicks, and Mildred A. Schwartz, eds. *The Handbook of Political Sociology: States, Civil Societies and Globalisation*. Cambridge University Press, UK, 2005.
6. Kothari, Rajni. *Caste in Indian Politics*. Hyderabad: Orient Longman, 1970.
7. Lipset, S.M., ed. *Politics and Social Science*. New York: OUP, 1969.
8. Macpherson, C.B. *The Real World of Democracy*. Oxford: Clarendon Press, 1966.
9. Michelutti, Lucia. *The Vernacularisation of Democracy: Politics, Caste and Religion in India*. New York: Routledge, 2009.
10. Myrdal, Gunnar. *Asian Drama: An Inquiry into the Poverty of Nations*. London: Allen Lane, 1972.
11. Rudolf, Lloyd, and Rudolf Susan, eds. *In Pursuit of Lakshmi: The Political Economy of the Indian State*. Chicago: University of Chicago Press, 1987.
12. Sanyal, Kalyan. *Rethinking Capitalist Development: Primitive Accumulation, Governability and Post Colonial Capitalism*. New Delhi: Routledge, 2007.
13. Sen, Amartya. *Development as Freedom*. New Delhi: OUP, 1999.

14. Weber, Max. *Economy and Society: An Outline of Interpretive Sociology*. Edited by Guenther Roth and Claus Wittich. Translated by Ephraim Fischhoff et al. Berkeley: University of California Press, 1978.

## Society and Culture

**Nature of the Course:** MDC

**Course Code:**

**Semester:** First (I)

**Credits:** 3 (L2:T1)

**Mode of Examination:** UES

**Course ID:**

**Marks:** 100 (40+60)

**Internal Evaluation:** 40

**External Evaluation:** 60

### Course Objective

This course aims to provide a comprehensive understanding of the fundamental concepts of society and culture, exploring the distinctions and connections between human and non-human societies, material and non-material culture, and various societal types. It examines the complexities of intercultural communication, emphasizing the role of communication in maintaining social relationships and the impact of evolving technologies. Additionally, the course delves into belief systems and ideologies, highlighting their influence on individual and group identities, and power structures. Finally, it investigates the nature of popular culture, its interaction with society and individuals, and its role in driving social change.

**Course Outcome:** After completing this course, students will be able to

**CO1 (Knowledge):** Gain foundational knowledge of society and culture, including definitions, features, types, and key concepts like multiculturalism and ethnocentrism.

**CO2 (Understanding):** Understand the formation of personal and social identities, the nature of verbal and non-verbal communication, and the impact of changing communication technologies.

**CO3 (Synthesis):** Synthesize knowledge of belief systems and ideologies, exploring their role in identity formation, power structures, and the relationship between society and popular culture.

**CO4 (Application):** Apply sociological and cultural concepts to real-world scenarios, analyzing social behaviors, inclusion/exclusion dynamics, and the influence of popular culture on social change.

### Course Content

#### Unit I: Basic Concepts of Society and Culture

- a. Society: Definition, Features, and Comparison between human and non-human society
- b. Essential Elements of Society; Types of Society
- c. Concept of Culture- Material and Non-Material Culture; Elements of Culture
- d. Multiculturalism, Cultural Relativism and Ethnocentrism

#### Unit II: Intercultural Communication

- a. The behavior of people in different social, cultural, and environmental issues
- b. Nature of communication- verbal and non-verbal communication

- c. Role of communication in maintaining social relationships and social control
- d. Impact of changing communication technologies

### **Unit III: Belief System and Ideologies**

- a. Similarities and Differences
- b. Nature and role of shared values and understanding within belief systems and ideologies
- c. Belief systems and ideologies as the basis of group and individual identity
- d. Nature and role of hierarchy and internal power structures within belief systems

### **Unit IV: Popular Culture**

- a. What is popular culture? Features associated with commercial products and paraphernalia, different perceptions of popular culture, local to global perspectives
- b. Interaction between popular culture, society, and individual
- c. Consumers and nature of consumption of popular culture
- d. Continuity and Change: Interface between society and culture; contribution of popular culture to social change

### **Pedagogy**

- Lectures
- Discussion and Presentations
- Seminar
- Audio-Visual

### **Text Books**

1. Horton, Paul B; Hunt, Chester L. *Sociology*. McGraw-Hill. New York. 1980.
2. Klyukanov, I.G. *Principles of Intercultural Communication*. Taylor and Francis. 2020.
3. Brandt, Mark J; Rutjens, Bastiaan T. *Belief System and Perception of Reality*. Routledge. New York. 2019
4. Storey, John. *An Introductory Guide to Cultural They and Popular Culture*. The University of Georgia Press. Athens. 1993.
5. Williams, Raymond. *Keywords*. Fontana Press. London. 1983
6. Turner, B. S and Rojek, C. *Society and Culture: Scarcity and Solidarity*. Sage Publication. London. 2001.

### **Recommended Readings**

1. Chen, Guo-Ming. (2012). "The impact of new media on intercultural communication in global context." *China Media Research*, vol. 8, no. 2, 2012, pp. 1-10
2. Duke, Charles R. "Nonverbal Behavior and the Communication Process." *College Composition and Communication* 25, no. 5 (1974): 397-404
3. Burton, Eleanor Q. "Intercultural Communication." *Insight Turkey*, no. 7 (1997): 155-64.
4. Bennett, Milton J. (Eds.) *Basic Concepts of Intercultural Communication: Selected Readings*. Intercultural Press. London. 1998. (pp- 1-52; 173- 190).

5. Philip E. Converse (2006) The nature of belief systems in mass publics (1964), *Critical Review*, 18:1-3, 1-74. (Selected Sections).
6. Usó-Doménech, J.L., Nescolarde-Selva, J. What are Belief Systems?. *Found Sci* 21, 147–152 (2016)
7. Sartori, Giovanni. “Politics, Ideology, and Belief Systems.” *The American Political Science Review* 63, no. 2 (1969): 398–411.
8. Kennedy, Emmet. “‘Ideology’ from Destutt De Tracy to Marx.” *Journal of the History of Ideas* 40, no. 3 (1979): 353–68.
9. Frank, Jerome D. Nature and Functions of Belief Systems Humanism and Transcendental Religion. *American Psychologist*. (1997). pp. 555-559
10. Abelson, Robert P. “Differences Between Belief and Knowledge System”. *Cognitive Science*. Vol. 3. (1979). pp. 355-366
11. Harmon, Gary L. “On the Nature and Functions of Popular Culture.” *Studies in Popular Culture* 6 (1983): 3–15.
12. Harrington, C. Lee; Bielby, Denise. ‘Constructing the Popular: Cultural Production and Consumption’. In Harrington, C. Lee; Bielby, Denise (Eds.). *Popular Culture: Production and consumption*. Wiley Blackwell. London, 2000.

\*Any other relevant material

# *University School of Humanities and Social Sciences*

## *(USHSS)*

### Inter-Disciplinary Course

**Nature of the Course:** IDC  
**Course Title:** Introduction to Gender Studies  
**Course Code:** BAENG121  
**Credits:** 3 (L 2, T1)

**Mode of Exam:** UES

**Total Marks:** 100 (40 + 60)

#### **Course Objectives:**

To enhance the sensitivity of the students towards issues relating to gender; to help students gain an appreciation for literature and films that foreground gender debates.

#### **Course Outcomes (COs):**

**CO1 (Knowledge):** Students will get an introduction to various aspects of gender studies such as femininity and masculinity.

**CO2 (Understanding):** Students will understand how gender issues intersect with other forms of oppression and play out in various forms of literature and media.

**CO3 (Communication):** Students will be able to critically analyse literature and films in the context of gender.

#### **Course Content**

##### **Unit I: Essays**

**Simone de Beauvoir:** "Introduction" to *The Second Sex*

**R. W. Connell:** "The Science of Masculinity," Chapter 1 from *Masculinities*

##### **Unit II: Poetry**

**Maya Angelou:** "Caged Bird", "Phenomenal Woman"

**Sylvia Plath:** "The Voice of Empowerment", "The Colossus"

**Kamala (Das) Suraiya:** "An Introduction", "The Old Playhouse"

##### **Unit III: Fiction**

**Mohammed Hanif:** *Our Lady of Alice Bhatti*

##### **Unit IV: Films**

**Aniruddha Roy Chowdhury:** *Pink*

**Theodore Melfi:** *Hidden Figures*

**Examination Scheme:**

1. There will be **five** questions in total with internal choice. Each question will carry **12** marks.
2. Question no. 1 will have 4 short notes on theoretical concepts and short questions based on prescribed texts. Students will be required to attempt any 3. Each short note will carry 4 marks.
3. Questions no. 2 to 5 will be essay-type questions testing students understanding of the concepts; or else, it can have two sub-sections of short answer type questions.
4. In questions no. 2 to 5, there will be one question from each unit with internal choice.

**Suggested Readings:**

1. Chakravarti, Uma. "Caste, Class and Gender: The Historical Roots of Brahmanical Patriarchy." *Gendering Caste through a Feminist Lens*, Sage, 2018, pp. 36-62.
2. Chandra Talpade Mohanty – "Under Western Eyes: Feminist Scholarship and Colonial Discourses." *Feminist Review*, no. 30, 1988, pp. 61-88.
3. Crenshaw, Kimberlé W. "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics." *University of Chicago Legal Forum*, no. 1, 1989, pp. 139-167.
4. hooks, bell. "Feminist Manhood." *The Will to Change: Men, Masculinity, and Love*, Atria Books, 2004, pp. 107-124.
5. Rich, Adrienne. "Compulsory Heterosexuality and Lesbian Existence." *Signs*, vol. 5, no. 4, 1980, pp. 631-660.

# Film Appreciation

**Nature of the Course: MDC**  
**Course Title: Film Appreciation**  
**Course Code: BAENG125**  
**Credits: 4 (L3)**

**Mode of Exam: UES**

**Total Marks: 100 (40 + 60)**

## Course Objectives:

The course aims to introduce students to the basics of film studies as a discipline and impart tools of film analysis. It will give students an understanding of the language of cinema, narration in cinema, film genres, film aesthetics, and the relationship between films and society through world and Indian cinema.

## Course Outcomes (COs):

After the completion of the course, the students will

**CO1 (Knowledge):** have the tools of film analysis; know various aesthetic movements in the history of cinema; narrative styles and different kinds of cinemas produced in India;

**CO2 (Understanding):** understand films as artistic and cultural texts;

**CO3 (Analysis):** be able to analyse films in their social, cultural, and historical context;

**CO4 (Research):** be acquainted with new areas of research in the field of film studies.

## Course Content:

- Unit- I:**           **Vittorio De Sica:** *Bicycle Thieves*  
                          **Francis Ford Coppola:** *The Godfather-I*
- Unit-II:**           **Alfred Hitchcock:** *Psycho*  
                          **Sergio Leone:** *The Good, the Bad and the Ugly*
- Unit-III:**          **Raj Kapoor:** *Awara*  
                          **Shyam Benegal:** *Manthan*
- Unit-IV:**          Assignments and Presentations

**Pedagogy:** The course will begin with focusing on the origin of cinema, and the language of cinema: Mise-en-Scene, Montage, Sound; and Film Genres. Introduction to other concepts of film studies such as major movements, Film Genres, and Auteur Theory will be discussed while teaching the course.

### **Recommended Viewing:**

1. Vittorio De Sica: *The Shoeshine*
2. Sergei Eisenstein: *Battleship Potemkin*
3. Truffaut: *The 400 Blows*
4. Alfred Hitchcock: *The Rear Window*
5. Mrinal Sen: *Bhuvan Shome*
6. Ritwik Ghatak: *Meghe Dhaka Tara*
7. Bimal Roy: *Do Bigha Zameen*
8. B. R. Chopra: *Naya Daur*
9. K. Asif: *Mughal-e-Azam*

### **Recommended Readings:**

1. Beaver, Frank Eugene. *A Dictionary of Film Terms: The Aesthetic Companion to Film Art*. Peter Lang, 2006.
2. Bordwell, David. *Narration in the Fictional Film*. Routledge, 1985.
3. Braudy, Leo and Marshal Cohen. *Film Theory and Criticism*. OUP, 1998.
4. Hood, John W. *The Essential Mystery: Major Film Makers of Indian Art Cinema*. Orient Blackswan, 2009.
5. Metz, Christian. *Film Language: A Semiotics of the Cinema*. University of Chicago Press, 1991.
6. Monaco, James. *How to Read a Film: Motives, Media, Multimedia*. OUP, 2007.
7. Nicholas, Bill, editor. *Movies and Methods - Vol. I and II*. Seagull, 1993.
8. Ray, Satyajit. *Our Films, Their Films*. Orient Longman, 1976.

### **Examination Scheme:**

1. There will be **five** questions in total with internal choice.
2. Question no. 1 will have 4 short notes, with an internal choice, on Film Terms. Each short note will carry 5 marks.
3. Question no. 2 to 9 will be essay-type questions testing students' understanding of the prescribed texts.
4. From Question no. 2 to 9, there will be two questions from each unit. Students will be required to attempt at least one question from each unit. Each question will carry 10 marks.

## Basics Statistics for Economics

**Paper Code:** BAECO107

**Paper:** Basics Statistics for Economics

**Internal marks:** 40

**Lectures - 2, Tutorial - 1**

**Total Credits:** 3

**External marks:** 60

### Course Objective:

The course aims to introduce the students to the basic concepts of statistics and its economic applications.

### Course Outcomes

CO1: To impart the knowledge on basic concepts of statistics

CO2: To ensure that the students understand the application of basic concepts of statistics to economics.

CO3: To enable students to comprehend the various statistical tools and their application

CO4: Enable students to solve assignments and discuss applications of statistics to various economic concepts

### Unit – I: Introduction

Primary and Secondary Data – Data Collection – Tabular and Graphical Analysis – Frequency Distributions – Measures of Central Tendency: Mean, Median, Mode – Measures of Dispersion: Range, Variance, Standard Deviation

### Unit – II: Sampling Distribution and Hypothesis Testing

Concepts of a parameter, statistic, sampling distribution – Chi-square, student's 't, Snedecor's F distributions – Null and alternative hypotheses: Simple and Composite hypotheses – Type I, and Type II errors – critical region – power function

### Unit – III: Correlation and Regression

Scatter Diagram – Types of Correlation – Karl Pearson's Coefficient of Correlation – Spearman's Coefficient of Correlation – Rank Coefficient of Correlation – Linear Regression in two variables

### Unit – IV: Assignments and Discussions

Students would be required to complete assignments/case studies applying the statistical concepts taught in the class

### Recommended Readings:

1. Gupta, S. C., & Kapoor, V. K. (2014). *Fundamentals of Mathematical Statistics* (11th ed.). New Delhi: Sultan Chand & Sons.
2. Goon, A. M., Gupta, M. K., & Dasgupta, B. (2016). *Fundamentals of Statistics* (Vol. 1, 8th ed.). Kolkata: The World Press Pvt. Ltd.

3. Spiegel, M. R. (1989). *Schaum's Outline of Theory and Problems of Statistics* (2nd ed.). New York: McGraw-Hill

# *University School of Management Studies (USMS)*

## **Digital Innovation and Social Media Marketing**

**Course Code: MS-MDC 101**

**L-3, T/P-0, Credits – 3**

**Objective:** This course aims to equip students with a clear understanding of how digital innovation reshapes modern marketing strategies. It emphasizes the strategic use of social media platforms to drive brand engagement and customer interactions. Students will learn to apply essential tools, techniques, and metrics used in social media marketing. The course also includes an analysis of real-world case studies and the development of digital campaign strategies.

### **Course Outcomes**

CO1: Demonstrate a comprehensive understanding of digital innovation and its impact on modern marketing practices, including distinctions between traditional and digital marketing approaches.

CO2: Develop strategic social media marketing plans by leveraging platform-specific features, audience insights, influencer engagement, and ethical considerations.

CO3: Apply digital marketing tools and analytics to measure campaign performance using KPIs such as reach, engagement, conversion, and ROI.

CO4: Critically analyze real-world digital campaigns and emerging trends (e.g., AI, AR/VR, personalization), and design effective social media campaigns using learned principles.

### **Course Contents**

#### **Unit I:**

**(11 Hours)**

**Foundations of Digital Innovation & Marketing:** Meaning, origin, scope, and importance of digital marketing. Internet versus traditional marketing communication: The Internet microenvironment. Business to Consumer and Business to Business Internet Marketing; Basics of SEO, SEM, and content marketing.

#### **Unit II:**

**(11 Hours)**

**Social Media Landscape and Strategy:** Overview of major platforms (Facebook, Instagram, X, LinkedIn, TikTok, and YouTube). Understanding user behavior and platform algorithms. Developing a social media strategy (audience, goals, messaging). Influencer marketing and community building. Ethical and legal considerations in digital spaces.

**Unit III:****(11 Hours)**

**Social Media Data Management and Measurement:** Social media analytics: Social media research, social media listening, and social intelligence. Social media metrics: Metrics and KPIs (reach, engagement, conversion, ROI), Google Analytics, and other tools.

**Unit IV:****(12 Hours)**

**Case Studies, Campaigns, and Trends:** Analysis of successful and failed digital campaigns. Global vs. local strategies in social media marketing. Emerging trends: AI in marketing, AR/VR, and personalization. Group project: Design and pitch a social media campaign. Final presentations and critique.

**Suggested Readings (Latest Editions):**

1. Ryan, D. (2016). *Understanding Digital Marketing*. Kogan Page.
2. Chaffey, D., & Ellis-Chadwick, F. (2019). *Digital Marketing*. Pearson.
3. Kotler, P., Kartajaya, H., & Setiawan, I. (2021). *Marketing 5.0*. Wiley.
4. Tuten, T. L., & Solomon, M. R. (2023). *Social Media Marketing*. Sage.
5. Kingsnorth, S. (2022). *Digital Marketing Strategy: An Integrated Approach to Online Marketing*. Kogan Page.

# University School of Biotechnology (USBT)

BT-161 (MDC)	Design Thinking and Innovation	2	1	0	3	30
--------------	--------------------------------	---	---	---	---	----

## Course Objectives:

1. Explain the concept and process of design thinking for product and service development.
2. Develop the ability to identify innovation opportunities and apply human-centered design.
3. Equip students with tools for ideation, prototyping, testing, and implementation.
4. Foster skills to convert innovative ideas into viable products or solutions.
5. Encourage collaborative and empathetic problem-solving in real-world contexts.

## Course Outcomes:

Upon completion, students will be able to:

1. Apply design thinking to solve complex problems.
2. Conduct empathy research and define user needs.
3. Generate, prototype, and test innovative ideas.
4. Communicate and implement solutions effectively.
5. Analyze and learn from real-world innovation case studies.

## Course Content:

**Unit 1:** Introduction to Design Thinking & Innovation, Definition, history, and importance of design thinking, Design thinking vs. traditional design, Types of thinking processes, Problem-solving and need. (5)

**Unit 2:** Human-Centered Design & Empathy, Identifying user needs, Empathy research methods, Human-centered design principles, Reframing problems. (5)

**Unit 3:** Opportunity Identification & Ideation, Problem space exploration, Ideation techniques: brainstorming, mind mapping, "How Might We?", Lateral thinking, analogies, synectics, Generating and evaluating ideas. (5)

**Unit 4:** Prototyping and Testing, Prototyping mindset and methods, Types and fidelity of prototypes, Iterative improvement, Product testing and validation, User feedback integration. (5)

**Unit 5:** Implementation & Strategic Innovation, Converting ideas to products/services, Business model design, Value redefinition and experience design, Storytelling and communication, Managing change and fostering creative culture. (5)

**Unit 6:** Case Studies & Real-World Applications, Disruptive design innovations, Success and failure stories, Industry-specific applications (IT, healthcare, etc.), End-to-end application of design thinking, Empathize, define, ideate, prototype, test, implement. (5)

## Recommended Readings

- [1]. Creative Confidence by Tom Kelley & David Kelley
- [2]. The Design of Everyday Things by Don Norman
- [3]. Design Thinking: Understanding How Designers Think and Work by Nigel Cross

- [4]. Basics Design - 8: Design Thinking by Gavin Ambrose & Paul Harris
- [5]. Handbook of Design Thinking by Christian Müller-Roterberg
- [6]. Relevant articles, reviews, research papers and patents

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-163 (MDC)</b>	<b>Mass Spectrometry in Action: from theory to practice</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>30</b>

### Course Objectives:

1. To understand basic principles and techniques of mass spectrometry through theoretical lectures.
2. To learn how mass spectrometry data is generated and interpreted.
3. To explore the applications of mass spectrometry across various scientific fields.
4. To understand how MS techniques solve basic problems in different disciplines.
5. To develop critical thinking and communication skills by discussing MS data.

### Course Outcomes:

1. Students will explain fundamental concepts and techniques of mass spectrometry.
2. Students will describe how mass spectrometry data is generated and interpreted.
3. Students will identify applications of mass spectrometry in various fields.
4. Students will understand how MS techniques are used to solve basic problems.
5. Students will effectively discuss and communicate findings using mass spectrometry data.

### Course Content:

#### Unit 1: Introduction to Mass Spectrometry

- Overview of Mass Spectrometry (MS), Basic Components of MS Instruments, Ionization Techniques (Electron Ionization, Chemical Ionization, ESI, MALDI), Fundamentals of Mass Analyzers (Quadrupole, Time-of-Flight, Ion Trap), Data Acquisition and Interpretation (5)

#### Unit 2: Environmental Science Applications

- Role of MS in Environmental Monitoring, Detection of Pollutants and Contaminants, Analysis of Organic and Inorganic Compounds, Case Studies: Water Quality and Air Pollution Analysis, Hands-On: Sample Preparation and Analysis Using GC-MS and ICP-MS (5)

#### Unit 3: Forensic Science Applications

- Use of MS in Forensic Investigations, Detection of Drugs and Toxic Substances, Analysis of Trace Evidence (Explosives, Fire Accelerants), Case Studies: Drug Analysis and Crime Scene Investigations, Hands-On: Forensic Sample Analysis Using LC-MS and GC-MS (5)

#### Unit 4: Materials Science Applications

- Application of MS in Materials Characterization, Analysis of Polymers, Nanomaterials, and Advanced Materials, Surface Analysis Techniques (SIMS), Case Studies: Materials Defect Analysis and Polymer Characterization, Hands-On: Materials Analysis Using MALDI-TOF and SIMS (5)

#### Unit 5: Chemical Analysis Applications

- MS Techniques in Organic and Inorganic Chemistry, Identification and Quantification of Organic Compounds, Analysis of Metal Ions and Complexes, Case Studies: Reaction Monitoring and Purity Assessment, Hands-On: Chemical Analysis Using LC-MS and ICP-MS (5)

#### Unit 6: Emerging Technologies and Advanced Applications

- Imaging Mass Spectrometry (IMS) and Its Applications, Ambient Mass Spectrometry Techniques (DESI, DART), Hybrid Technologies and Future Trends in MS, Case Studies: Real-World Applications in Various Industries, Hands-On: Advanced MS Techniques and Data Analysis (5)

### **Recommended Readings**

- "Mass Spectrometry: Principles and Applications" by Edmond de Hoffmann and Vincent Stroobant
- "Introduction to Mass Spectrometry: Instrumentation, Applications, and Strategies for Data Interpretation" by Stephen Watts
- "Protein and Peptide Mass Spectrometry in Drug Discovery" by Michael L. Gross and Guodong Chen
- "The Encyclopedia of Mass Spectrometry, Volume 1: Theory and Ion Chemistry" edited by Michael L. Gross and Richard Caprioli
- "The Encyclopedia of Mass Spectrometry, Volume 6: Ionization Methods" edited by Michael L. Gross and Richard Caprioli
- Research articles by Ravi Kant, Michael L. Gross, and others from the field will be, provided during the course.

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-165 (MDC)</b>	<b>FOOD COMMODITIES</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>30</b>

**Course Objectives:**

1. To understand how importance of different food commodities.
2. To understand the basis of types of food groups and their functions in human body.

**Course Outcomes:**

Students will be able to understand:

1. Different food groups and their roles.
2. To understand different nutrient uptakes and requirements by these food commodities.
3. To have knowledge of different functions of food with relation to human health.

**UNIT I**

Cereals and pulses: Selection and variety, storage, processing, nutritional aspects. Pulses and legumes, millets, breakfast cereals, cereal products Concept of bakery and bakery products.

**UNIT II**

Milk and milk products: Composition, classification, nutritional aspects and processing methods of milk and milk products (curds, butter milk, paneer, cheese, ice-cream)

**UNIT III**

Meat, poultry, Eggs and sea food: meat and meat products, Composition, grade, quality, selection, storage, spoilage, uses and nutritional aspects. Composition of and structure Egg. Fish, Poultry and meat: Selection, storage, uses and nutritional aspects, spoilage, shellfish.

**UNIT IV**

Vegetables and fruits: Post harvest management, processing of fruits and vegetable, Variety, selection, purchase, storage, availability, uses and nutritional aspects of raw and processed vegetables and fruits.

**UNIT V**

Beverages and confectionery: Carbonated alcoholic and non alcoholic beverages, non carbonated beverages, chocolate and cocoa products, tea, coffee sugar based confections.

**REFERENCE BOOKS:**

1. B. Srilakshmi : Food Science
2. Lavies, S (1998): Food Commodities Ltd. London.
3. Hughes, O. and Bennion, M (1970); Introductory Foods, Macmillan & Co., New York.
4. Pyke, M. (1974); Catering Service and Technology, John Murrey Pube,' London.
5. Foods Facts and Principles- S. Manay
6. Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Press

# University School of Basic and Applied Sciences (USBAS)

## Mathematical Data Science

Paper Code	SEMESTER	COURSE	L	P	Total credits
BSID101	1	MATHEMATICAL DATA SCIENCE	2	1	3

### CO: Course Objective

CO1	To introduce various types of data and their sources
CO2	To analyse the data with models
CO3	To understand basic concepts of data sets for creation and rectification

### COE: Course Expected Outcomes

COE1	Understand the basic concepts of data sciences
COE2	Enhance the mathematical logical skills by learning different techniques.
COE3	Understand the techniques in solving problems for regression
COE4	To provide reasoning and arguments to justify conclusions

**UNIT-I:** Principles of Data Science: Types of Data: nominal, ordinal, interval, and ratio; Steps involved in data science casestudy: question, procurement, exploration, modeling, and presentation; Structured and unstructured data: streams, frames, series, survey results, scale and source of data – fixed, variable, high velocity, exact and implied/inferred; Overview of problems with data – dirty and missing data in tabular formats – CSV, anomaly detection, assessing data quality, rectification and creation methods, data hygiene,

**Unit-II:** Mathematical Foundations: Model driven data in  $R^n$ , Log-likelihoods and MLE, Chebyshev, and Chernoff-Hoeffding inequalities with examples, Importance sampling; Cosine and angular distances, KL divergence; Distances applied to sets– Jaccard, and edit distances; Modeling text with distances; Linear Regression: Simple, multiple explanatory variables, polynomial, cross-validation, regularized, Gradient descent.

**Unit-III:** Dimensionality Reduction, Clustering and Classification: Problem of dimensionality, Principal component analysis, Singular value decomposition (SVD), Best k-rank approximation of a matrix, Eigenvector and eigenvalues relation to SVD, Multidimensional scaling, Linear discriminant analysis; Clustering: Mixture of Gaussians, Hierarchical clustering, Density-based clustering and outliers, Mean shift clustering; Classification: Linear classifiers, Perceptron

algorithm, Kernels, Support vector machines, and k-nearest neighbors (k-NN) classifiers.

Text Books:

1. Cleaning Data for Effective Data Science, Mertz, David. Packt Publishing.
2. Principles of Data Science, Ozdemir, Sinan. Packt Publishing.
3. Mathematical Foundations for Data Analysis, Phillips, Jeff M. Springer.

**Reference Books:**

1. Mathematical Foundations of Data Science Using R. Frank Emmert-Streib, et al. De Gruyter

# University School of Chemical Technology (USCT)

CT-103	Unit Operations in Process Industries	L-T-P: 3-0-0	3 Credits	MDC-1
--------	---------------------------------------	--------------	-----------	-------

**Pre-requisites: None**

## **COURSE OBJECTIVES**

1. To introduce mechanical operations and fluid flow applicable in energy and chemical process industries.
2. To expose students to fundamentals of unit operations such as size reduction, filtration, heat and mass transfer.
3. To familiarize with the working principles of commonly used process equipment and instruments.

## **COURSE OUTCOMES**

1. Identify and explain the principles of fluid flow, mechanical operations, and separation techniques used in process industries.
2. Demonstrate understanding of working principles and selection criteria for process equipment such as pumps, crushers, mixers, and filters.
3. Apply fundamental engineering concepts to calculate key parameters in flow systems, size reduction, filtration, and heat/mass transfer.
4. Analyze and interpret the performance of basic unit operations and energy transfer equipment through laboratory experimentation and simulations

## **COURSE CONTENT**

### **UNIT 1**

**(10 Hrs)**

Introduction to fluid flow: Types of fluids, laminar and turbulent flow; fluid moving machineries: pumps, fans, blowers, compressors, and turbines – types and their applications; Industrial valves: gate, globe, ball, butterfly valves — function and selection; Flow measurement devices: full bore meters (e.g., venturi, orifice), insertion meters (e.g., pitot tube).

### **UNIT 2**

**(10 Hrs)**

Size reduction: principles and equipment – jaw crusher, ball mill, ultrafine grinders; Screening equipment: grizzlies, vibrating and gyratory screens, trommels; Bulk solids storage: open, closed, silos, bins; Flow issues; Conveying systems: belt, screw, bucket, chain, apron conveyors; Mixing and agitation: types of impellers (propellers, paddles, turbines); mixers for solid-solid and liquid-solid.

### **UNIT 3**

**(07 Hrs)**

Filtration: Classification of filtration, introduction to industrial filters, sand filter, filter press, leaf filter, rotary drum filter, horizontal belt filter, bag filter, centrifugal filtration, basics of membranes-based separation processes, microfiltration and ultrafiltration, reverse osmosis.

### **UNIT 4**

**(15 Hrs)**

Heat and Mass transfer operations: Fundamentals of heat and mass transfer, conduction, convection and radiation; diffusion: molecular and turbulent; mass transfer coefficient, Introduction to interphase mass transfer, introduction to various heat transfer equipment, heat exchangers, boilers

condensers, and evaporators; introduction to various mass transfer equipment: tray towers, packed columns, cooling towers, dryers etc.

### **TEXT AND REFERENCE BOOKS**

1. Robert E. Treybal, *Mass-Transfer Operation*, McGraw Hill, Third Edition, 1981.
2. Binay K Dutta, *Principles of Mass Transfer and Separation Processes*, Prentice-Hall India, 2015.
3. Christie J. Geankoplis, *Transport Processes and Separation Process Principles*, Pearson, Fourth Edition, 2016.
4. McCabe W.L., Smith J.C. and Harriott, P., *Unit Operations of Chemical Engineering*, McGraw Hill, Seventh Edition, 2005.
5. Foust A.S., *Principles of Unit Operations*, John Wiley & Sons, Singapore, 1994.

<b>Course Outcome (CO) to Programme outcomes (PO) Mapping (Scale 1: Low; 2: Medium; 3: High)</b>												
<b>CO/PO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	3	3	2	1	3	2	1	3	1	1	3
<b>CO2</b>	3	3	3	2	1	3	2	1	3	1	1	3
<b>CO3</b>	3	3	3	2	1	3	2	1	3	1	1	3
<b>CO4</b>	3	3	3	2	1	1	2	1	1	1	1	3

## **Environmental Pollution and Health**

Paper Code - BSCES – 107 (MDC)

L – 03

Credits-03

### **Course Objectives:**

CO1	To introduce the students about fundamentals of air pollution
CO2	To introduce the students about the fundamentals of water pollution and different water pollution indicators.
CO3	To introduce the students about soil and fertilizers induced soil pollution, environment and health

### **Unit-I**

**Air Pollution: Sources, Impacts and Control:** Criteria and specific air pollutants. Effects of air pollutants on plants, human health, materials and ecosystems, Air pollutant dispersion, Plume rise, Temperature inversion, Lapse Rate and Stability, Wind Rose, Meteorological parameter. Air pollution impact on lungs: Technologies to control air pollution

### **Unit-II**

**Water Pollution: Sources, Impacts and Control:** Water quality parameters, Organic and inorganic pollutants, Heavy metals in leachates, pollutants in aquatic ecosystems, Problems associated with pesticides.

Bioaccumulation, Biomagnification, Eutrophication, Bioindicators.

DO, BOD, COD. Characteristics of domestic, agricultural and industrial wastes. Effects on receiving water bodies, Waterborne diseases, Thermal Pollution: Sources, Effects on human and animals.

### **Unit-III**

**Soil Pollution: Sources, Impacts and Control:** Soil as resources. Soil Characteristics, Sources of Soil pollution sources: Pollution due to agricultural runoff, industrial effluents, fertilizers, pesticides, waste disposal. Detrimental effects of soil pollutants on flora, fauna and ground water. Measures to Control soil pollution

Introduction to environment and health: Key issues and historical perspectives; need and importance of environment health, human development indices of health

### **Suggested readings and Reference Books:**

De AK Environmental Chemistry. New Age International

Enger ED and Smith BF (2006) Environmental Science: Study of Interrelationships (11th Edn) McGraw Hill  
Hammer MJ and Hammer MJ Jr (2000) Water and Waste Water Technology. Prentice Hall

Herman and Bisesi, 1996, Handbook of environment health and safety (Vol. II), Lewis Publishers, Boca Raton, London.

Kemp MJ (1997) Environmental Science. McGraw-Hill 1997.

Liptak. Environmental engineering. Vol.1,2,3. Sharma BK (2000) Environmental Chemistry, Goel Publishing, Meeru

### Course Expected Outcomes

CO1	Students will learn the basics of air pollution, impacts on health and their control technologies
CO2	Students will learn about the basic indicators of water pollution, their impacts and control mechanisms
CO3	Students will learn about the soil pollution and causes of soil pollution and their remedies. Students will also get an opportunity to understand the concept of environment and health

# *University School of Information, Communication and Technology*

<b>Paper Code(s): ICT-111</b>										<b>L : 3</b>		
<b>Paper: PCB Design</b>										<b>C : 3</b>		
<b>Prerequisites: To Be Offered To Students Who Have Studied Physics &amp; Maths At 10+2 Level</b>												
<b>Marking Scheme:</b>												
1. Teachers Continuous Evaluation: 40 marks												
2. Term-End Semester Examinations: 60 Marks												
<b>Instructions for paper setter:</b>												
1. There should be 9 questions in the term end examinations question paper.												
2. The first (1 <sup>st</sup> ) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 12 marks.												
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 12.												
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.												
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.												
<b>Course Outcomes (CO):</b>												
CO1	Understand and Design PCB											
CO2	Understand Component placement strategies and layout validation											
CO3	Understand PCB fabrication steps											
CO4	Design simple Single -layer and double-layer PCBs											
<b>Course Outcomes (CO) to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High)</b>												
CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	-	-	-	-	1
CO2	3	3	3	3	3	-	-	-	-	-	-	1
CO3	3	3	3	3	3	-	-	-	-	-	-	1
CO4	3	3	3	3	3	-	-	-	-	-	-	1

## Unit I

PCB types (single-layer, double-layer, multilayer), through-hole vs. SMD components, PCB materials and substrates, structure of a PCB (pads, vias, traces, silkscreen, solder mask), design workflow overview, schematic capture, netlists, introduction to EDA tools (KiCAD, Eagle, Altium Designer), library creation and part symbols.

## Unit II

Component placement strategies, design for manufacturability (DFM), trace width and spacing calculation, ground and power planes, decoupling and bypass capacitors, differential pair routing, impedance matching basics, EMI/EMC guidelines, schematic to layout process, netlist management, layout validation (DRC, ERC), use of design constraints.

## Unit III

PCB fabrication steps (photoresist, etching, plating, solder mask), via types (through-hole, blind, buried), panelization, surface finish types (HASL, ENIG), soldering methods (wave, reflow, hand soldering), SMD rework tools, bill of materials (BoM), Gerber file generation, pick-and-place file, understanding fabrication drawings.

## **Unit IV**

Design of simple single-layer and double-layer PCBs:

- Power supply board (linear and switching)
- Microcontroller breakout board
- Sensor interface (e.g., temperature or motion)
- LED driver circuit

Signal integrity simulation basics, thermal considerations, component derating, PCB testing and debugging, integration with embedded systems.

### **Textbooks:**

1. Printed Circuit Board Design using KiCad, Peter Dalmaris, Tech Explorations, Latest Edition.
2. Complete PCB Design Using OrCAD Capture and PCB Editor, Kraig Mitzner, Newnes (Elsevier).

### **References:**

1. PCB Design for Real-World Design, Chris Schroeder, Prentice Hall. Latest Edition
2. High-Speed Digital Design: A Handbook of Black Magic, Howard Johnson & Martin Graham, Prentice Hall. Latest Edition
3. Signal and Power Integrity – Simplified, Eric Bogatin, Pearson. Latest Edition
4. Texas Instruments and Analog Devices App Notes on PCB Layout. Latest Edition
5. IPC Standards (IPC-2221, IPC-7351, IPC-A-600) – for layout, land patterns, and acceptability.

<b>Paper Code(s): ICT-115</b>											<b>L : 3</b>	
<b>Paper: Introduction to Manufacturing Process</b>											<b>C : 3</b>	
<b>Prerequisites: To Be Offered To Students Who Have Studied Physics &amp; Maths At 10+2 Level</b>												
<b>Marking Scheme:</b>												
1. Teachers Continuous Evaluation: 40 marks												
2. Term-End Semester Examinations: 60 Marks												
<b>Instructions for paper setter:</b>												
1. There should be 9 questions in the term end examinations question paper.												
2. The first (1 <sup>st</sup> ) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 12 marks.												
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 12.												
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.												
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.												
<b>Course Outcomes (CO):</b>												
CO1	Understand casting process.											
CO2	Understand joining process.											
CO3	Understand forging and sheet metal work.											
CO4	Basic understanding of new technology for manufacturing											
<b>Course Outcomes (CO) to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High)</b>												
<b>CO/PO</b>	<b>PO01</b>	<b>PO02</b>	<b>PO03</b>	<b>PO04</b>	<b>PO05</b>	<b>PO06</b>	<b>PO07</b>	<b>PO08</b>	<b>PO09</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	2	1	1	1	2	-	-	-	-	-	1	1
<b>CO2</b>	2	1	1	1	2	-	-	-	-	-	1	1
<b>CO3</b>	2	1	1	1	2	-	-	-	-	-	1	1
<b>CO4</b>	2	1	1	1	2	-	-	-	-	-	1	1

## Unit I

Definition of manufacturing, Importance of manufacturing towards technological and social economic development, Classification of manufacturing processes, Properties of materials.

Metal Casting Processes: Sand casting, Sand moulds, Type of patterns, Pattern materials, Pattern allowances, Types of Moulding sand and their Properties, Core making, Elements of gating system. Description and operation of cupola.

Working principle of Special casting processes: Shell casting, Pressure die casting, Centrifugal casting. Casting defects.

## Unit II

Joining Processes: Welding principles, classification of welding processes, Fusion welding, Gas welding, Equipments used, Filler and Flux materials. Electric arc welding, Gas metal arc welding, Submerged arc welding, Electro slag welding, TIG and MIG welding process, resistance welding, welding defects.

## Unit III

Deformation Processes: Hot working and cold working of metals, Forging processes, Open and closed die forging process. Typical forging operations, Rolling of metals, Principle of rod and wire drawing, Tube drawing. Principle of Extrusion, Types of Extrusion, Hot and Cold extrusion.

Sheet metal characteristics: Typical shearing operations, bending and drawing operations, Stretch forming operations, Metal spinning.

#### **Unit IV**

Ideation: Introduction, Steps of Ideation, Introduction of Product Design, Development and Prototyping.

3D Printing: Definition, Types, History, Feasibility of Rapid Prototyping Technology (RPT), Role of CAD in RPT, 3D Modeling software and its role in RPT, Creation of STL file from CAD model and FDM.

Laser Cutting and engraving: Definition, Types, History, 3D Modeling software, and Creation of compatible file format for Laser Cutting and engraving.

Wood Routing: Definition, Types, History, 3D Modeling software, and Creation of compatible file format for Wood Routing.

#### **Textbooks:**

1. Manufacturing Technology: Foundry, Forming and Welding Volume 1, P. N Rao, , McGrawHill, 5e, 2018.
2. Elements of Workshop Technology Vol. 1 and 2 by Hajra Choudhury, Media Promoters Pvt Ltd.,2008.

#### **References:**

1. Manufacturing Processes for Engineering Materials, by Serope Kalpajian and Steven R.Schmid, Pearson Education, 5e, 2014.
2. Fundamentals of Modern Manufacturing: Materials, Processes, and Systems by Mikell P. Groover, John Wiley and Sons, 4e, 2010 .
3. Production Technology by R.K.Jain and S.C. Gupta, Khanna Publishers. 16th Edition, 2001.

<b>Paper Code(s): ICT-117</b>											<b>L : 3</b>	
<b>Paper: Signals and Systems</b>											<b>C : 3</b>	
<b>Prerequisites: To Be Offered To Students Who Have Studied Maths At 10+2 Level</b>												
<b>Marking Scheme:</b>												
1. Teachers Continuous Evaluation: 40 marks												
2. Term-End Semester Examinations: 60 Marks												
<b>Instructions for paper setter:</b>												
1. There should be 9 questions in the term end examinations question paper.												
2. The first (1 <sup>st</sup> ) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 12 marks.												
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 12.												
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.												
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.												
<b>Course Outcomes (CO):</b>												
CO1	Understand classification and properties of Signals and Systems											
CO2	Ability to use Continuous and Discrete time Fourier methods for analysis of signals and systems											
CO3	Ability to use Laplace and Z- transform methods for analysis of signals and systems											
CO4	Ability to use DFT and FFT for solving problems											
<b>Course Outcomes (CO) to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High)</b>												
<b>CO/PO</b>	<b>PO01</b>	<b>PO02</b>	<b>PO03</b>	<b>PO04</b>	<b>PO05</b>	<b>PO06</b>	<b>PO07</b>	<b>PO08</b>	<b>PO09</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	3	3	3	3	-	-	-	-	-	-	2
<b>CO2</b>	3	3	3	3	3	-	-	-	-	-	-	2
<b>CO3</b>	3	3	3	3	3	-	-	-	-	-	-	2
<b>CO4</b>	3	3	3	3	3	-	-	-	-	-	-	2

## Unit I

Definition and classification of signals (continuous-time, discrete-time, deterministic, random, energy and power signals), signal transformations (time-shifting, time-scaling, reversal), common signals (step, impulse, ramp, exponential, sinusoidal), operations on signals (addition, multiplication), system properties (linearity, time-invariance, causality, memory, stability), examples of physical systems (mechanical, electrical, computational), system modeling via ODEs and recurrence relations, LTI systems and their role, introduction to sampling and aliasing, reconstruction using hold.

## Unit II

Fourier Series: representation of periodic signals, exponential and trigonometric forms, computation of Fourier coefficients, convergence and Dirichlet conditions, Parseval's relation, symmetry and waveform shaping, application to electrical and mechanical waveforms.

Continuous-Time Fourier Transform (CTFT): definition, existence conditions, properties (linearity, time/frequency shifting, scaling, convolution, modulation), frequency response of systems, bandwidth and filtering concepts.

Discrete-Time Fourier Transform (DTFT): definition, properties, interpretation, convolution in DT domain.

Application: solving ODEs and linear recurrence relations using Fourier methods, system behavior prediction.

### **Unit III**

Laplace Transform: definition, ROC, properties, inverse Laplace transform, initial/final value theorems, Laplace- domain circuit analysis, pole-zero diagrams, transfer functions, stability and causality in the s-domain.

Application: analysis of continuous-time systems modeled by linear constant-coefficient ODEs.

Z-Transform: definition, ROC, properties, inverse Z-transform techniques, system transfer function, stability in z- domain, mapping between s- and z-domains. Application: solving linear difference equations and recurrence relations, analysis of discrete-time systems.

### **Unit IV**

Discrete Fourier Transform (DFT): definition, computation, properties, circular convolution, relation to DTFT, spectral leakage and windowing.

Fast Fourier Transform (FFT): radix-2 FFT algorithms (DIT, DIF), computational advantages, signal analysis applications, spectral estimation.

Applications: analysis of discrete signals and systems, filter design verification, spectral analysis of recurrence- generated sequences, hardware implementation aspects.

### **Textbooks:**

1. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky, with S. Hamid Nawab, Pearson Education, Latest Edition.
2. Signals and Systems, Simon Haykin and Barry Van Veen, Wiley India, Latest Edition.

### **References:**

1. Linear Systems and Signals, B.P. Lathi, Oxford University Press.
2. Digital Signal Processing, John G. Proakis and Dimitris G. Manolakis, Pearson Education.
3. Fundamentals of Signals and Systems, Michael J. Roberts and Govind Sharma, McGraw Hill.
4. Discrete-Time Signal Processing, A.V. Oppenheim and R.W. Schaffer, Pearson Education.
5. Schaum's Outline of Signals and Systems, Hwei P. Hsu, McGraw Hill.

# **Skill-Enhancement Courses (SEC)**

## *University School of Liberal Arts (USLA)*

### **History of Science and Technology in India (IKS)**

**Nature of the Course:** SEC

**Course Code:**

**Semester:** First (I)

**Credits:** 3 (L2:T1)

**Mode of Examination:** UES

**Course ID:**

**Marks:** 100 (40+60)

**Internal Evaluation:** 40

**External Evaluation:** 60

**Course Objective:** Understand the history of science and technology in India.

#### **Course Outcomes:**

**CO1 (Knowledge):** Trace the genealogy of scientific developments and technological advancements in India from early years till present.

**CO2 (Understanding):** Learn to critically assess claims of cultural superiority and the attribution of scientific discoveries to Ancient Indians.

**CO3 (Synthesis):** Study the impact of colonial ‘modernity’ on Indian society.

**CO4 (Application):** Critically assess post-independence India’s progress in the field of science till the end of the twentieth century.

#### **Course Content:**

##### **UNIT-I: Science and Technology in India up to c.1200 CE**

- a. Astronomy (*Surya-Siddhanta*, Aryabhata, Varahamihira), Mathematics, Medicine (Ayurveda)
- b. Agriculture, metallurgy, textile production, shipbuilding, armaments
- c. Critical assessment of the attribution of scientific discoveries to Ancient Indians

##### **UNIT-II: Science and Technology in India c.1200 CE to 1757 CE**

- a. Geometry, Trigonometry and Algebra, Graeco-Arabic Medicine (*Unani-tibb*), Astronomy, medicine
- b. Agriculture (Canals and other irrigation systems), textile, arms-making, shipbuilding
- c. Technology, warfare in medieval period

##### **UNIT-III: Science in Colonial India: 1757 CE to 1947 CE**

- a. Surveys, scientific education, scientific societies, growth of scientific institutions in colonial India
- b. Indian response

c. Assessing the impact of ‘colonial modernity’ on Indian society

#### **UNIT-IV: Post-Independence India**

a. Policies in science and technology in independent India (IITs, Council of Scientific and Industrial Research, Ministry of Science and Technology), Indian Council of Agricultural Research (1947), Indian Council of Medical Research (1949), DRDO and Defense Technology, TIFR and Department of Atomic Energy and Nuclear Energy, ISRO and Space Programme (satellite and communication Revolution)

b. Assessing India’s scientific progress till the end of the twentieth century

#### **Pedagogy:**

- Classroom lectures/project work.
- Class debate on the myth and reality of scientific developments in pre-colonial India.
- Classroom assignment on the impact of modern science and technology (such as railways) on Indian society.

#### **Textbooks**

1. Arnold, David. *The New Cambridge History of India, III*, Cambridge: Cambridge University Press, 2004.
2. Bose, D.M., Sen, S.N. & Subbarayappa, B.V. eds., *A Concise History of Science in India*, New Delhi: Indian National Science Academy, 1971.
3. Chakrabarti, Pratik. *Western science in modern India: Metropolitan methods, colonial practices*. Orient Blackswan, 2004.
4. Chattopadhyaya, Debiprasad. *History of Science and Technology in Ancient India: Astronomy, Science and Society*. Firma KLM, 1996.
5. Kumar, Deepak. *Science and the Raj: A Study of British India*, Oxford Scholarship Online, October 2012
6. Kumar, .Deepak, ed. *Science and Empire: essays in Indian context, 1700-1947*. Anamika Pub & Distributors, 1991.
7. Muley, Gunakar. *Bharat: Itihaas, Sanskriti aur Vigyan*. Rajkamal Prakashan. 2013.
8. Plofker, Kim. *Mathematics in india*. Princeton University Press, 2008.

#### **Recommended Readings:**

1. Arnold, David. “Nehruvian science and postcolonial India”. *Isis* 104, no. 2 (2013): 360-370.
2. Ansari, SM Razaullah. “The observatories movement in India during the 17–18th centuries.” *Vistas in Astronomy* 28 (1985): 379-385.
3. Basham, Alan L. “The practice of medicine in ancient and medieval India.” *Asian medical systems: A comparative study* (1976): 18-43.
4. Bhatia, P. "Mining and metallurgy in ancient India." *Indian Historical Review* 34, no. 1 (2007): 283-287.
5. Kumar, Deepak. “Adoption and Adaption: A Study of Medical Ideas and Techniques in Colonial India.” In *Science between Europe and Asia: Historical Studies on the Transmission, Adoption and Adaptation of Knowledge*, pp. 233-243. Dordrecht: Springer Netherlands, 2010.

6. Mahalanobis, P. C. "Recent developments in the organization of science in India." *Sankhyā: The Indian Journal of Statistics, Series B* 25, no. 1/2 (1963): 67-84.
7. Edney, Matthew H. "The patronage of science and the creation of imperial space: The British mapping of India, 1799-1843." *Cartographica: The International Journal for Geographic Information and Geovisualization* 30, no. 1 (1993): 61-67.
8. Habib, Irfan, "Presidential Address, Medieval India Section", *Proceedings of the Indian History Congress*, Varanasi, 1969.
9. Habib, Irfan, 'Technology and Barriers to Social Change in Mughal India', *Indian Historical review*, Vol. V, Nos.1-2, 1978-79.
10. Habib, Irfan, "Changes in Technology in Medieval India", in *Studies in History*, Vol. II, No. 1, 1980.
11. Habib, S. Irfan, and Dhruv Raina. "The introduction of scientific rationality into India: A study of Master Ramchandra—Urdu journalist, mathematician and educationalist." *Annals of science* 46, no. 6 (1989): 597-610.
12. Haines, Daniel. "Development, Citizenship, and the Bhakra–Nangal Dams in Postcolonial India, 1948–1952." *The Historical Journal* 65, no. 4 (2022): 1124-1144.
13. Khan, Iqbal Ghani. "The Awadh Scientific Renaissance and the Role of the French: C. 1750-1820", *Indian Journal of History of Science*, Vol. 3, No. 38, pp. 273-301, 2003.
14. Nanda, Meera. "Science Sanskritized: How modern science became a handmaiden of Hindu nationalism." In *Routledge Handbook of South Asian Religions*, pp. 264-286. Routledge, 2020.
15. Parayil, Govindan. "The green revolution in India: A case study of technological change." *Technology and culture* 33, no. 4 (1992): 737-756.
16. P. Rama Rao, 'Science and Technology in Independent India: Retrospect and Prospect', in *Current Science*, Vol. 74, No.5, 10 March, 1998, pp.418-432.
17. Qaisar, A. Jan, "Shipbuilding in the Mughal Empire during the Seventeenth Century", *Indian Economic and Social History Review*, Vol. V, No. 2, June, 1968.
18. Raj, Kapil. "Networks of knowledge, or spaces of circulation? The birth of British cartography in colonial south Asia in the late eighteenth century." *Global Intellectual History* 2, no. 1 (2017): 49-66.
19. Suvabrata Sarkar (Ed.), *History of Science, Technology, Environment and Medicine in India*, London and New York: Routledge (Taylor & Francis), 2022.
20. Verdon, Noémie, and Michio Yano. "Al-Bīrūnī's India, Chapter 14: An Account of Indian Astronomical, Mathematical and Other Literature." *History of science in South Asia* 8 (2020): 57-76.

## Gender and Development

**Nature of Course:** SEC

**Course Code:**

**Semester:** First (I)

**Credits:** 3 (L2 T1)

**Mode of Examination:** UES

**Course ID:**

**Total Marks** 100 (40+60)

**Internal Evaluation:** 40

**External Evaluation:** 60

### Course Objective

The primary objective of the course is to provide the basic conceptual and analytical tools to the students to understand the different dynamics of the interaction of gender and development in India. The course explores the interactions of gender with other social categories like caste, ability, and sexuality in various developmental policies in Indian democracy. The course will specifically look at gender and development in the context of education, health, and economic policies in India.

### Course Outcome

**CO1 (Knowledge):** The student will have a foundational understanding of the concept of gender and development and various developmental policies in Indian democracy.

**CO2 (Understanding):** The student will have a basic understanding of the different developmental policies in India.

**CO3 (Synthesis):** The student can understand the intersection of gender with different social categories like caste, ability, and sexuality in the context of development in Indian democracy.

**CO4 (Application):** The student can evaluate the impact of development policies and interventions on gender equality and empowerment.

### Course Content

#### Unit I: Introduction to Gender, Development

- a. Gender and Development: Definitions and Concepts
- b. Gendering Development: Discourses and Debates

#### Unit II: Gender and Health in India

- a. Reproductive Rights and Maternal Health-Janani Suraksha Yojana
- b. Accessibility to Health Care- Transgender Persons Protection of Rights Act 2019

#### Unit III: Gender and Economic Policy

- a. Women in Development (WID), Women and Development (WAD), and Gender and Development (GAD)
- b. Women's Unpaid Labour and Informal Economy
- c. Grameen Bank, Self-Help Groups (SHG), Kudumbashree

#### Unit IV: Gender and Violence

- a. Gender-Based-Violence and Violence Against Women
- b. Laws and Institutions
- c. Appraisal of Safety and Security Schemes like Mission Shakti: Evaluation

### Pedagogy

- Lectures
- Classroom discussion/Interaction
- Project and Assignment
- Documentary/ Movies

- Field Visit

### Text Books

1. Agnes, Flavia. *Law and Gender Inequality: The Politics of Women's Rights in India*. Oxford: Oxford University Press, 2001.
2. Bhatt, Ela R. *We Are Poor but So Many: The Story of Self-Employed Women in India*. New Delhi: Oxford University Press, 2005.
3. Menon, Nivedita, ed. *Gender and Politics in India*. New Delhi: Oxford University Press, 1999.
4. Rathgeber, Eva. *WID, WAD, and GAD: Trends in Research and Practice*. *Journal of Developing Areas* 24, no. 4 (1991): 489–502.
5. Razavi, Shahra, and Carol Miller. *From WID to GAD: Conceptual Shifts in the Women and Development Discourse*. Geneva: UNRISD, 1995.

### Recommended Readings

1. India introduces economic reforms to improve women's access to markets and financial assets, Available at: <https://www.cfr.org/womens-participation-in-global-economy/case-studies/india/>
2. Kabeer, Naila. *Reversed Realities: Gender Hierarchies in Development Thought*. London: Verso, 1994.
3. Parpart, Jane L., Patricia Connelly, and Eudine Barriteau. *Theoretical Perspectives on Gender and Development*. Ottawa: International Development Research Centre, 2000.
4. Pearson, Ruth, and Caroline Sweetman, eds. *Gender and Development: Critical Concepts in Development Studies*. London: Routledge, 2017.
5. National Health Policy, India (2017).
6. The Right of Children to Free and Compulsory Education (RTE) Act, 2009, <https://dse1.education.gov.in/rte>
7. Where Do the Victims of Gender- Based Violence go?Based Violence go? A Needs Analysis for Women’s Safety Schemes in IndiaA Needs Analysis for Women’s Safety Schemes in India Available At: <https://cprindia.org/wp-content/uploads/2023/03/A-Needs-Analysis-for-Womens-Safety-Schemes-in-India.pdf>
8. National Commission for Women (NCW) Reports
9. Visvanathan, Nalini, ed. *The Women, Gender and Development Reader*. 2nd ed. London: Zed Books, 2011.
10. World Bank. *Engendering Development: Through Gender Equality in Rights, Resources, and Voice*. Washington, DC: World Bank and Oxford University Press, 2001.

## Understanding Indian Society Through Cinema

**Nature of the Course:** SEC

**Semester:** First (I)

**Course Code:**

**Credits:** 3 (L2 T1)

**Mode of Examination:** UES

**Course ID:**

**Marks:** 100 (40+60)

**Internal Evaluation:** 40

**External Evaluation:** 60

### Course Objective

This course aims to explore the dynamic relationship between cinema and Indian society across different historical periods. Students will examine how films serve as social documents, distinguishing between parallel and mainstream cinema and analyzing their roles in reflecting and driving social change. Through an in-depth study of the Indian cinema industry's history, including Bollywood and regional cinema, learners will gain insights into its evolution and impact. Additionally, they will critically assess the portrayal of key social issues such as nationalism, identity, family norms, caste, class, gender, race, and the environment, identifying the evolving representations and their implications within Indian society.

### Course Outcome

After completing this course, students will be able to

**CO 1 (Knowledge):** Understand Indian cinema's historical development and its reflection of societal norms, focusing on Bollywood and regional industries.

**CO 2 (Understanding):** Analyze the socio-cultural context of Indian cinema, differentiating between parallel and mainstream cinema and their impact on societal changes.

**CO 3 (Synthesis):** Synthesize knowledge to critically evaluate Indian cinema's portrayal of social issues, examining the interplay between cinema and society.

**CO 4 (Application):** Apply understanding to interpret films, identifying societal dynamics and proposing solutions to depicted challenges.

### Course Content

#### Unit I: Cinema and Society: Reciprocal Relations

- a. Films as Social Document
- b. Parallel vs Mainstream Cinema
- c. Cinema and Social Change
- d. Cinema Industry of India (Bollywood and Regional) and its History

#### Unit II: Indian Society and Cinema: Independence to Liberalization

- a. Nationalism and Nation Building

- b. The transition from traditional to modern
- c. The 'Angry Young Man' Era
- d. The archetype of the 'Villain'

#### **Unit IV: Indian Society and Cinema: Post-Liberalization**

- a. Changing family norms and values
- b. The Question of Identity and the Portrayal of Indian Diaspora
- c. Culture of Aspiration and Consumption
- d. The emergence of the 'Anti-Hero'

#### **Unit IV: Portrayal of Social Issues in Indian Cinema\*<sup>1</sup>**

- a. Caste
- b. Class
- c. Gender
- d. Race
- e. Environment

#### **Pedagogy**

- Lectures
- Discussion and Presentations
- Seminar
- Audio-Visual

#### **Text Book**

1. Prasad, M. Madhava. Ideology of the Hindi Film: A Historical Construction. Oxford University Press. New Delhi. 2000
2. Ghosh, Tapan K. Bollywood Baddies: Villains, Vamps and Henchmen in Hindi Cinema. SAGE Publications. New Delhi. 2013
3. Juluri, Vamsee. Bollywood Nation: India through its Cinema. Penguin. London. 2013
4. Mehta, Rini Bhattacharya, and Rajeshwari V. Pandharipande, eds. Bollywood and Globalization: Indian Popular Cinema, Nation, and Diaspora. Anthem Press, 2010.

#### **Recommended Readings**

1. Ahmed, Akbar S. 1992. "Bombay Films: The Cinema as Metaphor for Indian Society and Politics". In Modern Asian Studies Vol. 26, No. 2. pp. 289-320

---

\* **Note:** This course is primarily meant to develop a sociological lens among the students by comparing and analyzing what they read in the classroom with the popular medium of cinema and films. The choice of theme-based films that students will watch and analyze will depend upon the course instructor.

2. Young, Colin. "Film and Social Change". *The Journal of Aesthetic Education* Vol. 3, No. 3, Special Issue: Film, New Media, and Aesthetic Education (1969), pp. 21-27
3. Deshpande, Anirudh. "Indian Cinema and the Bourgeois Nation State". *Economic and Political Weekly* Vol. 42, No. 50 (2007), pp. 95-101, 103.
4. Datta, Sangeeta. "Globalisation and Representations of Women in Indian Cinema". *Social Scientist* Vol. 28, No. 3/4 (Mar. - Apr., 2000), pp. 71-82
5. Viridi, Jyotika. *The Cinematic ImagiNation [sic]: Indian Popular Films as Social History*. Rutgers University Press. London2023.
6. Shafer, D. M., & Raney, A. A. (2012). Exploring how we enjoy antihero narratives. *Journal of Communication*, 62(6), 1028–1046

## Entrepreneurship Mindset

**Nature of the Course:** SEC

**Semester:** First (I)

**Course Code:**

**Credits:** 3 (L2 T1)

**Mode of Examination:** UES

**Course ID:**

**Marks:** 100 (40+60)

**Internal Evaluation:** 40

**External Evaluation:** 60

### Course Objective:

1. To provide a fundamental for basic entrepreneurial skills and to acquaint them with the world of entrepreneurship and inspire them to set up and manage their businesses.
2. To acquaint students with the process of creativity and innovation.
3. To expose students to various aspects of entrepreneurship and business.
4. To expose students to case studies on successful entrepreneurs.

### Course Outcomes:

After completing this course, students will be able to

**CO1 (Knowledge):** Form a strong foundations for basic entrepreneurial skills

**CO2 (Understanding):** Understand creativity and innovation for opportunity recognition.

**CO3: (Synthesis):** Learn about opportunity analysis and writing of business plans.

**CO4: (Application):** Students will be inspired by examples of successful entrepreneurs.

### Course Content

1. Introduction: The Entrepreneur, theories of Entrepreneurship; Characteristics of successful entrepreneurs, myths of entrepreneurship;
2. Entrepreneurial mindset-creativity (steps to generate creative ideas, developing creativity) and innovation (types of innovations)
3. Promotion of Venture and Writing a business plan: Opportunity Analysis; External Environment Analysis Economic, Social and Technological Analysis, Business plan- What is business plan, parts of a business plan. Writing a Business plan.
4. Entrepreneurship Support: Entrepreneurial Development Programmes (EDP): EDP Role of Government in organizing EDPs.
5. Institutions supporting small business enterprise: Central level, state level, other agencies, industry associations.
6. Practicals:
  - i. Presenting a business plan
  - ii. Project on Start up India any other Government policy on entrepreneurship
7. Discussion on why Start up fails, role of MSME etc.  
Discussion on role of entrepreneur in economic growth  
Discussion on Technology part.
8. Case study discussion on successful Indian entrepreneurs.

### Pedagogy:

- Lectures
- Discussions and Presentations
- Seminars

**Text Books:**

1. Entrepreneurship Development and Small Business Enterprise by Charantimath, Pears Education 8<sup>th</sup> Ed, 2014
2. Entrepreneurship: A Small Business Approach by Bamford CE, McGraw Hill Education, 1<sup>st</sup> Ed, 2015.
3. Entrepreneurship by Asrich, McGraw Hill Education, 2013.
4. Entrepreneurship Development: An analysis Study by Balaraju, Theduri, Akansha Publishing House, 2012.
5. A Guide to Entrepreneurship by David, Otic, Jaico Books Publishing House, Delhi, 2014.
6. Entrepreneurship Management by Kaulgud, Aruna, Vikas Publishing House, Delhi, 2012.
7. Entrepreneurship Development by Chhabra, TN, Sun India, 20

# *University School of Humanities and Social Sciences (USHSS)*

## **Communication Skills**

**Nature of the Course:** SEC  
**Course Title:** Communication Skills  
**Course Code:** BAENG127  
**Credits:** 3 (L 2, T1)

**Mode of Exam:** NUES

**Total Marks:** 100 (40 + 60)

### **Course Objectives:**

To enhance oral and written communicative competence of the students; to enable them to communicate effectively in a professional context.

### **Course Outcomes (COs):**

After the completion of the programme, students will

**CO1 (Knowledge):** have the knowledge of language and communication skills;

**CO2 (Understanding):** have an understanding of language and its usage;

**CO3 (Research):** be able to use language skills to write their research papers effectively;

**CO4 (Lifelong Learning):** enable students to improve communication skills to enhance their academic and professional career.

### **Course Content:**

**Unit I: Basic Concepts in Communication-** Communication: Meaning and Nature; Context of Communication; Channels of Communication: Formal and Informal; Verbal and Non-verbal Communication (Paralanguage, Kinesics), Barriers to Communication; Guidelines for Effective Communication.

**Unit II: Speaking Skills -** Elementary Phonetics; Speech Mechanism; Description of Speech Sounds, Phoneme, Syllable, Word Accent, Connected Speech; Phonetic Transcription.

**Unit III: Listening Skills -** Hearing and Listening; Essentials of Good Listening; Presentation Skills; Group Discussion Skills; Interview Skills

**Unit IV: Oral Communication -** Activities, Classroom Presentations, Group Discussions, Mock Interviews.

**Note:** Focus should be given to the practical side of communication skills rather than theory. Students will be evaluated on the basis of their performance in the classroom activities and a practical examination at the end of the semester. The panel of practical examiners will be notified by the Dean.

### **Recommended Readings:**

1. Fiske, John. *Introduction to Communication*. Routledge, 2011.
2. Lewis, Hedwig. *Body Language: A Guide for Professionals*. Response Books, 1998.
3. Maison, Margaret. *Examine Your English*. Orient Longman, 1965.
4. Morris, Desmond. *The Naked Ape*. RHUK, 1967.
5. Sides, Charles H. *How to Write and Present Technical Information*. Cambridge U.P., 1992

### **Examination Scheme:**

1. **Evaluation** will be based on assignments/presentations during the semester and an oral examination to test students' capability to speak correctly.
2. **Oral Examination** shall be conducted by the teacher at the end of the semester.

## Basics of Excel and Data Analysis

**Paper Code:** BAECO109

**Paper:** Basics of Excel and Data Analysis

**Internal Marks:** 40

**Mode of Exam:** NUES

**Lectures - 2, Tutorial -1**

**Total Credit - 3**

**External Marks: 60**

### Course Objectives

The course aims to introduce the students to the basics of Ms Excel and its applications data analysis.

### Course Outcomes

CO1: To enable students, understand the basic concepts of excel and data analysis

CO2: To equip students with basic data computational and presentation skills

CO3: To familiarize with data visualization in the form of charts and pivot tables

CO4: To equip students with basic data integration, manipulation, analysis and decision making skills

### Unit – I: Introduction to Excel

Excel and Spreadsheets: Running Excel Commands – Excel Workbooks and Worksheets – Worksheet Cells: Selecting a Cell, Moving Cells – Saving Work – Excel Add-Ins: Loading the StatPlus, Loading the Data Analysis ToolPak – Printing Worksheets: Formatting Margins, Headers, Footers, Page Setup

### Unit – II: Working With Data

Data Entry – Data Formats – Formulas and Functions: Inserting Simple Formula, Inserting an Excel Function – Cell References – Range Names – Sorting Data – Querying Data – Using Advanced Filter – Importing Data from Text Files – Importing Data from Databases – Data Consolidate Command

### Unit – III: Working with Charts and Tables

Introducing Excel Charts – Introducing Scatter Plots – Editing a Chart – Identifying Data Points: Selecting a Data Row, Labeling Data Points, Formatting Labels – Creating Bubble Plots – Breaking a Scatter Plot into Categories – Plotting variables – Using pivot tables

### Unit – IV: Assignments and Discussion

Students would be required to do a brief project/ assignment on the topics covered in the course

### Recommended Readings:

1. Berk, N. K., & Carey, P. (2010). *Data Analysis with Microsoft Excel: Updated for Office 2007*. Brooks/Cole, Cengage Learning.
2. Alexander, M., Jelen, B. (2013). *Excel 2013 Pivot Table Data Crunching*. United Kingdom: Pearson Education.
3. Jelen, B. (2013). *Excel 2013 Charts and Graphs*. United Kingdom: Que
4. Wang, W. (2018). *Office 2019 For Dummies*. United States: Wiley. Microsoft

### **Suggested Data Sources:**

The following data sets are suggested to carry out the activities

1. <https://data.worldbank.org/>
2. <https://www.statista.com/>
3. <https://data.gov.in/>
4. <https://censusindia.gov.in/>
5. <https://www.kaggle.com/>
6. <http://data.un.org>

## *University School of Bio-Technology (USBT)*

<b>BT-171 (SEC)</b>	<b>New Product Development in Biotechnology</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>30</b>
---------------------	---	----------	----------	----------	----------	-----------

### **Course Objectives:**

1. To provide a comprehensive understanding of the end-to-end process of new product development (NPD) in biotechnology.
2. To equip students with knowledge and practical skills in ideation, research, design, development, regulatory, and commercialization aspects of biotechnological products.
3. To develop critical thinking regarding ethical, legal, and societal issues in biotech innovation.
4. To foster interdisciplinary teamwork and project management skills for successful biotech product launches.

### **Course Outcomes:**

By the end of the course, students will be able to:

1. Understand and apply the full NPD process in biotechnology from ideation to commercialization.
2. Design and evaluate biotechnological products for healthcare, agriculture, and environmental applications.
3. Navigate regulatory, ethical, and legal frameworks for biotech products.
4. Develop business strategies and commercialization plans for new biotech products.
5. Work effectively in interdisciplinary teams and communicate complex ideas to diverse stakeholders.

### **Course Content:**

**Unit 1:** Introduction to Biotechnology Product Development, Overview of NPD in biotechnology, Types of biotech products: drugs, vaccines, biologics, diagnostics, agricultural, and environmental products. Ideation and Market Analysis, Identifying unmet needs and market opportunities, Problem Inventory Analysis (PIA), Technology scouting, Market research and feasibility analysis, Intellectual property (IP) landscape. (6)

**Unit 2:** Research and Discovery Phase, Target identification and validation, High-throughput screening, molecular modeling, In vitro and in vivo studies, Omics technologies (genomics, proteomics, metabolomics), Case studies of successful discoveries. Product Design and Development, Designing for function, safety, and manufacturability, Formulation development (stabilization, delivery systems), Analytical method development and quality control, Scale-up and process optimization. (6)

**Unit 3:** Preclinical and Clinical Development, Preclinical testing (safety, efficacy, toxicity), Design and phases of clinical trials (I-IV), Clinical trial protocols, endpoints, data analysis, Manufacturing and Quality Assurance, Upstream and downstream processing, Good Manufacturing Practices (GMP), QA, QC, Scale-up, production challenges, Product consistency, validation, and documentation. (6)

**Unit 4:** Regulatory Affairs and Compliance, Regulatory bodies (FDA, EMA, CDSCO, ICH), Regulatory pathways for different products, IND, NDA, BLA submissions, Navigating regulatory inspections and approvals, Biosafety and bioethics. Commercialization and Business Strategy, Business models for biotech products, Market access, pricing, and reimbursement, Licensing, partnerships, and alliances, Marketing, branding, and sales strategies, Post-market surveillance and lifecycle management. (6)

**Unit 5:** Intellectual Property and Legal Issues, Patents, trademarks, and trade secrets, Patent application and management, Freedom to operate, IP litigation, Legal and contractual issues in biotech, Societal, Ethical, and Environmental Considerations, Bioethics and biosafety, Societal acceptance and public communication, Environmental impact assessments, Responsible innovation.

(6)

**Recommended Readings**

- [1]. Biotechnology Product Development: Planning, Design, and Implementation by Michael J. Groves
- [2]. Bioprocess Engineering by Michael L. Shuler, Fikret Kargi, Matthew DeLisa
- [3]. Drug Delivery and Targeting by A.M. Hillery, A.W. Lloyd, J. Swarbrick
- [4]. Pharmaceutical Dosage Forms and Drug Delivery Systems by H.C. Ansel et al.
- [5]. Regulatory and IP guidelines (FDA, EMA, ICH, WIPO documents)
- [6]. Relevant articles, reviews, research papers and patents.

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-173 (SEC)</b>	<b>Protein footprinting</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>30</b>

### Course Objectives:

1. To understand the fundamental principles and techniques of protein footprinting through theoretical lectures.
2. To learn how protein footprinting data is generated and interpreted.
3. To explore the applications of protein footprinting in understanding protein structure and function.
4. To investigate the role of protein footprinting in drug discovery and enzymatic mechanisms.
5. To develop critical thinking and communication skills through the analysis and discussion of protein footprinting data.

### Course Outcomes:

1. Students will explain the foundational concepts and techniques of protein footprinting.
2. Students will describe the processes of generating and interpreting protein footprinting data.
3. Students will identify applications of protein footprinting in studying protein structure and function.
4. Students will understand the role of protein footprinting in drug discovery and enzymatic studies.
5. Students will effectively analyze and communicate findings from protein footprinting data.

### Syllabus Overview:

#### Unit 1: Introduction to Protein Footprinting

- Overview of Protein Footprinting, Basic Concepts of Protein Structure, Overview of Techniques (Hydroxyl Radical Footprinting, Hydrogen-Deuterium Exchange and covalent modifications), Basic Data Collection and Interpretation (5)

#### Unit 2: Applications in Structural Biology

- Role of Protein Footprinting in Studying Structures, Mapping Protein Interactions, Case Studies: Protein Complexes, Interpreting Data on Protein Structures (5)

#### Unit 3: Applications in Drug Discovery

- Use of Protein Footprinting in Finding Drug Targets, Identifying Binding Sites, Case Studies: Drug-Protein Interactions, Interpreting Drug Discovery Data (5)

#### Unit 4: Applications in Enzyme Mechanisms

- Studying Enzyme Actions with Footprinting, Mapping Active Sites, Case Studies: Enzyme-Substrate Interactions, Interpreting Enzyme Data (5)

#### Unit 5: Applications in Protein Folding and Stability

- Investigating Protein Folding and Stability, Monitoring Folding Processes, Case Studies: Protein Misfolding, Interpreting Folding Data (5)

#### Unit 6: Emerging Techniques and Advanced Applications

- New Footprinting Techniques, High-Throughput Methods, Combining Footprinting with Other Techniques, Case Studies: Real-World Applications, Interpreting Advanced Data (5)

### Recommended Readings

- "Mass Spectrometry in Structural Biology and Biophysics: Architecture, Dynamics, and Interactions of Biomolecules" by Igor A. Kaltashov and Stephen J. Eyles
- "Protein and Peptide Mass Spectrometry in Drug Discovery" by Michael L. Gross and Guodong Chen
- "The Encyclopedia of Mass Spectrometry, Volume 1: Theory and Ion Chemistry" edited by Michael L. Gross and Richard Caprioli
- "The Encyclopedia of Mass Spectrometry, Volume 6: Ionization Methods" edited by Michael L. Gross and Richard Caprioli
- Research articles from the field will be provided during the course

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-175 (SEC)</b>	<b>FOOD PRESERVATION</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>30</b>

### Course Objectives:

To understand about techniques to prevent spoilage and extend the shelf life of food, ensuring it remains safe and palatable for consumption

### Course Outcomes:

The student will be able to understand:

1. Different Methods like canning freezing drying and fermentation to extend shelf life reduce waste and ensure food safety
2. Food prevention methods and techniques to reduce food spoilage and enhance food safety.

### UNIT I

Food preservation: definition, objectives and principles of food preservation. Different methods of food preservation.

### UNIT II

Preserved Products: Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects.

### UNIT III

Sugar and sugar products: Different forms of sugar (sugar, jaggery, honey, syrup), selection, storage and use, preserves. Salts: Types, uses in the diet.

### UNIT IV

Fats and Oils: Types and sources of fats and oils (animal and vegetable), processing, uses, storage and nutritional aspects

### UNIT V

Raising agents: preservation method. Food adjuncts: Spices, condiments, herbs, extracts, concentrates- origin, classification, description, uses, specifications, procurement and storage.

### Recommended Readings

1. Subalakshmi, G and Udipi, S.A. Food processing and preservation; New Age International Publishers, New Delhi, 2001.
2. Srilakshmi, B. Food Science. New Age International Publishers, New Delhi, 2003.
3. Potter, N.N. and Hotchkiss J. H. Food Science. CBS publishers and distributors. 1996.
4. Srivastava, R.PO and Kumar, S. Fruit and vegetable preservation, International Book distribution Company, Lucknow, 1994.
5. MC Williams, M and Paine, H. Modern Food preservation. Surjeet Publications, Delhi, 1984.
6. Cruess, W.V. Commercial Fruits and Vegetable Products, Anees Offset press, New Delhi, 1997

## *University School of Basic and Applied Sciences (USBAS)*

Skill Enhancement Course - 3 credits					
Paper Code	SEM	COURSE	L	P	Credits
	1/3 (odd)	The Story of Science	3	0	3

### **Course Objectives**

CO1- The course helps students develop skills such as Critical Thinking & Analytical Skills CO2- The course will show how scientific ideas evolved and their impact on society

CO3- The course will develop an ability to engage with scientific concepts in an informed way and promote Research & Inquiry Skills

CO4- The course will connect science with philosophy, history, and culture and teach effective communication and translating scientific ideas into narratives that non-specialists can understand

**Unit-I:** Introduction: a review of the present scenario of science and science education in society and the attitudes and misconceptions. An essence of what science is and an overview of the practical and poetic reasons for everybody to familiarise with it.

**Unit-II:** Probabilities: The basic concept of probabilities. Learning to think quantitatively. Basic concepts

**Unit-III:** Calibration: numbers and scales in the real world. Measurements

**Unit-IV:** Physics: What is the enterprise of physics? Matter and forces and laws. From subatomic particles to the Universe

**Unit-V:** Chemistry: Molecules and reactions. Chemical bonds and materials. Real life examples

**Unit-VI:** Evolutionary Biology: The evolution and diversity of life forms. Darwinism. DNA-the molecule of life:

**Unit-VII:** Molecular Biology: Cells, proteins, DNA, RNA. The genome. Pharmaceuticals **Unit-VIII:** Geology: The Earth and its evolution and composition. Plate tectonics and the geography of the earth **Unit-IX:** Astronomy. The Universe, planets, Stars, Galaxies and how we study them.

**Reference:** - "The Canon: A Whirligig Tour of the Beautiful Basics of Science" Natalie Angier, Faber & Faber.(2007)

### **Course Expected Outcomes:**

CEO1 - Students with both science and non science backgrounds will view and respect the vast importance and beauty of the basic sciences as a great human intellectual endeavour CEO2 - Students will learn what entails the scientific enterprise and its fascinating aspects CEO3 - The course will be a beginning to start a dialogue on bridging the gap between the humanities and the sciences as lamented in C P Snow's reference to the "two cultures" CEO4 - Students will learn and develop skills such as Critical Thinking & Analytical Skills

Paper Code	SEMESTER	COURSE	L	P	Total credits
BSSEC 101	1	EXCEL I	2	1	3

**CO: Course Objective**

CO1	Introduction to Workbook and worksheet
CO2	Introduction to formulas in workbook and worksheet
CO3	Introduction to various types of Charts

**COE: Course Expected Outcomes**

COE1	To understand the use of Workbook and worksheet
COE2	Ability to apply formulas in workbook and worksheet
COE3	Able to use various types of Charts
COE1	To understand the real life applications in spreadsheets

**Unit I:**

Workbook and worksheets- Navigation with keyboard, Tabs and ribbons, file menu, quick access toolbar, create print and save workbook, worksheet basics, protecting excel workbook and worksheet, importing and exporting data, co-authoring; Data and Formatting-Adding Data, Cut Copy Paste, Data fill, Data Movement , Cell Formatting, Conditional Formatting, Cell Operations, Reusable Lists , Data Validation, Sorting And Filtering , Tables. Saving and updating workbooks, Insert and remove hyperlinks, The Sparkline, The Trendline

**Unit II:**

Understanding formulas; operators in formula; named ranges; calculations; functions in formulas; relative and absolute addressing; referencing cells outside the worksheet and workbook; functions - logical, summarizing, text , lookup, reference, data and time, math functions; error handling, formula auditing.

**Unit III:**

Charts types and uses, Chart depiction – column, line, pie, bar, bubble, histogram Analysis - Pivot Table, Pivot Charts, Create and email worksheet, preparing to print, Page Setup options, Printing worksheets

**Text Books:**

1. Manisha Nigam, “Data Analysis with Excel”, BPP publications
2. Microsoft Excel 2019 Data Analysis and Business Modeling Skills), 6<sup>th</sup> Edition, by Wayne Winston

**Reference:**

1. Excel 2019 Bible, 1<sup>st</sup> Edition, by Michael Alexander Richard Kusleika, Walkenbach

**Skill Enhancement Course - 3 credits**

<b>Paper Code</b>	<b>SEMESTER</b>	<b>COURSE</b>	<b>L</b>	<b>P</b>	<b>Total credits</b>
<b>BSSEC 201</b>	<b>3</b>	<b>LATEX I</b>	<b>2</b>	<b>1</b>	<b>3</b>

**CO: Course Objective**

CO1	LaTeX, a high-quality open-source typesetting
CO2	Introduction to concepts in LaTeX
CO3	Introduction to various types of ITRANS packages

**UNIT-I:** Getting Started with LaTeX: Installing and using LaTeX for creating a first LaTeX document; Formatting text and understanding LaTeX commands and environments; Designing pages, Creating a book with chapters and table of contents, Creating and customizing lists, Including images, and creating tables with captions.

**UNIT-II:** Cross-References, Index, Bibliography and Large Documents: Setting labels and references, Hyperlinks; Customizing the table of contents, Generating an index, Creating a bibliography; Writing basic math formulas and equations; Developing large documents by splitting the input and creating front/back matter.

**UNIT-III:** Typesetting in Indian Languages using LaTeX: Transliteration symbols with illustrative examples of the Indian languages, such as Sanskrit, Hindi (Devanagari), Punjabi, and Malayalam; Creation of the transliterated document for typesetting in Devanagari (for Sanskrit, Hindi, and Marathi), Gurumukhi (for Punjabi), and Rachana (for Malayalam); ITRANS pre-processor package to convert English-encoded text into various Indian language script such as Gujarati, Bengali, Kannada, Tamil, Telugu, etc.

**Text Books:**

1. LaTeX Beginner's Guide (2nd ed.). Kottwitz, Stefan, Packet Publishing Ltd.
2. LaTeX for Beginners., Nambudiripad, K.B.M. Narosa Publishing.
3. <https://ctan.org/pkg/devanagari>; <https://www.ctan.org/pkg/gurmukhi-singh>
4. <https://ctan.org/tex-archive/language/indian/itrans>

# *University School of Environment Management (USEM)*

## **AIR AND WATER QUALITY ANALYSIS**

**Paper Code - BSCES - 111 (SEC – 1)**

**L-02**

**Credits: 02**

### **Course Objectives**

<b>CO<sub>1</sub></b>	The course is designed to make students aware and knowledgeable about different types of water and air quality parameters.
<b>CO<sub>2</sub></b>	To enable students to learn the importance of environmental resources.

### **Course Contents**

#### **Unit-I**

##### **Water Quality Analysis**

Water quality parameters: physical, chemical and biological parameters; sampling and preservation methods, monitoring, and analysis -pH, Electric conductivity, Total Solids, Total Dissolved Solids, Total Suspended Solids, Alkalinity, Acidity, Hardness, Chloride; water quality standards for drinking purpose, and irrigation uses; Water pollution control

#### **Unit-II**

##### **Air Quality Analysis**

Air pollutants: monitoring, sampling methodology: grab and stack samples, and standard practices of analysis; Introduction to measurement of SO<sub>x</sub>, NO<sub>x</sub>, Particulate Matter, Black Carbon, Suspended particulate matter, Purpose for determination No<sub>x</sub> and SO<sub>x</sub> in the atmosphere air; Air quality standards; Air pollution control

#### **Suggested Readings and References:**

1. Gilbert M. Masters and Wendell P. Ela (2009). Introduction to Environmental Engineering and Science, 3rd Ed., PHI Learning Ltd., New Delhi.
2. Laboratory Manual on Engineering Chemistry, Dhanpat Rai Publishing Company, New Delhi
3. Peavy, H. S., Donald, R. R., Tchobanoglous, George. (2013). McGraw Hill Education (India) Private Limited, Chennai
4. Satinder Ahuja (2013) Monitoring Water Quality, Pollution Assessment, Analysis, and Remediation, Elsevier
5. APHA (2005), Standard Methods for the Examination of Water and Wastewater. 21st Edition, American Public Health Association.
6. Nandini, N. (2009). Handbook on water quality monitoring and Assessment. Sapna Book House, Bengaluru.
7. Sawyer, C. N. and Mc Carty, P. L. (1978). Chemistry for Environmental Engineering. Mc Graw – Hill International. Saxena M M. (1990).
8. Zhang, C. (2007). Fundamentals of environmental sampling and analysis. John Wiley & Sons

### Course Expected Outcomes

<b>CEO<sub>1</sub></b>	Students will be able to learn theoretical aspects of water and air quality analysis.
<b>CEO<sub>2</sub></b>	Course will create ability to understand the importance of analysis and standard methods

# **Ability Enhancement Courses (AEC)**

## *University School of Liberal Arts (USLA)*

### **Story of Indian Food**

**Nature of the Course:** AEC

**Course Code:**

**Semester:** First (I)

**Credits:** 2

**Mode of Examination:** NUES

**Course ID:**

**Marks:** 100

**Continuous Evaluation**

#### **Course Objective**

To understand changes in eating habits and the influence of caste and other cultural factors on Indian eating habits.

#### **Course Outcome**

**CO1 (Knowledge):** Identify the sources for food history; introduce students to the idea of the Neolithic 'Revolution' and the debates around it.

**CO2 (Understanding):** Understand the role of caste and other cultural factors on Indian eating habits.

**CO3 (Synthesis):** Analyse the idea of fluidity of culture and its evolution through interaction and exchange; for example, through the study of 'Indian staples' like potato and maize, which are actually recent arrivals from the New World.

**CO4 (Application):** Analyse the role of culture and environment in dietary restrictions (for example the consumption of fish by so-called 'upper castes' in Eastern India).

#### **Course Content**

##### **Unit-I: Pre-history and proto-history**

- a. Sources for food history– rock paintings, remains of bones.
- b. Neolithic revolution– domestication of animals and farming.
- c. Eating habits in the Harappan Civilization, tools and utensils used.

##### **Unit-II: 'Vedic' Period and dietary restrictions**

- a. Food grains in Vedic literature.
- b. Consumption of meat, the question of beef eating in Vedic culture.
- c. Consumption of alcohol and other intoxicants like soma.
- d. Caste restrictions on food consumption and inter-dining.
- e. Growth of vegetarianism.

### **UNIT-III: The advent of Islamic and change in eating patterns**

- a. Introduction of food items from the New World – potato, maize, tobacco.
- b. Mughlai cuisine – Ni'matnama, Nushka-i-Shahjahani and other cookbooks from the era.

### **UNIT-IV: Impact of European rule**

- a. Portuguese influence on Indian cuisine with special reference to Goa.
- b. British rule and the spread of alcohol consumption.
- c. Breakfast staples – tea, omelet and bread.

### **Pedagogy**

- Classroom Lectures/ project work.
- Studying parts of primary sources to understand the idea of 'dietary restrictions' in South Asian culture.
- Classroom discussion on 'common' Indian diets and how many of these contain items introduced from the New World or elsewhere.
- Visit to traditional food spaces to understand the ideas that lie behind food.

### **Textbooks**

1. Antani, Vishu and Santosh Mahapatra, 'Evolution of Indian cuisine: a Socio-historical Review', Journal of Ethnic Foods, Volume 9, Article Number 15, 2022.
2. Achaya, K.T., The Story of our Food, Hyderabad: Universities Press (India) Limited, 2003.
3. Jha, D.N., The Myth of the Holy Cow. New York, Verso, 2002.
4. Prakash, O., Food and Drinks in Ancient India: From Earliest Times to c.1200 AD, Delhi: Munshi Ram Manohar Lal, 1961.

### **Recommended Readings**

1. Sengupta, Jayanta, 'Nation on a Platter: The Culture and Politics of Food and Cuisine in Colonial Bengal', (Modern Asian Studies, No. 44, 1, 2010).
2. Elias, Megan, 'Summoning the Food Ghosts: Food History as Public History', PH, 34,2, 2012
3. Roy, Utsa, Culinary Culture in colonial India, Introduction, 2015.

## Legislative Management and Support

**Nature of Course:** AEC

**Course Code:**

**Semester:** First (I)

**Credits:** 2

**Mode of Examination:** NUES

**Course ID:**

**Total Marks:** 100

**Continuous Evaluation**

### Course Objective

The course objective is to provide students with foundational and analytical tools to understand the Legislative process in the country so that they can provide research and data support to different levels of legislative processes.

### Course Outcome

**CO1 (Knowledge):** The students will have analytical tools and the ability to acquire foundational skills to integrate into a legislative support team and actively participate in authentic legislative endeavours.

**CO2 (Understanding):** The students will have a basic understanding of the legislative process of India.

**CO3 (Synthesis):** After the end of the course, the students will be trained to provide research and data support to different levels of legislative processes.

**CO4 (Application):** The students will have the basic knowledge to grasp complex policy issues, draft new legislation, track and analyze ongoing bills, write speeches and floor statements, write articles and press releases, attend legislative meetings, conduct meetings with various stakeholders, monitor media and public developments, manage constituent relations, and handle interoffice communications.

### Course Content

#### Unit I: Different Tiers of Representatives of governance: Powers and functions

- a. Members of Parliament
- b. State Legislative Assemblies
- c. Functionaries of Rural and Urban Local Self-government

#### Unit II: Legislative Procedures

- a. Framing of a Bill
- b. Amendments to a Bill
- c. Types and roles of different committees

#### Unit III: Reading Budget

- a. Introduction of the Budget
- b. Types of Budgets

- c. Overview of Budget Process

#### **Unit IV: Media, Communication, and Legislation**

- a. Types of media
- b. Media and communication

#### **Pedagogy**

- Class lecture, Seminars, Workshops
- Discussions, Mock Scenarios
- Films and Documentaries
- Writing a sample speech on some legislative issues.
- Projects and Assignments

#### **Text Books**

1. Austin, G. Working of a Democratic Constitution of India. New Delhi: Oxford University Press, 2004.
2. Basu, DD. Introduction to Indian Constitution. 26th edition. Delhi: LexisNexis, 2024.

## Reading Folklore

**Nature of the Course:** AEC

**Semester:** First (I)

**Course Code:**

**Credits:** 2 (L1 T1)

**Mode of Examination:** NUES

**Course ID:**

**Marks:** 100

**Continuous Evaluation**

### Course Objective

This course provides a comprehensive understanding of folklore, exploring its concepts, theories, and functions across diverse genres. It delves into Indian folklore, examining narrative, theatrical, and artistic traditions. The impact of digital technology on folklore, including digital culture, virtual communities, and memes, is also covered. Additionally, the course contrasts urban and rural folklore, exploring urban legends, street art, and conspiracy theories.

### Course Outcome

After completing this course, students will be able to

**CO1 (Knowledge):** Identify and describe the fundamental concepts, theories, and functions of folklore.

**CO2 (Understanding):** Analyze the various genres of folklore, particularly within the context of Indian traditions, and understand their cultural significance.

**CO3 (Synthesis):** Integrate knowledge of folklore with digital technology, recognizing how virtual communities and digital media influence contemporary folk expressions.

**CO4 (Application):** Apply the concepts of folklore to urban contexts, evaluating urban legends, street art, and conspiracy theories as modern forms of folklore.

### Course Content

#### Unit I: Introduction to Folklore

- a. Concept of Folk and Folklore
- b. Theories of Folklore
- c. Functions of Folklore
- d. Genres of Folklore

#### Unit II: Introduction to Indian Folklore and its Genres

- a. Indian Narrative and Sung Traditions
- b. Heritage of the Epics
- c. Indian Folk Theatre
- d. Indian Folk Painting Tradition

#### Unit III: Folklore and Digital Technology

- a. Folklore and Digital Culture
- b. Folk Groups and Virtual Communities
- c. Memes as folklore

#### **Unit IV: Folklore in Urban Context**

- a. Difference from rural folklore
- b. Urban Legends and Myths
- c. Street Art and Graffiti as Folklore
- d. Rumour and Conspiracy Theories

#### **Pedagogy**

- Lectures
- Discussion and Presentation

#### **Text Books**

1. Ben Amos, Dan. (Eds). Folklore Genres. University of Texas Press. Austin. 1976
2. Adams, Robert J. Introduction to Folklore. Best Books Publications. New York. 1975
3. Blank, Trevor J (Ed.). 2009. Folklore and the Internet: Vernacular Expression in a Digital World. Utah: Utah State University
4. Harding, Nick. Urban Legends. Pocket Essentials. 2005. Vermont

#### **Recommended Readings**

1. Bascom, William R. "Four Functions of Folklore." *The Journal of American Folklore*, 67 (266) (1954): 333-349.
2. Lombardi-Satriani, Luigi. "Folklore as Culture of Contestation." *Journal of the Folklore Institute*, Vol. 11, No. 1/2, Special Issue: Folklore Studies in Italy (1974): 99-121.
3. Ben Amos, Dan, 1982: "Towards a Definition of Folklore" in *Folklore in Context*, New Delhi: South Asian Publishers.
4. Propp, Vladimir. 1984. *Theory and History of Folklore*. Translated by Ariadna Y. Martin and Richard P. Martin. Edited with Introduction and Notes by Anatoly Liberman, Minneapolis, University of Minnesota Press.
5. Unit-3 Indian Folklore: Forms, Patterns and Variations. IGNOU. <https://egyankosh.ac.in/bitstream/123456789/48230/1/Unit-3.pdf>
6. UNIT 4 THEORETICAL APPROACHES TO FOLKLORE: Patterns and Variations. IGNOU. <https://egyankosh.ac.in/bitstream/123456789/48229/1/Unit-4.pdf>
7. Laba, Martin. "Urban Folklore: A Behavioural Approach." *Western Folklore* 38, no. 3 (1979): 158–69
8. Simpson, Jacqueline. "Rationalized Motifs in Urban Legends." *Folklore* 92, no. 2 (1981): 203–7

***University School of Humanities and Social Sciences  
(USHSS)***

**English Language and Grammar - I**

**Nature of the Course: AEC**

**Mode of Exam: NUES**

**Course Title: English Language and Grammar - I**

**Course Code: BAENG107**

**Credits: 2 (L2)**

**Total Marks: 100**

**Course Objectives:**

To impart knowledge about the English language and its grammar to improve students' writing skills; to work on students' errors.

**Course Outcomes (COs):** After the completion of the programme, students will

**CO1 (Knowledge):** have an understanding of the English language and grammar;

**CO2 (Understanding):** possess the knowledge of various aspects of the English language and grammar;

**CO3 (Communication):** help students improve their linguistic ability, speaking skills and writing skills.

**Course Content:**

**Unit I:** Subject and Predicate; Parts of Speech - Noun; Pronoun; Verb - Transitive, Intransitive; Adverb; Adjective

**Unit II:** Preposition; Conjunction; Interjection; Antonyms, Synonym, Homophones

**Unit III:** Idioms; One-word substitution

**Unit IV:** Assignments and Activities based on the topics covered in the above Units

**Recommended Readings:**

1. Murphy, Raymond. *Intermediate English Grammar*. Cambridge University Press, 1999.
2. Thomson, A.J. and Martinet, A.V. *A Practical English Grammar*. OUP, 1986.
3. Wren, P.C. & Martin. *English Grammar & Composition*. Blackie ELT Books, 1935.

## **Examination Scheme:**

### **Internal Evaluation**

1. **Internal Evaluation** will be based on assignments/presentations during the semester and an oral examination to test students' capability to speak correctly.
2. **Oral Examination** shall be conducted by the teacher at the end of the semester.

## **Punjabi – I**

**Nature of the Course: AEC**

**Mode of Exam: NUES**

**Course Title: Punjabi – I**

**(Punjabi Bhasha Da Mudhla Padhar)**

**Course Code: BAENG109**

**Credits: 2 (L2)**

**Total Marks: 100**

**Course Objectives:** To introduce students to the basics of the Punjabi language, alphabets, word formation, and meaning; to give them reading and speaking skills in Punjabi.

**Course Outcomes (COs):** After the completion of the programme, students will

**CO1 (Knowledge):** have the knowledge of Punjabi language and Gurmukhi script;

**CO2 (Understanding):** understand the basics of Punjabi language

**CO3 (Communication):** be able to express himself/herself in oral and written form in Punjabi;

**Course Content:**

**Unit-I  
Bodh)**

**(Lipi**

Gurmukhi Lipinaal mudhli jaan-pachhaan; painti akhri ate pair-bindi vale varnada ucharan ate sunder likhai da abhiyaas; Lagan-Matruvan ate lgakhran di varton

**Unit-II (Shabad Bodh)**

Binan Lag Vale, Ik Lag Vale, Do Lag Vale ate Do ton vadh lag Vale Shabadan da Ucharan ate Likhan Abhiyaas; Ling ate Vachan di Varton; Agetar ate Pichhetar di Varton

**Unit III (Arth Bodh)**

Samey, Dinan, Desi Mahinian, Ruttan, Dishaavan, Ginti, Janavran, Panchhian, Keerhe-Makaurhe, Sareer de Angaan, Sabziaan, Phalaannaal Sambandhat Shabdaavli Ucharan ate likhan abhiyaas; Ghar de Kamm-Dhande, Rasoi da Samaan, Pehraave, Khaan-Peen, Lok Kittean, Kheta-Barhi, Tithaan-Teoharan, Darakhtaan naal Sambandhat Shabdaavli da Ucharan ate likhan abhiyaas; Samanarthak Shabad, Virodharthak Shabad, Bahuarthak Shabad ate Bahute Shabdan di than ik Shabad da Ucharan ate likhan abhiyaas

## Unit IV(VaakBodh)

Sadharan Vaak, Prashan Vaachak Vaak ate Nahn Vaachak Vaak di Pachhaan ate likhan da abhiyaas; Aam Bol-chal, Daftri Kamm-kaaj, Kharido-Pharokhat naal Sambandhat Sanvaad da Vaak likhan abhiyaas; ShudhVaak likhan da abhiyaas

### Essential Readings:

1. **Adhunik Punjabi Viakaran ate lekhrachna** (2019), Punjab School Sikkhia Board, Sahibzada Ajeet Singh Nagar.
2. **Punjabi Path Pustak-4** (Dooji Bhasha) (2020), Punjab School Sikkhia Board, Sahibzada Ajeet Singh Nagar.
3. Teja, Charnjit Singh (Eds.) (2017),**Pehli Kitab**, Sann Santali Publication, Amritsar.

### Recommended Readings:

1. Brar, Boota Singh and Nachhattar Singh. *Punjabi Bhashalipi ate Viakaran*. Arsee Publishers, 2015.
2. Duggal, Narinder Singh (Dr.). *Punjabi ViakaranteRachnavali*. New Book Company, 2000.
3. Singh, Harkirat. *Saadi Bhasha*. Punjabi University, 2004.
4. Singh,Harkirat and Giani Lal Singh. *Punjabi Viakaran*, Punjab State University Text Book Board, Chandigarh.
5. Singh, Harkirat. *Punjabi Baare*. Punjabi University, 1988.
6. Singh, Teja. *Punjabi Kiven Likhie*(Second Edition). Hind Publishers Limited, 1947.

### Internet Resources:

- <http://www.learnpunjabi.org/pr.aspx>

### Examination Scheme:

### Internal Evaluation

1. **Evaluation** will be based on assignments/presentations during the semester and an oral examination to test students' capability to speak correctly.
2. **Oral Examination** shall be conducted by the teacher at the end of the semester.

## **French - I**

**Nature of the Course: AEC**

**Mode of Exam: NUES**

**Course Title: French - I**

**Course Code: BAENG111**

**Credits: 2 (L2)**

**Total Marks: 100**

### **Course Objectives:**

This course is designed for those who want to learn French part-time as a foreign language. The course corresponds to A1 level of the Common European Framework of Reference for Languages (CEFR).

**Course Outcomes (COs):** After the completion of the programme, students will

**CO1 (Knowledge):** know the basic grammar and sounds of the French language;

**CO2 (Understanding):** understand the basics of the French language with respect to their listening skills;

**CO3 (Communication):** be able to express themselves in oral and written form in French.

### **Course Content:**

#### **Unit I French Communicative Grammar-I**

**Les objets de la vie quotidienne, Où est le professeur?, Comment est le professeur?** Introduction to French; Les salutations; Le Nom et le pluriel des noms ;L'Alphabet Vocabulaire (Unit 1-5, book 1)

#### **Unit- II French Communicative Grammar-I**

**La matière, Les parties du corps; Les nationalités;** Singular/Plural; Verb Conjugation; Sentence Form- Form negative/interrogative; adjectives (Unit 6-9, book 1)

#### **Unit- III Listening**

Listening practice and exercises pertaining to Unit 1 & Unit 2 in Communicative Grammar and Written Comprehension

#### **Unit- IV Listening**

Listening practice and exercises pertaining to Unit 3 & Unit 4 in Communicative Grammar and Written Comprehension

#### **Prescribed Books:**

**G. Mauger, cours de Langue et de Civilisation Françaises 1 & 2, Goyal Publishers & Distributors Ltd.**  
Apprenons Le Français Methode de francais -01 & 02.

Mahitha Ranjit & Monica Singh Alliance Francaise de Delhi, New Saraswati House (India) Pvt. Ltd. French visual phrase book, *D K French visual phrase book*.

**Recommended Readings:**

1. G. Mauger. *cours de Langue et de Civilisation Françaises 1 & 2*, Goyal Publishers & Distributors Ltd., 2013.
2. Mahitha, Ranjit & Monica Singh. *Apprenons Le Français Methode de francais ---01 & 02*. Alliance Francaise de Delhi, New Saraswati House (India) Pvt. Ltd., 2019.
3. French visual phrase book, *D K French visual phrase book*. D. K. Publisher, 2011.
4. Capelle, Guy and Noelle Gidon. *Cahier d'Excercises 1 (Le NouvelEspaces Cahier d'Excercises)*. Hachette, 1995.

**Examination Scheme:**

1. **Evaluation** will be based on assignments/presentations during the semester and oral examination to test students' capability to speak correctly.
2. **Oral Examination** shall be conducted by the teacher at the end of the semester.

## German - I

**Nature of the Course:** AEC

**Mode of Exam:** NUES

**Course Title:** German - I

**Course Code:** BAENG113

**Credits:** 2 (L2)

**Total Marks:** 100

### Course Objectives:

This course is designed for those who want to learn German part-time as a foreign language. The course corresponds to A1 level of the Common European Framework of Reference for Languages (CEFR).

**Course Outcomes (COs):** After the completion of the programme, students will

**CO1 (Understanding):** understand and use familiar, everyday expressions and simple sentences in German;

**CO2 (Knowledge):** know the German alphabet and the basics of the German language;

**CO3 (Communication):** be able to introduce themselves and others as well as ask simple questions, for instance, where they live, whom they know, their family and work, how to place an order for food in a restaurant, seek information at a railway station, etc. They should be familiar with some important cities in Germany, Austria and Switzerland.

### Course Content

<b>Unit- I</b>	Guten Tag, Freunde
<b>Unit II</b>	Kollegen und ich
<b>Unit- III</b>	In der Stadt
<b>Unit- IV</b>	Assignments, Practice Sessions

### Recommended Readings:

1. Durell, M. Kartin Kohl and Gudrun Loftus. *Essential German Grammar*. Arnold, 2002.
2. ---. *Hammer's German Grammar and Usage*. Routledge, 1997.
3. Dengler, Stefanie, et al. *Netzwerkneu A1*. Goyal Publishers & Distributors, 2021.

However, teaching will not be restricted to the textbook and additional material will also be provided to the learners. The students will also be introduced to audio-visual exercises, films, etc suitable for beginners.

**Examination Scheme:**

1. **Evaluation** will be based on assignments/presentations during the semester and oral examination to test students' capability to speak correctly.
2. **Oral Examination** shall be conducted by the teacher at the end of the semester

## Hindi -I

**Nature of the Course:** AEC

**Mode of Exam:** NUES

**Course Title:** Hindi -I

**Course Code:** BAENG119

**Credits:** 2 (L 2)

**Total Marks:** 100

**Course Objectives:** To impart knowledge about Hindi language, Literature and improve students' writing skills; to work on students' errors

**Course Outcomes (COs):** After the completion of the course, students will

**CO1 (Understanding):** develop understanding of Hindi language and literature;

**CO2 (Knowledge):** know about various aspects of Hindi language and grammar and various parts of language.

**CO3 (Communication):** The course will help students improve their speaking and writing skills

### Course Content

#### Unit I:

- i. Hindi Bhaasha: Vyutpatti aur Kshetr
- ii. Hindi Saahitya ka Itihaas: Saamaanya Parichay
- iii. Aadikal
- iv. Bhaktikaal
- v. Reetikaal

#### Unit II: Naatak

Andher Nagri–Bharatendu Harishchandra

#### Unit III: Kahaaniyaan

Kafan – Premachand

Paajeb – Jainendra Kumar

Sikka Badal Gaya – Krishna Sobti

#### Unit IV: MadhyakaaleenaKavy

## **Kabir**

Potheepadhi-padhi Jagmuva, pandit bhayana koi  
Dhaiaakharprem ka, padhe so pandit Hoi.

Sukhiya sab sansaarhai, khaearusovai  
Dukhiya das kabeerhai, Jaagaiarurovai

## **Mira**

He ri main toh prem diwani, mera darad na jaane koye,  
Sooleeoo par sejh amaaree, kis vidh sona hoye.  
Gagan mandal par sejpgiya ki, kis vidh milna hoye.  
Ghayal ki gati ghayal janei, ki jin lagi hoye,  
Johari ki gati johari jane, ki jin lagi hoye.  
Darad ki maari ban ban dolun vaid milyo nahin koye,  
Mira ki prabhu peer mitei jab vaid sanvleya hoye.

## **Ghananand**

Ati sudho saneh ko maragh ai jahan neku sayanap baank nahin  
Tahan sachen chalaita ji aapanpon jhahhak ek apti je nisan knahin.

Ghananand pyare sujan sunao yahan ek tei dusro aank nahin  
Tum kaun dhaon paati padhe hao kaho mann lehu peide hu chatank nahin.

## **Recommended Readings**

1. *Hindi Saahitya ka Saral Itihaas* – Vishvanath Tripathi
2. *Kahaanee Nayi Kahaani*– NaamvarSingh
3. *Kabir Granthavalie*– ShyamasundarDas
4. *Mira Pad Sanchayan* – Madhav Haada
5. *Saneh ko Maarag* – ImaraiBangha

## **Examination Scheme:**

1. **Evaluation** will be based on assignments/presentations during the semester and an oral examination to test students' capability to speak correctly.
2. **Oral Examination** shall be conducted by the teacher at the end of the semester

## University School of Bio-Technology (USBT)

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-181 (AEC)</b>	<b>Use of Generative Artificial Intelligence</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>20</b>

### Course Objectives:

1. Understand core principles and mechanisms of generative AI across multiple modalities.
2. Gain proficiency in using leading generative AI tools for text, image, spreadsheet (Excel), presentation, audio, and video content creation.
3. Develop prompt engineering skills to optimize outputs from generative models.
4. Critically evaluate the ethical, legal, and societal implications of generative AI.
5. Apply generative AI to real-world projects in business, education, marketing, and creative domains.

### Course Outcomes:

By the end of the course, students will be able to:

1. Confidently use leading generative AI tools for text, images, spreadsheets, presentations, audio, and video.
2. Craft effective prompts and workflows for AI-driven content creation.
3. Critically assess the outputs and limitations of generative AI.
4. Navigate ethical, legal, and societal challenges of AI-generated media.
5. Deliver a portfolio of AI-generated content across multiple modalities.

### Course Content:

**Unit 1:** Introduction to Generative AI, History and evolution of generative AI, Core concepts: LLMs, GANs, VAEs, Diffusion Models, Multimodal AI: integrating text, image, audio, video, Major platforms and tools overview (ChatGPT, Gemini, Copilot, Midjourney, DALL-E, etc.), (4)

**Unit 2:** Text Generation with AI, Prompt engineering for text, Content creation: articles, summaries, emails, reports, Copywriting, creative writing, and translation, Automating routine writing tasks, Legal and ethical considerations for AI-generated text. Image Generation and Editing, Text-to-image and image-to-image generation, Tools: DALL-E, Midjourney, Stable Diffusion, Style transfer, image editing, enhancement, Use cases: marketing, design, social media, Copyright and ownership issues. (4)

**Unit 3:** Generative AI for Excel and Data Analysis, AI-assisted formula creation and optimization, Automating data cleaning, analysis, and visualization, Generating reports and dashboards, Using AI for task automation (VBA, macros), Integrated AI tools: Copilot, Gemini, ChatGPT for Excel. AI-Driven Presentations, Generating slides and visual content from text prompts, AI tools for design, layout, and storytelling, Automating data visualization and infographics, Integrating multimedia (images, audio, video) into presentations, Best practices for effective AI-powered presentations. (4)

**Unit 4:** Audio Generation and Enhancement, Text-to-speech, voice cloning, and music generation, Tools: ElevenLabs, Descript, Adobe Podcast, Suno, etc., Podcasting, narration, and audio branding, Ethical issues: deepfakes, consent, and authenticity. Video Generation and Editing, Text-to-video and image-to-video tools, AI for motion graphics, animation, and video editing, Integrating AI-generated assets (audio, images, text) into video, Tools: Runway, Synthesia, Pika, Lumen5, Adobe Firefly, Copyright, licensing, and data privacy. (4)

**Unit 5:** Multimodal AI and Advanced Applications, Cross-modal generation: combining text, image, audio, video, Multimodal prompt engineering, Real-world applications: marketing, education, accessibility, entertainment, Limitations and future trends. Ethics, Legal, and Societal Implications, Copyright, ownership, and licensing, Bias, misinformation, and AI hallucinations, Security, privacy, and data protection, Responsible and transparent AI use. (4)

### **Recommended Readings**

- [1]. Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play by David Foster
- [2]. Generative AI: The Future of Everything by Sharad Gandhi
- [3]. Ripples of Generative AI: How Generative AI Impacts, Informs and Transforms Our Lives by Jacob Emerson
- [4]. The Big Book of Generative AI (Databricks)
- [5]. AI Made Simple: A Beginner's Guide to Generative Intelligence by Rajeev Kapur

### **Suggested Tools & Platforms**

- [1]. Text: ChatGPT, Gemini, Claude, Jasper
- [2]. Image: DALL-E, Midjourney, Stable Diffusion, Canva AI
- [3]. Excel/Data: Microsoft Copilot, ChatGPT for Excel, Gemini for Sheets
- [4]. Presentations: Tome, Gamma, Beautiful.ai, Canva AI Presentations
- [5]. Audio: ElevenLabs, Descript, Adobe Podcast, Suno
- [6]. Video: Runway, Synthesia, Pika, Lumen5, Adobe Firefly

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-183 (AEC)</b>	<b>Scientific communication and writing</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>20</b>

### Course Objectives:

1. To understand the fundamental principles of scientific communication and writing.
2. To develop skills for writing clear and concise scientific papers and reports.
3. To learn how to effectively present scientific information orally and visually.
4. To conduct and synthesize literature reviews in a coherent manner.
5. To communicate scientific information to diverse audiences.

### Course Outcomes:

1. Students will explain the foundational principles of scientific communication and writing.
2. Students will write clear and concise scientific papers and reports.
3. Students will effectively present scientific information both orally and visually.
4. Students will conduct and synthesize coherent literature reviews.
5. Students will communicate scientific information to diverse audiences

### Course Content:

#### Unit 1: Principles of Scientific Writing

- Introduction to Scientific Communication, Structure of Scientific Papers (Abstract, Introduction, Methods, Results, Discussion), Writing Style and Clarity, Common Pitfalls in Scientific Writing (4)

#### Unit 2: Conducting Literature Reviews

- Importance of Literature Reviews, Steps in Conducting a Literature Review, Summarizing and Synthesizing Information, Citing Sources Appropriately, Writing a Literature Review Section (4)

#### Unit 3: Writing Scientific Papers and Reports

- Detailed Examination of Each Section of a Scientific Paper, Writing Research Proposals, Laboratory Reports, and Review Articles, Editing and Revising Scientific Documents, Peer Review Process (4)

#### Unit 4: Oral and Visual Scientific Communication

- Preparing and Delivering Oral Presentations, Designing Effective Visual Aids (Graphs, Tables, Posters), Communicating Data Visually, Using Presentation Software (PowerPoint, Prezi) (4)

#### Unit 5: Communicating Science to Diverse Audiences

- Techniques for Explaining Complex Scientific Concepts to Non-Scientists, Writing for General Audiences (Blogs, Popular Science Articles), Public Speaking and Science Outreach, Ethical Considerations in Scientific Communication (4)

### Recommended Readings

- "Scientific Writing and Communication: Papers, Proposals, and Presentations" by Angelika H. Hofmann
- "The Craft of Scientific Writing" by Michael Alley
- "Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded" by Joshua Schimel
- "The Elements of Style" by William Strunk Jr. and E.B. White
- "How to Write and Publish a Scientific Paper" by Barbara Gastel and Robert A. Day
- "The Chicago Manual of Style" by The University of Chicago Press Editorial Staff
- "Science Research Writing for Non-Native Speakers of English" by Hilary Glasman-Deal
- "Presenting Science Concisely: How to Give High-Impact Presentations in Biology, Chemistry, Engineering, and Medicine" by Dennis Meredith

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-185 (AEC)</b>	<b>Emerging Technologies in Food Industry</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>30</b>

### Course Objectives:

To understand about new developments in food industry and to impart knowledge about the importance and applications of the technology.

### Course Outcomes:

The student will be able to understand:

Emerging / alternative technologies applied to food processing.

Relative advantages / disadvantages over existing technologies.

Economics and commercialization of newer technologies.

### UNIT I

Membrane separation process Membrane Technology-process- Micro-filtration, Ultra-filtration, Nano-filtration and Reverse Osmosis-advantages-equipment

### UNIT II

High pressure processing and microwave heating, dielectric heating of foods, cold plasma techniques.

### UNIT III

Irradiation and PEF and ohmic heating Pulsed electric field – equipment –mechanism of PEF-advantages, Ohmic heating of foods- mechanism- principle-advantages, applications. Irradiation- principle- types of irradiation-advantages-applications

### UNIT IV

Osmotic dehydration of foods and minimal processing Principle – Mechanism of osmotic dehydration – Effect of process parameters on mass transfer – Methods to increase the rate of mass transfer – Applications – Limitations of osmotic dehydration – Management of osmotic solutions. Minimal processing-principle-methods- advantages

### UNIT V

Nanotechnology and antimicrobial technology Role of Antimicrobial agents in food –Plant and animal derived antimicrobials – Antimicrobial enzymes, antimicrobial food packaging, nanotechnology-application of nanotechnology in food industry.

### Recommended Readings

1. Leistner L. and Gould G. Hurdle Technologies – Combination treatments for food stability safety and quality, Kluwer Academics / Plenum Publishers, New York (2002)
2. Novel Food Processing Technologies(Food Science and Technology Series) by Gustavo V. Barbosa-Canovas, Maria S. Tapia, M. Soledad Tapia, M. Pilar Cano, Publisher: CRC Press, November 2004, ISBN-13: 9780824753337,
3. P Richardson (2001), “Thermal Technologies in Food Processing”, Campden and Chorleywood Food Research Association, UK, Woodhead Publishing Limited.

# Value-Added Courses (VAC)

## *University School of Liberal Arts (USLA)*

### Environmental Studies

**Nature of the Course:** VAC

**Semester:** First (I)

**Course Code:**

**Credits:** 2 (L1 T1)

**Mode of Examination:** NUES

**Course ID:**

**Marks:** 100

**Continues Evaluation**

#### **Course Objective:**

Make students familiar with the environmental challenges, issues, and concerns.

#### **Course Outcomes:**

**CO1 (Knowledge):** The environmental Studies course will provide necessary information and knowledge about the various aspects of the environment, ecosystems, and related biodiversity.

**CO2 (Understanding):** Students will be able to learn and understand the availability and sustainable use of resources, environmental problems, and their short-term and long-term impacts on humans.

**CO 3 (Synthesis):** Students will be able to integrate different paradigms and issues related to the environment.

**CO4 (Application):** The course will help them learn about various social issues and the role of humans in conservation and protection.

#### **Course Content**

##### **Unit I: Fundamentals:**

**(16 hours)**

- a. **The Multidisciplinary nature of environmental studies:** Definition, scope and importance, need for public awareness;
- b. **Ecosystems:** Concept, Structure and function of an ecosystem, energy flow in ecosystems, food chain, food web, ecological pyramids, ecological succession; Introduction to types, characteristics features, structure and function of different ecosystems including forest, grassland, desert and aquatic ecosystem
- c. **Biodiversity:** Introduction to biodiversity-definition, genetics, species, ecosystem diversity, biogeographically classification of India, value of biodiversity-consumptive uses, productive, social, ethical, aesthetic and option values, biodiversity at global, national and local level, India as a mega diversity nation, endangered and endemic species of India, hot spots of biodiversity, threats to biodiversity – habitat loss, poaching of wild life, man wildlife conflicts and conservation of biodiversity-in-situ and ex-situ conservation.

##### **Unit II: Renewable and Non-renewable resources**

**(8 hours)**

- a. **Energy Resources:** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources-green fuel.
- b. **Water Resources:** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems
- c. **Forest resources:** Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forest and tribal people, case studies
- d. **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources, case studies
- e. **Food resources:** World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies
- f. **Land resources:** Land as a resource, land degradation, man-induced landslides, soil erosion, and desertification. Role of individual in conservation of natural resources, Resource Management-Sustainable development.

### **Unit III: Environment Pollution:**

**(8 hours)**

- a. **Air Pollution:** Types of pollutants, source, effects, sink & control of primary pollutants– CO, NOX, HC, SOx and particulates, effect of pollutants on man & environment: photochemical smog, acid rain and global warming, CO2 Sequestration.
- b. **Water Pollution:** Classification of Pollutants, their sources, waste water treatment (domestic and industrial).
- c. **Soil Pollution:** Composition of soil, classification and effects of solid pollutants and their control
- d. **Solid Waste Management:** Classification, waste treatment and disposal methods; composting, sanitary land filling, thermal processes, recycling and reuse methods.
- e. **Hazardous wastes** - Classification, radioactive, biomedical & chemical, treatment and disposal- Physical, chemical and biological processes.
- f. **Marine Pollution:** Causes, effects and control of marine pollution, coastal zone management
- g. **Thermal pollution:** Causes, effects and control of marine pollution, coastal zone management
- h. **Disaster Management:** Floods, earth quake, cyclone and landslides

### **Unit IV: Social Issues, Human Population and Environment**

**(13 hours)**

- a. Water conservation- rain water harvesting, watershed management
- b. Environmental ethics; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, case studies; wasteland reclamation

- c. Environmental Impact Assessment; Some important Environmental laws
- d. Green bench; population growth and variation among nations, population explosion-family welfare program, environment and human health, human right, value education, women and child welfare, HIV/AIDS; case studies and public awareness
- e. Role of government and non-government organizations in public awareness and environment improvement.

### **Field work**

### **Pedagogy:**

- Lectures
- Discussion and Presentation

### **Text Books:**

1. Barucha, E. Textbook of Environmental Studies. UGC, 2005.
2. Mishra, D.D. (2008). Fundamental concepts in Environmental Studies. S Chand & Co. Ltd.
3. Gadu. R, S Rattan, & S Mohapatra. (2014). A textbook of Environmental Studies. Kataria Publication.

### **Recommended Readings:**

1. P Meenakshi. (2014). Elements of Environmental Sciences and Engineering. PHI Learning Pvt Ltd.
2. Joseph, B. (2005) Environmental studies. Tata McGraw-Hill Publishing Company Ltd.
3. Sharma & Kaur, Environmental Chemistry, Goel Publishing House.
4. Franky Varah, Mahongnao P., Khashimwo P. and T. Shimrah. (2020). Environmental Studies. Heritage Publishers, New Delhi.

# *University School of Humanities and Social Sciences (USHSS)*

## **Introduction to Indian Philosophy (IKS)**

**Nature of the Course:** VAC

**Mode of Exam:** NUES

**Course Title:** Introduction to Indian Philosophy (IKS)

**Course Code:** BAENG121

**Credits:** 2(L2)

**Total Marks:** 100 (40 + 60)

### **Course Objectives:**

To introduce students to the Indian tradition of thought through discussion on various concepts, theories and texts of Indigenous schools of philosophy

**Course Outcomes (COs):** After the completion of the programme, students will have

**CO 1 (Knowledge):** an overview of the development of the Indian tradition of thought;

**CO 2 (Understanding):** an awareness of various schools of philosophy/*Darshan* in India;

**CO 3 (Life-Long Learning):** the motivation to learn more about the heritage, and to generate the possibility of engaging with the discipline at a higher level;

**CO4 (Research):** the capability to engage with Indian philosophy and its relevance in contemporary times.

### **Course Content:**

**Unit I:** Development of Indian Philosophical System (Darshan) and Pramanas in Bharatiya Darshanas

**Unit II:** Sankhya and Yoga—Theory of Evolution, Satkaryavada and Asatkaryavada, Essence of Yoga Darshana

**Unit III:** Essence of Bauddha and Jain Darshana—Four Noble Truths, Noble Eightfold Paths, Dependent Origination, Anekantavada and Syadvada

**Unit IV:** Assignments and Activities

### **Recommended Readings:**

1. Dasgupta, Surendranath. *A History of Indian Philosophy Vol I*. Motilal Banarsidas, 2015.
2. Mohanty, J. N. *Classical Indian Philosophy*. Roman and Littlefield Publishers, 2000.
3. Radhakrishnan; *Indian Philosophy, Vol. I*. George Allen and Unwin Ltd., 1923.
4. Radhakrishnan; *Indian Philosophy, Vol. II*. The Macmillan Company, 1923.
5. Sharma, Chandradhar. *Indian Philosophy: A Critical Survey*. Barnes and Noble, 1962.
6. Sinha, Jadunath. *Introduction to Indian Philosophy*. Lakshmi Narain Agarwal Educational Publishers, 1949.

### **Examination Scheme:**

1. **Evaluation** will be based on assignments/presentations during the semester and oral examination to test students' capability to speak correctly.
2. **Oral Examination** shall be conducted by the teacher at the end of the semester

## IT Tools for Statistics in Economics – I

**Paper Code:** BAECO111

**Paper:** IT Tools for Statistics in Economics – I

**Internal Marks:** 40

**Mode of Exam:** NUES

**Lectures - 2, Tutorial – 0**

**Total Credit – 2**

**External Marks: 60**

**Course Objectives:** The course aims to introduce students to the basic Statistical tools used in analysing and visual representation of data using MS Excel and Power Bi

### Course Outcomes

CO1: To develop the understanding of basic tools of statistics using IT tools, such as MS Excel and Power Bi

CO2: To equip students with basic computing skills required for representing data

CO3: To familiarize students with fundamental concepts that play important role in understanding and visualizing data using Power Bi

CO4: To enable students with basic quantitative skills required for analysing data using Excel

### Unit – I: Introduction

Introduction to Excel – Data Entry – Data Formats – Importing Data – Primary and Secondary Data – Variables and Descriptive Statistics – Frequency tables – Histograms – Bar graphs – Pie charts – Stem and Leaf Plots

### Unit – II: Measures of Central Tendency and Dispersion

Distribution Statistics – Measures of Central Tendency: Mean, Median and Mode – Measures of Dispersion: Range, Variance & Standard Deviation, Quartiles, Deciles and Percentiles – Measures of Shape: Skewness and Kurtosis – Outliers – Boxplots – Normal Curve and its Properties: Visual Representation

### Unit – III: Data Analysis with Power Bi

Introduction – Uploading Data – Introduction to Reports – Visual Interactions – Sharing a Dashboard

### Unit – IV: Assignments and Discussions

Students would be required to do assignments/ projects applying the concepts taught in the class using power Bi and MS Excel

### Recommended Readings:

1. Berk, N. K., & Carey, P. (2010). *Data analysis with Microsoft excel: updated for office 2007*. Brooks/Cole, Cengage Learning.
2. Ferrari, A., & Russo, M. (2016). *Introducing Microsoft Power BI*. Microsoft Press.
3. Rowntree, D. (2018). *Statistics without tears - A primer for non-mathematicians*, Allyn and Bacon.
4. Levin, I.R., Rubin, S.D., Siddiqui, H.M., & Rastogi, S. (2014). *Statistics for Management, 7th Edn*, Pearson
5. Jelen, B. (2010). *Charts and Graphs: Microsoft Excel 2010*. Pearson Education India

### Suggested Data Sources

<https://data.worldbank.org/>

<https://www.statista.com/>

<https://data.gov.in/>

<https://censusindia.gov.in/>

<https://www.kaggle.com/>

<http://data.un.org/>

## *University School of Bio-Technology (USBT)*

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-191 (VAC)</b>	<b>Bioentrepreneurship</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>20</b>

### **Course Objectives:**

1. Equip students with skills to launch and manage ventures in biotechnology, healthcare, and life sciences.
2. Integrate scientific knowledge with business strategy, innovation, and ethical practices.
3. Develop competencies in market analysis, product development, funding, and regulatory compliance.
4. Foster entrepreneurial thinking through case studies, industry collaborations, and hands-on projects.

### **Course Outcomes:**

By the end of the course, students will be able to:

1. Launch and manage ventures in biotechnology and allied fields
2. Integrate scientific knowledge with business strategy, innovation, and ethical practices.
3. Develop competencies in market analysis, product development, funding, and regulatory compliance.
4. Foster entrepreneurial thinking

### **Course Content:**

**Unit 1:** Introduction to Bioentrepreneurship, Definition, scope, and global trends, Life science sectors: biotech, medtech, digital health, Bioeconomy and sustainability principles, Case studies of successful ventures.

(4)

**Unit 2:** Opportunity Identification & Market Analysis, Unmet needs in healthcare/biotech, Feasibility studies (market, technical, financial), Competitive landscape analysis, Intellectual property (patents, licensing),

(4)

**Unit 3:** Business Planning & Strategy, Business model canvas for life sciences, Funding strategies: grants, VC, crowdfunding, Risk management and exit strategies, Pitch deck development, Product Development in Life Sciences, Drug/devices R&D pipelines, Regulatory pathways (FDA, EMA, CDSCO), Clinical trials and compliance (GCP, GMP), Scale-up and manufacturing.

(4)

**Unit 4:** Marketing & Commercialization, Value proposition design, Pricing, reimbursement, market access, Digital marketing for biotech, Post-market surveillance.

(4)

**Unit 5:** Funding & Financial Management, Venture capital/angel investing in biotech, financial modeling and valuation, Grant writing, Legal & Ethical Considerations, Bioethics and biosafety regulations, Data privacy, Contract negotiations and partnerships, Global compliance challenges.

(4)

### **Recommended Readings**

- [1]. Bioentrepreneurship: From Idea to Marketplace by J. Edwards,
- [2]. Innovation and Entrepreneurship in Biotechnology: Concepts, Theories and Cases by Damian Hine and John Kapeleris
- [3]. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses by Eric Ries

- [4]. Academic Entrepreneurship: How to Bring Your Scientific Discovery to a Successful Commercial Product by Jeffrey S. Aramini
- [5]. Biotechnology Entrepreneurship: Starting, Managing, and Leading Biotech Companies by Craig Shimasaki
- [6]. Bioentrepreneurship: From Idea to Market by Arvind K. Bansal and Shikha Bansal

Paper code:	Paper Title	L	T	P	C	Hrs
<b>BT-192 (VAC)</b>	<b>Ethics in Biotechnology</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>20</b>

### Course Objectives:

1. To understand key ethical principles and frameworks in biotechnology.
2. To identify and analyze ethical issues arising from biotechnological innovations.
3. To evaluate the social, environmental, and individual impacts of biotechnology.
4. To discuss the role and responsibilities of biotechnologists in ethical decision-making.
5. To develop critical thinking skills to navigate ethical dilemmas in biotechnology.

### Course Outcomes:

1. Students will explain key ethical principles and frameworks related to biotechnology.
2. Students will identify and critically analyze ethical issues in biotechnological advancements.
3. Students will evaluate the social, environmental, and individual impacts of biotechnological innovations.
4. Students will articulate the role and responsibilities of biotechnologists in ethical decision-making.
5. Students will develop and apply critical thinking skills to address ethical dilemmas in biotechnology.

### Course Content:

#### Unit 1: Introduction to Ethics and Biotechnology

- Fundamental Ethical Principles (Beneficence, Non-Maleficence, Autonomy, Justice), Ethical Theories (Utilitarianism, Deontology, Virtue Ethics), Overview of Biotechnology and Its Applications, Historical Context of Ethics in Biotechnology (4)

#### Unit 2: Genetic Engineering and Ethical Concerns

- Ethical Issues in Genetic Modification (GMOs, CRISPR, Gene Therapy), Impact on Agriculture and Food Security, Human Genetic Engineering and Enhancement, Case Studies: Ethical Dilemmas in Genetic Engineering (4)

#### Unit 3: Medical Biotechnology and Bioethics

- Ethical Considerations in Medical Biotechnology (Stem Cell Research, Cloning, Personalized Medicine), Patient Consent and Privacy, Access to Biotechnological Treatments, Case Studies: Ethical Issues in Medical Biotechnology (4)

#### Unit 4: Environmental Biotechnology and Sustainability

- Biotechnology and Environmental Ethics, Bio-Remediation and Conservation, Impact of Biotechnology on Biodiversity and Ecosystems, Case Studies: Environmental Ethics in Biotechnology (4)

#### Unit 5: Policy, Regulation, and the Role of Biotechnologists

- Role of Policy and Regulation in Biotechnology, Ethical Guidelines and Regulatory Frameworks, Responsibilities of Biotechnologists and Professional Conduct, Case Studies: Policy and Ethical Decision-Making in Biotechnology (4)

### Recommended Readings

- "Ethical Issues in Biotechnology" by Richard Sherlock and John D. Morrey
- "Bioethics: Principles, Issues, and Cases" by Lewis Vaughn
- "Biomedical Ethics" by Thomas A. Mappes and David DeGrazia
- "The Ethics of Biotechnology" by Jonathan Morris
- "From Chance to Choice: Genetics and Justice" by Allen Buchanan, Dan W. Brock, Norman Daniels, and Daniel Wikler
- "Biotechnology and Society: An Introduction" by Hallam Stevens
- "Ethics in Biomedical Research: International Perspectives" edited by Matthias Kaiser and John-Stewart Gordon

**Research Articles and Ethical Guidelines:**

- Selected research articles and ethical guidelines (e.g., Nuffield Council on Bioethics reports, UNESCO Bioethics guidelines) provided during the course to enhance understanding of contemporary ethical issues in biotechnology.

Paper code:	Paper Title	L	T	P	C	Hrs
BT-193 (VAC)	Regulatory affairs in Biotechnology	2	0	0	2	20

### Course Objectives:

1. To understand the fundamental principles of regulatory affairs in biotechnology.
2. To identify the major regulatory agencies and their roles in biotechnology.
3. To understand the regulatory processes involved in the development and approval of biotechnological products.
4. To discuss the importance of compliance and quality assurance in biotechnology.
5. To develop skills to navigate regulatory challenges in the biotechnology industry.

### Course Outcomes:

1. Students will explain the basic principles and importance of regulatory affairs in biotechnology.
2. Students will identify key regulatory agencies and understand their roles in biotechnology.
3. Students will outline the regulatory processes for biotechnological product development and approval.
4. Students will discuss the significance of compliance and quality assurance in ensuring product safety and efficacy.
5. Students will develop problem-solving skills to address regulatory challenges in the biotechnology industry.

### Course Content:

#### Unit 1: Introduction to Regulatory Affairs

- Overview of Regulatory Affairs, Importance in Biotechnology, Key Concepts (Regulation, Compliance, Standards), Historical Context and Evolution of Regulations in Biotechnology (4)

#### Unit 2: Regulatory Agencies and Frameworks

- Major Regulatory Agencies (FDA, EMA, WHO), Key Regulatory Frameworks and Guidelines (ICH, GLP, GMP), Roles and Responsibilities of Regulatory Agencies, Case Studies: Regulatory Processes Across Different Regions (4)

#### Unit 3: Regulatory Processes and Product Development

- Stages of Product Development (Preclinical, Clinical Trials, Market Approval), Regulatory Submissions and Documentation (IND, NDA, BLA), Safety and Efficacy Evaluations, Case Studies: Successful Regulatory Approvals (4)

#### Unit 4: Compliance and Quality Assurance

- Principles of Good Laboratory Practices (GLP), Good Manufacturing Practices (GMP), Quality Assurance and Control, Risk Management in Biotechnology, Case Studies: Ensuring Compliance and Quality (4)

#### Unit 5: Regulatory Challenges and Future Directions

- Common Regulatory Challenges (Emerging Technologies, Global Harmonization), Navigating Regulatory Pathways, Future Trends in Biotechnology Regulation, Role of Regulatory Affairs Professionals, Case Studies: Addressing Regulatory Challenges (4)

## **Recommended Readings**

- "Fundamentals of EU Regulatory Affairs - Eighth Edition" by Regulatory Affairs Professionals Society (RAPS)
- "FDA Regulatory Affairs: A Guide for Prescription Drugs, Medical Devices, and Biologics" by Douglas J. Pisano and David S. Mantus
- "The Regulatory Compliance Almanac" by Les Schnoll
- "Biotechnology: Business, Regulation, and Law" by Edward L. Hennessy and Albert J. Rosenthal
- "Good Pharmaceutical Manufacturing Practice: Rationale and Compliance" by John Sharp
- "Biotechnology and Biopharmaceutical Regulation in Value Chains" by Børge Obel and Frederik Ørsted
- "Quality Assurance and Quality Control in the Analytical Chemical Laboratory: A Practical Approach" by Piotr Konieczka and Jacek Namiesnik

## **Regulatory Documents and Guidelines:**

- Selected regulatory documents and guidelines (e.g., FDA guidance documents, ICH guidelines, EMA reports) provided during the course to enhance understanding of regulatory frameworks and compliance procedures.

# *University School of Environment Management (USEM)*

## *AI IN ENVIRONMENT*

**Paper Code -BSCES-113 (VAC 1)**

**L - 01**

**Credits - 01**

### **Course Objectives**

CO <sub>1</sub>	Describe and apply AI methods covered in the course, including the basic concepts and the key algorithms
CO <sub>2</sub>	Describe pressing societal and environmental challenges, where AI has been successfully deployed to tackle them
CO <sub>3</sub>	Model societal challenges as mathematical problems that AI techniques can be applied to and recognize which AI techniques fit the problems

### **Course Contents**

**Unit 1:** Introduction to Artificial Intelligence (AI), Applications of AI in environmental forecasting and assessment, Introduction to AI tools used in Environmental management, Databases and datasets, AI based Tool development using R/ Python.

**Unit II:** Weather forecasting, Assessing depletion of environmental resources, Water economics modelling, Forecasting geological events and potential disasters, Errors and biases in AI predictions, Development of AI prediction algorithms, Validations of prediction methods and algorithms.

### **Suggested Readings and References:**

1. Introduction to Data Mining, by Tan, Steinbach, Kumar. Chapter 8. Cluster Analysis: Basic Concepts and Algorithms
2. Artificial Intelligence Methods in the Environmental Sciences Ed. By Sue Ellen Haupt, Antonello Pasini, Caren Marzban (2009) Springer
3. Recent articles, web resources and research papers

**Course Expected Outcomes:**

<b>CO<sub>1</sub></b>	Understand the concept of Artificial Intelligence (AI).
<b>CO<sub>2</sub></b>	Identify tools and algorithms appropriate for different applications
<b>CO<sub>3</sub></b>	Gain insight into different application areas for AI and their different challenges
<b>CO<sub>4</sub></b>	Evaluate potential error sources occurring when applying AI algorithms