JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT, SOLAN

1.3.1

(Courses which address Gender, Environment and
Sustainability, Human Values and Professional Ethics)

Year 2023-24

1.3.1 List of Courses which address Gender, Environment and Sustainability, Human Values and Professional Ethics into the Curriculum

Year - 2023-24

S.No.	Course Code	Course Name	
1	17P1WGE102	Ethics,IPR related issues and Plagiariasm	Ph.Dfor all streams
2	10B11GE 411	Enviormental Studies	2nd year all branches
3	18B1WHS636	Understnading India: Literary Reflections	Elective for VI Semester
4	13M11BT113	IPR Bioethics and Biosafety	for MSc.
5	18B1WBT732	IPR and commercialization	Elective for 4th yr
6	14B1WBT731	Bioenergy and Biofuels	Elective for 3rd Year
7	18B1WHS641	Human rights for Technocrats	Elective for 3rd Year
8	18B11HS311	Interpersonal Dynamics Values and Ethics	Core for 3rd Sem
9	23B11HS211	Universal Human Values II-Understanding Harmony	Core for 2nd Sem
10	23BBWHS231	CRITICAL AND CREATIVE THINKING	Elective BBA
11	23BBWHS132	ETHICS & CORPORATE SOCIAL RESPONSIBILITY	Elective BBA
12	23BBWHS131	INDIA'S DIVERSITY & BUSINESS	Elective BBA
13	23BB1HS112	PRINCIPLES AND PRACTICES OF MANAGEMENT	Core BBA
14	23BB1HS111	BUSINESS COMMUNICATION	Core BBA
15	24BB1HS414	ORAL WRITTEN COMMUNICATION	Core BBA
16	24BB1HS412	HUMAN RESOURCE MANAGEMENT	Core BBA
17	23B11HS212	PROFESSIONAL COMMUNICATION PRACTICES	Core 1st year

18	23B11HS211	UNIVERSAL HUMAN VALUES II-UNDERSTANDING HARMONY	Core 1st year
19	24B1WHS732	KNOWLEDGE SYSTEMS IN ANCIENT INDIA	Elective for 4th yr
20	24B1WHS731	SCIENCE, TECHNOLOGY AND SOCIETY	Elective for 4th yr
21	24B11MA112	MATHEMATICS FOR LIFE SCIENCES-I	Core 1st year
22	23BB1HS314	POLITICAL PROCESS IN INDIA	Core BBA
23	23BB1HS313	MANAGEMENT ACCOUNTING	Core BBA
24	23BB1HS113	BUSINESS ENVIRONMENT	Core BBA
25	23B1WHS632	HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY	Elective for 3rd Year
26	23B11HS311	LIFE SKILLS AND INTERPERSONAL DYNAMICS	Core 2nd year

Ethics Plagiarism & IPR Issues

COURSE CODE : 17P1WGE102

COURSE COORDINATOR : Dr HEMANT SOOD

COURSE CREDITS: 3

Pre-requisite: None

Objective:

To provide an insight to the Ph D students on different aspects of protection of inventions and research developments, academic, research and publication ethics .

Course Assessment:

Test -1	15
Test -2	25
Test -3	35
Teacher Assessment (Based on Assignments, ppt and quizzes etc .) Attendance	25
Total	100

Course Outcomes:

CO1. To enable students with basic concepts of philosophy of science,ethics and intellectual property rights for protecting innovations in different sciences.

CO2. Able to learn the mechanisms of publications and IP protections and registrations under different classifications.

CO3. Able to tackle problems in research misconduct and intervene ethics and inventiveness for the benefit generation and mass utilization

CO4. To enable them for developing the strategies for handling issues related to IP, Ethics and plagiarism

CO5. Able to learn effective research integrity and useful publication for generating future perspectives

CO6. Able to learn different modes of tackling plagiarism and developing academic integrity

Topics	Lecture hrs.
Introduction to philosophy and its nature with scopes in different branches	1
Different types of IPR (Patents, copyrights, Trademark, Trade secret, ICL, GI, TK and PBR)	2
Rationale of different IPR, their mechanism of protection and provisions in Law	1
Ethics used in science and research and tools to follow it with case studies Scientific misconduct: Falsification, Fabrication and Plagiarism	2
Plagiarism and misuse of Privileged Information Data analysis include Integrity of Data, use and Misuse of Data, Ownership of and Access to Data and Storage and Retention of Data	3
Responsibilities to Funding Agencies	2
Responsibilities of a Research Investigator	1
Ethics : Moral philosophy and nature of moral judgement w. r. t.Special Obligations in Human Subject Research and Laboratory Animals or any other technology with safety concern	3
Authorship and Other Publication Issues includes violations 1. Criteria for Authorship 2. Order of Authors 3. Self-citations 4. Conflict of interst 5. Duplicate Publication 6. Accessibility of Publications 7. Predatory publishers and journals	3

Practice:

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher
3. Software tools by SPPU
4. Journal finder/journal suggestion tools viz JANE,Elsevier,Springer etc
5. Plagiarism software tools Turntin and other open resources
6. Databases :citation databases (SCI,Web of science ,Scopus etc.) and Indexing databases
7. Impact factors and Metrics: h-index g index, i 10 index etc.

Assignments:

Each student should submit assignment in the form of hard copy on case studies linked with research of their respective areas like civil engineering, ECE, computer, biotechnology etc

Books:

1. Ethics in Research by Ian Gregory
2. IPR- A primer by R. Anita Rao and Bhanoji Rao
3. Intellectual Property Rights & Copyright By Bouchoux

Environmental Studies

COURSE CODE: 10B11GE411

COURSE CREDITS: 0

CORE/ELECTIVE: Audit Course

L-T-P: 2-0-0

Pre-requisite: None

Course Objectives:

1. Identify environmental problems arising due to engineering and technological activities and the science behind those problems.
2. Estimate the population- economic growth, energy requirement and demand.
3. Analyze material balance for different environmental systems
4. Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
5. Identify the major pollutants and abatement devices for environmental management and sustainable development.
6. Recognizing the major concepts of environmental studies, developing problem solving ability, forecasting the global climate change

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Introducing basic concept of environmental studies, interdisciplinary nature and scope of the subject	Familiarity
CO-2	Understanding ecosystem services and its functioning as well as equitable use of natural resources.	Assessment
CO-3	Understanding Pollution, A threat to the environment and finding its solutions, Pollutant sampling and monitoring of samples.	Assessment
CO-4	Correlating the concept of Biodiversity and its importance to human mankind	Usage
CO-5	Understanding social issues and their impact on environment.	Usage
CO-6	Role of Information Technology in environment and human health	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Unit 1: Multidisciplinary nature of environmental studies:** The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, Biogeochemical cycles.	3
2	**Unit 2: Natural resources, their consumption & Protection:** Natural resources, their consumption & Protection: Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources.	4
3	**Unit 3: Pollution- a threat to environment:** Pollution- a threat to environment: Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, toxicity limits of pollutants. Critical issues concerning global Environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and the Roots in: Cultural, Social, Political, Commercial, industrial, territorial domains	4
4	**Unit 4: Environmental standards & Quality:** Environmental standards & Quality: Air, Water & Soil Quality, Pollutant sampling, pollution control systems. Green Chemistry and its applications	3
5	**Unit 5: Biodiversity and its conservation:** Biodiversity loss: Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity	4
6	**Unit 6: Social Issues and the Environment:** Waste land reclamation, consumerism and waste products, eco-consumerism, dematerialization, green technologies, eco-tourism. Water conservation, rain water harvesting, watershed management. Environment protection act, Air (prevention and control of population) act; Water (prevention and control of pollution) act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities.	4
7	**Unit 7: Human Population and the environment:** Population growth, variation among nations. Population explosion—Family Welfare Programme. Environment and human health. Human rights. Value education.HIV/AIDS. Women and Child Welfare. Role of Information Technology in environment and human health. Case Studies.	4

8	**Unit 8: Field work:** Field Work: Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc	**4**
Total lectures		**30**

Suggested Text Book(s):

1. Environmental Studies By: M. P. Poonia and S.C. Sharma, Khanna Publishers
2. Textbook of Environmental Studies for UG Courses - Erach Bharucha, University Press
3. Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India.

Suggested Reference Book(s):

1. Nebel, B.J. & Wright, R.T., 1993, Environmental Science, 8th Edition, Prentice Hall, USA.
2. Chiras D D.(Ed.). 2001. Environmental Science – Creating a sustainable future. 6th ed. Jones & Barlett Publishers.
3. David Laurance. 2003. Environment Impact assessment, Wiley publications.
4. Chhokar KB, Pandya M & Raghunathan M. 2004. Understanding Environment. Sage publications, NewDelhi .

Other useful resource(s):

1. Issues of the journal: Down to Earth, published by Centre for Science and Environment.
2. Audio visuals from: Discovery, National Geographic etc.
3. https://nptel.ac.in/courses/120108002/
4. https://nptel.ac.in/courses/120108005

Understanding India: Literary Reflections

COURSE CODE: 18B1WHS636

COURSE CREDITS: 3

L-T-P: 3-0-0

Course Goals:

This Elective Course aims to explore the cultural diversity of India, creatively interpreting the differences between various states in India. It will throw light on the manner in which language, metaphors, tradition and culture contribute to the impact of a work. It will help promote ways of deeper understanding and acceptance between Indians for each other's apparent contradictions. The students are sensitized to the survival strategies of the marginalized people who are overlooked in society, enabling them to be more empathic to the less empowered and look for similarity and dissimilarity of themes and concerns in Dalit and mainstream literature

Course Objectives:

1. To understand migration.
2. To recognize the impact of displacement on individuals.
3. To explore social, economic, cultural and geographical contexts and its relevance for a holistic living.
4. To look for roots and connections in literature with focus on environment and peace in society.
5. To access the impact of gender on migration.
6. To define identity and what it means in the modern context.

Detailed Syllabi

Lecture-wise Breakup

Module No.	Subtitle of the Module	Topics	No. of Lectures
1.	Modern Literature	Cross-cultural reflections in Vinay Rai's "A Rainbow of Contradictions" from Think India	3

2.	From other Margins (Regional environment/ecology, traditions, folklores)	Mamang Dai's "Sorrow of Women" and "An Obscure Place" Sanjoy Hazarika's "There are No Shangri-Las Left"	8
3.	Indian Culture, tradition and societal norms	Rajiv Malhotra's "Indian Comfort with Chaos" and "Western Joker and Indian Clown" from Being Different: An Indian Challenge to Western Universalism	8
4.	Views on Education, Indian ethos, identity and rural development	S. Radhakrishnan's "The Adaptive Culture" and "Of One Mind" from The Adaptive Indian: Identity and Ethos	4
5.	Partition Literature: Migration and Identity	Jhumpa Lahiri's "The Triangle", "The Second Exile" and "The Wall" from In Other Words Ismat Chugtai's Roots	8
6.	Dalit Literature: Human Rights in India against caste system	Introduction to Dalit Movement The Bhakti Radicals and Untouchability by Gail Omvedt from Speaking Truth to Power: Religion, Caste and the Subaltern Question in India	3
Total number of Lectures			34

Methodology and Evaluation Scheme		
The lecture will focus the basic concepts and tutorials will focus real problems and case-studies.		
S.No.	Component	Exam marks
1.	Test – 1 (1 Hr)	15
2.	Test – 2 (1 Hr 30 mins)	25
3.	Test – 3 (2 Hrs)	35
4.	Internal assessment Assignments Group Discussions Presentation Class assessment	25 6 6 8 5

Recommended Reading (Books/Journals/Reports/Websites etc.: Author(s), Title, Edition, Publisher, Year of Publication etc. in IEEE format)	
1.	Malhotra, Rajiv. Being Different: An Indian Challenge to Western Universalism. Harper Collins: Noida, 2013
2.	Radhakrishnan, S. The Adaptive Indian: Identity and Ethos. Orient Paperbacks: New Delhi, 2013
3.	Lahiri, Jhumpa. In Other Words. Penguin: New Delhi, 2017
4.	Bhagavan, Manu and Anne Feldhaus.Eds. Speaking Truth to Power: Religion, Caste and the Subaltern Question in India. OUP: New Delhi, 2008
5.	Asaduddin, M. Ismat Chugtai: Lifting the Viel. Modern Classics. Penguin: New Delhi, 2009

IPR Biosafety &Bioethics

COURSE CODE: 20MS1BT315

COURSE COORDINATOR: Dr HEMANT SOOD

COURSE CREDITS: 2

Objective:

1. To provide basic knowledge on intellectual property rights and their implications in biological research and product development;
2. To become familiar with India's IPR Policy;
3. To learn biosafety and risk assessment of products derived from biotechnology and regulation of such products;
4. To become familiar with ethical issues in biological research.

Course Assessment:

Test -1	15
Test -2	25
Test -3	35
Teacher Assessment (Based on Assignments, ppt and quizzes etc .) Attendance	25
Total	100

Course Outcomes:

CO1. To enable students with basic concepts and knowledge of intellectual property rights and types
CO2. Understand the rationale for and against IPR and especially patents
CO3. Understand why India has adopted an IPR Policy and be familiar with broad outline of patent regulations;
CO4. Understand different types of intellectual property rights in general and protection of products derived from biotechnology research and issues related to application and obtaining patents;
CO5. Gain knowledge of biosafety and risk assessment of products derived from recombinant DNA research and environmental release of genetically modified organisms, national and international regulations;

CO6. Understand ethical aspects related to biological, biomedical, health care and biotechnology research

Course content

Topics	**Lecture required**
Unit 1 Introduction to intellectual property; types of IP: patents, trademarks, copyright & related rights, industrial design, traditional knowledge, geographical indications, protection of new GMOs; International framework for the protection of IP; IP as a factor in R&D; IPs of relevance to biotechnology and few case studies; introduction to history of GATT, WTO, WIPO and TRIPS; plant variety protection and farmers rights act; concept of 'prior art': invention in context of "prior art"; patent databases - country-wise patent searches (USPTO, EPO, India); analysis and report formation.	5
UNIT2 Basics of patents: types of patents; Indian Patent Act 1970; recent amendments; WIPO Treaties; Budapest Treaty; Patent Cooperation Treaty (PCT) and implications; procedure for filing a PCT application; role of a Country Patent Office; filing of a patent application; precautions before patenting-disclosure/non-disclosure - patent application- forms and guidelines including those of National Bio-diversity Authority (NBA) and other regulatory bodies, fee structure, time frames; types of patent applications: provisional and complete specifications; PCT and conventional patent applications; international patenting-requirement, procedures and costs; financial assistance for patenting-introduction to existing schemes; publication of patents-gazette of India, status in Europe and US; patent infringement- meaning, scope, litigation, case studies and examples; commercialization of patented innovations; licensing – outright sale, licensing, royalty; patenting by research students and scientists-university/organizational rules in India and abroad, collaborative research - backward and forward IP; benefit/credit sharing among parties/community, commercial (financial) and non-commercial incentives.	5
UNIT3 Biosafety and Biosecurity - introduction; historical background; introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; GRAS organisms, biosafety levels of specific microorganisms; recommended biosafety levels for infectious agents and infected animals; definition of GMOs & LMOs; principles of safety assessment of transgenic plants – sequential steps in risk assessment; concepts of familiarity and substantial equivalence; risk –	5

environmental risk assessment and food and feed safety assessment; problem formulation – protection goals, compilation of relevant information, risk characterization and development of analysis plan; risk assessment of transgenic crops *vs* cisgenic plants or products derived from RNAi, genome editing tools	
UNIT4 International regulations – Cartagena protocol, OECD consensus documents and Codex Alimentarius; Indian regulations – EPA act and rules, guidance documents, regulatory framework – RCGM, GEAC, IBSC and other regulatory bodies; Draft bill of Biotechnology Regulatory authority of India - containments – biosafety levels and category of rDNA experiments; field trails – biosafety research trials – standard operating procedures - guidelines of state governments; GM labeling – Food Safety and Standards Authority of India (FSSAI).	5
Introduction, ethical conflicts in biological sciences - interference with nature, bioethics in health care - patient confidentiality, informed consent, euthanasia, artificial reproductive technologies, prenatal diagnosis, genetic screening, gene therapy, transplantation. Bioethics in research – cloning and stem cell research, Human and animal experimentation, animal rights/welfare, Agricultural biotechnology - Genetically engineered food, environmental risk, labeling and public opinion. Sharing benefits and protecting future generations - Protection of environment and biodiversity – biopiracy	5
Total Lectures	25

Assignments on topics:

Each student should submit assignment in the form of soft copy and ppt on any of the topic

1. IPR developing knowledge economy…
2. Case studies on different types of Intellectual Property rights (TK, GI, Patent , Coyright etc.) and litigations involved in it.
3. Bioethics and biosafety; Relevance and Essentiality
4. IP management and commercialization: Scopes in research institutes
5. Status of IPR in different countries and its contribution for uplifting economy

Projects:

It should be in the form of concept and proposal where rationale of the project and its utilization should be highlighted. It should be submitted in the group of two students per project.

1. Any business idea where any form of IP can be used for value addition and commercialization.

2. Role of bioethics and biosafety in carrying out any biological projects and their significance.

Quizes:

There will be two quiz tests conducted each of 10 marks which contain MCQ, fill in the blanks and one word answer.

1. In the last week of September
2. In the Last week of November

Recommended Textbooks and References:

1 IPR- A primer by R. Anita Rao and Bhanoji Rao
2 Bioethics and Biosafety by M K Sateesh
3 Patent Search: Tools and Techniques- David Hunt
4 Intellectual Property Rights by NS Rathore ,SM Mathur,Priti Mathur and Ansul Rathi
5 Ganguli, P. (2001). *Intellectual Property Rights: Unleashing the Knowledge Economy.* New Delhi: Tata McGraw-Hill Pub.
6 *National IPR Policy*, Department of Industrial Policy & Promotion, Ministry of Commerce, GoI *Complete Reference to Intellectual Property Rights Laws*. (2007). Snow White Publication Oct.
7 Kuhse, H. (2010). *Bioethics: an Anthology*. Malden, MA: Blackwell.

Online resources for reference

1. Office of the Controller General of Patents, Design & Trademarks; Department of Industrial Policy & Promotion; Ministry of Commerce & Industry; Government of India. http://www.ipindia.nic.in/
2. Karen F. Greif and Jon F. Merz, *Current Controversies in the Biological Sciences Case Studies of Policy Challenges from New Technologies*, MIT Press
3. World Trade Organisation. http://www.wto.org
4. World Intellectual Property Organisation. http://www.wipo.int
5. International Union for the Protection of New Varieties of Plants. http://www.upov.int
6. National Portal of India. http://www.archive.india.gov.in
7. National Biodiversity Authority. http://www.nbaindia.org
8. Recombinant DNA Safety Guidelines, 1990 Department of Biotechnology, Ministry of Science and Technology, Govt. of India. Retrieved from http://www.envfor.nic.in/
    a. divisions/csurv/geac/annex-5.pdf
9. Guidelines for Safety Assessment of Foods Derived from Genetically Engineered Plants. 2008.
10. Guidelines and Standard Operating Procedures for Confined Field Trials of
    a. Regulated Genetically Engineered Plants. 2008. Retrieved from
    b. http://www.igmoris.nic.in/guidelines1.asp

Intellectual Property Rights and Commercialization

COURSE CODE: 18B1WBT732

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. To provide an insight and understanding about different aspects of protection of inventions and research developments
2. Learn about procedures for filling protection through Intellectual Property Rights.
3. To provide scopes of protection of diverse intellectual properties and its commercialization for socio-economic improvement.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To enable students with basic concepts and knowledge of intellectual property rights.	Awarness
CO-2	To apply and execute different types of IP protection in research and academics.	Assessment and technical skills
CO-3	Able to understand about the mechanisms of different IP protections, registrations and applications	Technical
CO-4	To be capable of tackling issues related to IP and its commercialization	Assessment
CO-5	Able to learn the strategies for effective IP management and commercialization	Analytical skills

CO-6	To apply the knowledge of IPR for the benefit generation and for mass utilization	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction:Introduction of Intellectual properties and rights conferred . Integration of Intellectual Property, Bioethics and Biosafety for biological and applied sciences in research and academia.	4
2	Types of IP tools:Different types of IPR(Patents, copyrights and related rights, Trademark, Tradesecret, Integrated circuit layout, Geographical indications, Traditional knowledge, Industrial designs and PBR) Drafting Patent Application and Documentation Revocation of Patent, Litigation and Infringement Rationale of different IPR ,their mechanism of protection and provisions in Law	10
3	International Agreements and Treaties:International IP treaties (Madrid Agreement, Trademark law treaty, Patent Law treaty etc.) WIPO, EPC, WTO, and TRIPS. International agreements relevant to biotechnology-associated IP	8
4	Commercialization: Methods of commercialization,Impact of commercialization. Financing	6
5	IP Management for value addition: Strategies for IP Management and commercialization. IP audit, IP insurance Bioentreprenuership management	4

6	Licensing/Assignment :Types of licensing and modes to carry out, Assignments and its benefits, Compulsory Licensing Commercialization for social and economic prosperity with case studies	8
Total lectures		40

Methodology:

The course will be covered through lectures, presentations and vedios. Apart from discussions on topics covered through lectures and assignments, students have to carry out research paper analysis.

Suggested Text Book(s):

Intellectual Property Rights & Copyright By Bouchoux.
Intellectual Property Licensing Strategies by Thompson Reuters

Suggested Reference Book(s):

1. Intellectual Property Rights, the WTO and Developing Countries: The TRIPS ...Book by Carlos María Correa
2. Perspectives on Commercializing Innovationby F. Scott Kieff (Editor), Troy A. Paredes (Editor

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus

4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes & Attendance

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	1	1	2	2	15
CO-2	2	2	1	2	2	2	1	1	1	1	1	2	1.5
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.7
CO-4	2	2	3	3	2	1	1	1	2	2	2	2	1.9
CO-5	2	2	2	2	2	1	2	1	1	2	1	2	1.6
CO-6	2	2	2	2	2	2	1	1	2	2	2	2	1.8
Average	3.4	3.4	2	2.1	2.1	1.3	1.1	1	1.5	1.6	1.5	2	

Bioenergy and Biofuels

COURSE CODE: 14B1WBT731

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite:

Microbiology, Bioprocess Engineering, Downstream Processing, Bioresource Technology

Course Objectives:

The shortage of fossil fuels and its environmental consequences, Bioenery and Biofuel technology seems to be a alternative for generation of energy and fuels. This sector facing various technical, process and social problems for implementation. Based on these aspects the objectives of the course are framed as

1. Introduction of existing and possible Bioenergy and Biofuels technoloies
2. Discussion of technical, process and economic issues related to first, second and third generation biofuels along with Physico chemical techniques

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Advantages and disadvantages of Bioenergy and Biofuels over fossil fuels	Familiarity
CO-2	Technical barriers in Bioenergy and Biofuel Technology	Assessment
CO-3	Whole biorefinery approaches for economical implementation into the market	Usage
CO-4	Conversion technologies of waste to Biofuels, Bioproducts, and Bioenergy	Usage
CO-5	Conversion of waste and Mixed feedstock to Biofuels, Bioenergy and Bioproducts	Usage

Course Contents:

Unit	Contents	Lectures required
1	Introduction to Biofuels and Bioenergy: Definition, Global Energy Outlook, Sustainability, Biomass Feedstocks, Processes and Technologies, Environment and Ecology	4
2	Crop Oils, Biodiesel, and Algae Fuels: Vegetable Oils, Algae Oil Extraction of Straight Vegetable Oil, Manufacture of Biodiesel	12
3	Ethanol from Corn and Lignocellulosics: Fuel Ethanol from Corn, Corn Ethanol as Oxygenated Fuel, Chemistry of Ethanol Fermentation, Corn-toEthanol Process Technology, By-Products/Coproducts of Corn Ethanol, Ethanol as Oxygenated and Renewable Fuel, Ethanol Vehicles, Lignocellulose and Its Utilization, Lignocellulose Conversion, Agricultural Lignocellulosic Feedstock, Cellulosic Ethanol Technology; Energy Balance for Ethanol Production from Biomass, Process Economics and Strategic Direction.	12
4	Fast Pyrolysis and Gasification of Biomass: Biomass and Its Utilization, Analysis and Composition of Biomass, Chemistry of Biomass Gasification, Fast Pyrolysis of Biomass, Biomass Gasification Processes, Utilization of Biomass Synthesis Gas	7
5	Conversion of Waste to Biofuels, Bioproducts, and Bioenergy & Mixed Feedstock: Types of Waste and Their Distributions, Strategies for Waste Management, Waste Preparation and Pretreatment for Conversion, Technologies for Conversion of Waste to Energy and Products, Economic and Environmental Issues Related to Waste Conversion, Future of the Waste Industry, Advantages and Disadvantages of Mixed Feedstock, Transportation, Storage, and Pretreatment, Gasification Technologies, Liquefaction Technologies, Future of Mixed Feedstock.	7
	Total Lectures	42

Suggested Text Book(s):

1. Biofuels and Bioenergy: Processes and Technologies by Sunggyu Lee and Y. T. Shah, CRC Press
2. Bioenergy and Biofuel from Biowastes and Biomass by Samir K. Khanal, Rao Y. Surampalli, Tian C. Zhang, Buddhi P. Lamsal, R. D. Tyagi and C.M. Kao, ASCE Publishers.

Suggested Reference Book(s):

1. Review and research articles from Science Direct, Springer, Wiley and PubMed Publishers.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment, Quizzes&Attendance

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	1	3	1	2	1	2	1	3	2.17
CO2	3	3	3	3	2	2	1	2	1	2	-	3	2.27
CO3	3	3	3	3	2	2	1	2	1	2	-	3	2.27
CO4	3	3	3	3	1	2	2	3	2	2	2	3	2.42
CO5	3	3	3	3	1	2	3	3	3	2	2	3	2.58
Average	3.00	3.00	3.00	3.00	1.40	2.20	1.60	2.40	1.60	2.00	1.00	3.00	

Human Rights For Technocrats

COURSE CODE: 17B1WHS732

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop an understanding of what human rights are and to understand the origins of modern human rights
2. Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments
3. Appreciate the relationship between rights and responsibilities
4. Understand the forms human rights can take, legally and morally
5. Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Develop an understanding of what human rights are and to understand the origins of modern human rights	Familiarity
CO-2	Appreciate the meaning and significance of the Universal Declaration of Human Rights and other human rights instruments	Usage
CO-3	Appreciate the relationship between rights and responsibilities	Familiarity
CO-4	Understand the forms human rights can take, legally and morally	Familiarity
CO-5	Analyze the relationship of human rights to daily life and apply the concepts of human rights to their own lives.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Conceptual background of human rights and duties: Definitions and classifications	2
2	Meaning and Significance of Human Rights : Scope of the Human Rights	2
3	Relationship between Rights and Duties: Constitutional provisions, Fundamental rights, Directive Principles of state policy, Duties of individuals and Fundamental duties	4
4	Universal Declaration of Human Rights: Technical background : Creation and drafting, Adoption, Significance of the UDHR, And its legal effect	5
5	History of human rights civilization: Brief history of human Rights, The Spread of Human Rights, Middle Ages, Modern human rights	5
6	Human rights movements : Anti-colonialism, World War II and the United Nations, Global human rights struggles, Changes in the 1970s Since the 1990s	8
7	Enforcement and protection mechanism of human rights in India: Judiciary, National Human Rights Commission and other Commissions and Committees ,Non-governmental organizations, Information Media, Education	5
8	Development, international trade and human rights: Right to development: Issues of international equity and justice, equitable access to benefits of science and technology, Freedom of international trade, most- favoured nation treatment (equality of treatment) versus special treatment of the developing countries, access to international markets, equitable pricing of raw material	5
9	Human rights, science and technology: Overview,violation of human rights by technology	3

10	Human rights of the working class: Labour welfare legislation in India, Problems of bonded labour, exploitation of child labour, female labour and unorganized labour	
	Total lectures	42

Suggested Text Book(s):

1. Internet and human rights Griffin, J. (2008) On Human Rights. Oxford: Oxford University Press.
2. Miller, D. (2007) National Responsibility and Global Justice. Oxford: Oxford University Press Suggested Reference Book(s):

Other useful resource(s):

1. https://www.google.com/search?q=Meaning+and+Significance+of+Human+Rights&rlz=1C1GCEU_enBIN820IN820&oq=Meaning+and+Significance+of+Human+Rights&aqs=chrome..69i57j0l5.1710j0j7&sourceid=c hrome&ie=UTF-8
2. https://www.equalityhumanrights.com/en/human-rights/what-are-human-rights

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour.	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (5) - 10 Presentation (1)- 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Human Rights for Technocrats)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	0	3	0	0	3	3	3	3	3	0	3	1.75
CO-2	0	3	0	3	0	3	3	3	3	3	0	3	2
CO-3	0	0	0	3	0	3	3	3	3	3	0	3	1.75
CO-4	0	0	0	0	0	3	3	3	3	3	0	3	1.5
CO-5	0	3	0	0	0	3	3	3	3	3	0	3	1.75
Average	0	1.2	0.6	1.2	0	3	3	3	3	3	0	3	

Interpersonal Dynamics, Values and Ethics

COURSE CODE: 18B11HS311

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. This course is designed to help students understand the importance of values in their development as professionals and responsible citizens.

2. This starts with developing an understanding of their own needs and wants, what they 'really want to be' in their lives and profession.

3. This understanding of oneself then leads to understanding others better so that effective personal and professional relationships can be built.

4. The moment a student enters the workplace they are confronted with organizational values and ethical dilemma.

5. This course helps facilitate the students to understand harmony at all the levels of human living, and live an ethical and happy life.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the significance of value inputs in a classroom and learn their significance in personal and professional life.	Familiarity
CO-2	Appreciate the relationship between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	Assessment
CO-3	Understand the value of harmonious relationship based on trust and respect in their life and profession.	Assessment

CO-4	Understand the role of a human being in ensuring harmony in society and nature.	Usage
CO-5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.	Usage

Course Contents:

Unit	Contents	Lectures required
1	Human Values: Definition and classification of values: Extrinsic values, Universal and Situational values, Physical, Environmental, Sensuous, Economic, Social, Aesthetic, Moral and Religious values. The Problem of Sustenance of value in the process of Social, Political and technological change. Case Study 3 The Three Mile Island Disaster	5
2	Understanding Individual Differences, perceptions and attributions: Understanding and Managing Yourself: Human Relations and You: Self-Esteem and Self-Confidence: Self-Motivation and Goal Setting; Emotional Intelligence, Attitudes and Happiness; Problem Solving and Creativity.	5
3	Leadership and Motivation: Dealing Effectively with People: Communication in the Workplace, Becoming an Effective Leader; Motivating Others and Developing Teamwork	5
4	Developing and leading teams Tactics for Getting Along with Others in the Workplace; Managing Conflict; Specialized Diversity and Cross-Cultural Competence.	4
5	Interpersonal Dynamics in practice Self confidence and attitude building, Social and Professional etiquettes (To be conducted on workshop mode with the help of role plays, GDs, self and peer appraisal and class demonstrations. Performance to be evaluated for internal assessment)	6

6	Engineering Ethics History, Recent developments and General principles. Case Study 1 Space Shuttle Challenger	4
7	Engineering as Social Experimentation Engineer as experimenter, Responsibility in experimentation	3
8	Engineers' Responsibility for Safety and Risk Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis	4
	and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination Case Study 2 Bhopal Gas Tragedy	
9	Global Issues Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility Case Study 4 The Chernobyl Disaster	4
10	Ethical Audit : Need for and ethics audit, Procedure, Best practices	2
Total lectures		42

Suggested Text Book(s):

1. Govindarajan M, Natarajan S, Senthil Kumar V. S: Professional Ethics and Human Values, Prentice Hall of India, 2016.
2. R R Gaur, R Sangal, G P Bagaria: Human Values and Professional Ethics, Excel Books, 2010.
3. Stephen P. Robbins, Timothy A. Judge: Organizational Behavior, 15th Edition, Pearson Education, 2015

Suggested Reference Book(s):

1. Ken Blanchard, Spencer Johnson, The New One-Minute Manager, HarperCollins Publishers Limited, 2015

Other useful resource(s):

1. Institution of Engineers (India): Sample Codes of Ethics

2. ACM Code of Ethics and Professional Conduct Websites related to course:

- www.onlineethics.org
- www.nspe.org
- www.globalethics.org
- www.ethics.org

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Class participation in case discussion and group discussions (2) - 10 Assignments (2)- 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme outcomes (POs)

Course outcomes (Interpersonal Dynamics, Values and Ethics)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	0	2	2	2	1	3	2	3	3	3	0	3	2.4
CO-2	0	2	2	2	1	3	2	3	3	3	0	3	2.4
CO-3	0	2	2	2	0	3	2	3	3	3	0	3	2.3
CO-4	0	2	2	2	1	3	2	3	3	3	0	3	2.4
CO-5	0	2	2	2	1	3	2	3	3	3	0	3	2.4
Average	0	2	2	2	2	3	2	3	3	3	0	3	

UNIVERSAL HUMAN VALUES II-Understanding Harmony

COURSE CODE: 23B11HS211

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 2-1-0

Pre-requisite: None

Course Objectives:

1. Development of a holistic perspective based on self-exploration about themselves (human being), Family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/ existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Self Awareness, Social awareness (family, society, nature).Sustainability in relationships and Critical thinking	Familiarity
CO-2	. Introspection and self reflection	Assessment
CO-3	Sensitive to commitment towards human values, human relationship and human society	Usage
CO-4	Developing commitment and courage	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** 1. Purpose and motivation for the course, recapitulation from Universal Human Values-I 2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	6
2	**Understanding Harmony in the Human Being - Harmony in Myself!** 7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' 8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility 9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) 10. Understanding the characteristics and activities of 'I' and harmony in 'I' 11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail 12. Programs to ensure Sanyam and Health.	6
3	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** 13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship 14. Understanding the meaning of Trust; Difference between intention and competence 15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship 16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals	5

	17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	
4	**Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** 18. Understanding the harmony in the Nature 19. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self regulation in nature 20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space 21. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	**5**
5	**Implications of the above Holistic Understanding of Harmony on Professional Ethics** 22. Natural acceptance of human values 23. Definitiveness of Ethical Human Conduct 24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. 26. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations	**6**
Total lectures		**28**

Suggested Text Book(s):

1. Text Book 1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004

Suggested Reference Book(s):

1. The Story of Stuff (Book).
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
4. Small is Beautiful - E. F Schumacher.
5. Slow is Beautiful - Cecile Andrews
6. Economy of Permanence - J C Kumarappa

7. Bharat Mein Angreji Raj - PanditSunderlal
8. Rediscovering India - by Dharampal
9. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
10. India Wins Freedom - Maulana Abdul Kalam Azad
11. Vivekananda - Romain Rolland (English)
12. Gandhi - Romain Rolland (English)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	Average
CO-1	3	3	3	3	3	3	3	3	**3**
CO-2	3	3	3	3	3	3	3	3	**3**
CO-3	3	3	3	3	3	3	3	3	**3**
CO-4	3	3	3	3	3	3	3	3	**3**
Average	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	3

English Language Skills

COURSE CODE:
COURSE CREDITS: 0
CORE/ELECTIVE: Core
L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. The course aims to improve students' abilities to learn to speak and write grammatically correct sentences.
2. The course will primarily focus on improving students' command over English language in formal as well as informal settings.
3. The course will also focus on helping students design effective resumes, and write effective emails, letters and other official documents.

Course outcomes

SNo	Course Outcomes	Level of attainment
CO1	To improve students' abilities to speak and write grammatically correct sentences.	Usage
CO2	To help students design effective resumes, and write effective emails, letters and other official documents.	Usage
CO3	To improving students' command over English language while interacting in various formal as well as informal settings.	Usage

Course Contents:

Unit 1	**Grammar and Usage: Basic concepts of grammar using software and additional exercises** **(Reading and writing Skills** Software: (i) Level Test of Tense Buster (ii) Practical 1 and 2 of Tense Buster (iii) Worksheets on grammar	**6**
Unit 2	**Spoken English Language Skills Development** **(Speaking Skills)** (i) Self Introduction, (ii) Practicing speaking in various formal and informal communicative situations	**8**
Unit 3	**Presentation Skills** **(Speaking and Listening Skills)** (i) Delivering PowerPoint presentations with emphasis on pronunciation, intonation and body language (ii) Understanding how to handle questions during presentations and respond appropriately	**8**
Unit 4	**Writing formal documents** Practicing writing letters, emails, resume and cover letters	**6**
Total lectures		**28**

Suggested Text Book(s):

1. Central Institute of English and Foreign Languages: *Exercises in Spoken English. Parts. I-III.* Hyderabad. OUP, 1997.
2. G. Leech: *A Communicative Grammar of English*, ROUTLEDGE, 2012.
3. Michael Swan*: Practical English Usage,* OUP, 1995.
4. William Zinsser: *On Writing Well*, Harper Resource Book, 2001.
5. Liz Hamp-Lyons and Ben Heasly: *Study Writing,* Cambridge University Press, 2006.
6. F.T. Wood: *Remedial English Grammar,* Macmillan, 2007

Suggested Reference Book(s):

1. H.S. Mukherjee: *Business Communication-connecting at work*, Oxford University Press, 2nd Edition 2013.
2. R.V Lesikar, M.E. Flatley, K Rentz, N Pande: *Business communication, 12th Edition,* McGraw Hill, 2009.

Evaluation Scheme:

S No	Examination	Marks
1	Lab Marks	20
2	Self Introduction and other oral communication activities	20
3	PowerPoint Presentations	20
4	Letter Writing	10
5	Emails	10
6	Resume and Cover letter	20

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	2	2	2	3	3	2	3	3	2	3	**2.3**
CO-2	1	2	2	2	2	3	3	2	3	3	2	3	**2.3**
CO-3	1	2	2	2	2	3	3	2	3	3	2	3	**2.3**
Average	**1**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**2.3**

ENGINEERING ECONOMICS

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: ELECTIVE

L-T-P: 3-0-0

Course Objectives:

1. To provide understanding about economics and its applicability to engineering discipline.
2. To impart knowledge about the fundamental concepts and theories in economics.
3. To engage in learning the techniques of economic thinking and decision making.
4. To make the students familiar with the fundamentals of financial perspectives of Indian economy.

Course Outcomes:

S. No	Course Outcomes	Level of attainment
CO-1	Understand the economic terminology and concepts and use the principles of economics in engineering discipline.	Familiarity and usage
CO-2	To analyze the economic theories, cost concepts and pricing techniques.	Familiarity
CO-3	Apply knowledge of economic constraints in choosing alternatives by performing economic analysis.	Usage
CO-4	Apply Quantitative Tools and Techniques for production, cost and revenue.	Usage
CO-5	To understand the various forms of economic systems at micro and macro level.	Familiarity

Course Contents:

UNIT	Course Content	Lectures
1.	**Introduction to Engineering Economics:** Definitions, Nature, Scope and application; Economic Problems and attempted solutions: Scarcity and Choice; Principles of economics, Difference between Micro-Economics and Macro-Economics; How markets work: Theory of Demand & Supply: Meaning, Determinants, Law of Demand, Elasticity of demand, Demand Forecasting, Law of Supply, Equilibrium between Demand &Supply, Consumer equilibrium, Optimizing Conditions, Price, Substitution	**8**

	and income effect, Consumer Surplus, Derivation of Demand Curve.	
2.	**Theory of Production, Costs and Revenue:** Production functions, Isoquants, Least Cost combination, Laws of Returns to Scale. Factor substitution; Ridge lines; least cost combination of factors, Economics and Diseconomies of Scale of production, Producer Surplus, Cost and Cost curves, Cost function: different concepts of costs, short run cost analysis and long run cost, Analysis relation between the expansion path and cost function, Excess Capacity and Reserve Capacity Revenue and Revenue curve, Profit maximization, Break even analysis and its uses.	**8**
3.	**Market Structure:** Meaning, Types of Markets, Characteristics (Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly) Price and Output Determination; Product Differentiation; Selling Costs; Excess Capacity.	**8**
4.	**Money and Inflation:** Money in the Modern Economy; Banking and credit creation; Credit Control: Open Market Operations and other measures; Money Multiplier; Money Demand and Interest Rates; Money and Inflation in the Long Run: Demand for Money:Classical, Keynes, Friedman's and Tobin's approaches; Supply of money: Money supply functions, components and determinants; H-theory of money supply; Money multiplier-concept and determinants; Measures of money supply; Reserve bank's analysis of money supply, Inflation and Money Growth, Costs of Inflation.	**6**
5.	**After-Tax Economic Analysis:** Income Tax Terminology and Basic Relations, Calculation of Cash Flow after Taxes, Effect on Taxes of Different Depreciation Methods and Recovery Periods, Depreciation Recapture and Capital Gains (Losses), After-Tax Evaluation, After-Tax Replacement Study, After-Tax Value-Added Analysis, After-Tax Analysis for International Projects	**7**
6.	**Indian Economy, Foreign Trade & Investment:** Indian Economy: monetary, fiscal policies and their implications. Trade and investment factors, trade protectionism; balance of payment, devaluation and exchange rate determination,Trade Policy Instruments and their Impact on Welfare, Trade and Income Distribution, International Factor Movements, Theories of Exchange Rate and BOP (Balance of Payments) and Different	

	Approaches to the BOP.	5
	Total Lectures	**42**

Suggested Text Books:

Hal R. Varian. Intermediate Microeconomics, W. W. Norton and Company, 2019.

Henderson J., & Quandt, R.E. Microeconomic Theory: A Mathematical Approach. McGraw Hills, New Delhi.

N. Gregory Mankiw. Principles of Microeconomics, 8th Ed., Cengage Learning India Pvt,2022.

Leland T. Blank & Anthony J. Tarquin, Engineering Economy, McGraw-Hill, 2007.

Ruder Dutt and Sundaram, Indian Economy, 65th Ed., S. Chand, 2018.

D. Salvatore, International Economics, 11th Ed., John Wiley & Sons, 2013.

Handa, J. Monetary Economics. Routledge.

References:

A. Koutsoyiannis. Modern Microeconomics. Macmillan.

Mark Hirschey, Fundamental of Managerial Economics, South Western Educational Publishing.

Paul DeGarmo. Engineering Economics. Prentice Hall.

Blank, L., & Tarquin, A. Engineering Economy. McGraw Hill.

Sodersten, BO, International Economics. Macmillan Press Ltd. London

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour.	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
	Teaching Assessment	25	Entire Semester	Class Performance– 10 MCQ-10 Attendance – 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	2	x	x	1	x	2	1	2	3	2.22
CO2	2	3	3	3	2	x	1	3	3	2	x	3	2.5
CO3	3	3	3	3	3	2	1	2	1	1	x	3	2.27
CO4	3	3	3	3	3	3	2	3	1	1	1	3	2.41
CO5	1	2	2	x	2	x	3	2	3	2	2	3	2.2
Average	2.4	2.8	2.4	2.75	2.5	3	1.6	2.5	2	1.4	1.67	3	2.3

History and Philosophy of Science and Technology

COURSE CODE:
COURSE CREDITS: 3
CORE/ELECTIVE: Elective
L-T-P: 3-0-0

Pre-requisite: None

Course Objectives:

1. Develop an understanding of the historical development of scientific and technological knowledge and their impact on society.
2. Explore the key figures, events, and movements that have shaped the history of science and technology.
3. Analyse the cultural, social, and political contexts in which scientific and technological advancements have occurred.
4. Examine the ethical and philosophical issues related to science and technology, including questions of responsibility, ethics in research, and the implications of technological advancements.
5. Foster critical thinking skills by engaging with primary and secondary sources, and by evaluating different philosophical perspectives on science and technology.
6. Gain an appreciation for the interplay between scientific, technological, and philosophical thought throughout history.
7. Cultivate an awareness of the connections between science, technology, and society and how these relationships have evolved over time.

SNo	Course Outcomes	Level of Attainment
CO1	The course will facilitate an understanding of the historical development of scientific and technological knowledge and their impact on society.	Familiarity
CO2	The course will enable students to understand the profound philosophical underpinnings of the domain of engineering.	Assessment
CO3	Course will cultivate a spirit of enquiry about the importance of science and technology in nation building and nurturing more democratic and secular societies	Assessment
CO4	The course will outline the social, political and cultural embeddedness of STEM and discuss the relevance socially and culturally engaging knowledge production and engineering practices.	Usage
CO-5	Course will introduce the emerging fields of STEM-Social Science interfaces and equip the students to aspire for intellectual and academic pursuits in those areas..	Usage

Course Content

Unit	Content	Lectures Required
1	**Why Social Sciences Matter in Science and Technology?** • How do different social sciences work? • How do history, philosophy and sociology engage with S&T? • STS, SHOT and SCOT **Science and Technology: Key Philosophical Underpinnings** • Science and technology's different relations to philosophy • The relationship between technology and science • The challenges and complexities in philosophical understanding of science and technology • How does science work and scientific knowledge progress? • How do science institutions and establishments work? **Science, Non-Science and Pseudoscience** • How to distinguish non-science from pseudoscience • Why philosophy is important to understand science and technology? **Understanding key Concepts** • *Episteme* and *Techne* • Ontology, epistemology and other key concepts • Realism, constructionism and constructivism	6
2	**History of Technology** • The Greeks • Later developments • Ambiguity in the meaning of technology **Philosophy of Technology** • The centrality of design to technology and other methodological Issues • Design as decision making • Metaphysical issues in philosophy of technology • The status and characteristics of artefacts **Ethical Aspects of Technology** • Cultural and political approaches • Engineering ethics • Ethics of specific technologies • Neutrality versus moral agency • Technological risks	6

3	**Philosophy of Science** • Positivism • Karl popper and theory of falsification • Thomas Kuhn and Paradigm Shift, • Scientific community and scientific progress • Poststructuralism and critique of Science • Criticism of Poststructuralism	6
4	**Modernity and History of Science** • Early Scientists and their fights with the Church • Science and Colonialism : post-colonial critiques • Non-Western traditions of knowledge and Needham's question • Knowledge systems of ancient China • Knowledge systems of Arab world • Globalisation of scientific knowledge	6
5	**Knowledge Systems in Ancient and Medieval India** • Mathematics and approximation of pi • Ancient botany and medicinal practices in India • Political science in ancient India • Scope and challenges of Indian Knowledge Systems	6
6	**Science and Technology in Modern India Sociological and Historical Perspectives** • Nationalism and S&T: theoretical insights: Asiatic mode of production, , oriental despotism, JD Bernal and social function of science • Science historiography in India • Great Indian Scientists and their works • IITS, IIMS and other institution building • Science and technology in five years plans • NSM and the critique of Bernalism • People's science movement	6
7	**STS and Sociology of Science** • Introduction to sociology of science • The social and economic roots of *Philosophiae Naturalis Principia Mathematica* • The problem of demarcation • Feminist critique of science • Risk theories • Understanding technoscience • Science and state • Science and social order	6
	Total	**42**

Essential Readings

1. Franssen, M., Lokhorst, G.-J., & van de Poel, I. (2023, March 6). *Philosophy of Technology*. Stanford Encyclopedia of Philosophy. https://plato.stanford.edu/entries/technology/
2. Losee, J. (1980). *A Historical Introduction to Philosophy of Science*. Oxford University Press. (only the relevant section as recommended by the instructor)
3. Merchant, C. (1980). *The death of nature: Women, ecology, and the Scientific Revolution*. (Introduction Chapter)
4. Polanyi, M. (1962). The Republic of Science. *Minerva*, *1*(1), 54–73. https://doi.org/10.1007/bf01101453
5. Raina, D. (1990). Commoditised Science or Science for Consumption? *Economic and Political Weekly*, 25 (40), 2245-2247.
6. Raina, D. (1997). Evolving Perspectives on Science and History: A chronicle of Modern India's Scientific Enchantment and Disenchantment (1850–1980). *Social Epistemology*, 11 (1), 3-24.
7. Sarukkai, S. (2012). *What is Science?* National Book Trust, India. (Introduction Chapter)
8. Sismondo, S. (2010). *An Introduction to Science and Technology Studies*. Wiley-Blackwell. (Chapter 1 and 2)
9. Star, S. L. (1988). Introduction: The Sociology of Science and Technology. *Social Problems*, *35*(3), 197–205. https://doi.org/10.2307/800618
10. Visvanathan, S. (2000). A Letter to the 21st Century. *Economic and Political Weekly*, *35*(1/2), 12–15.

Evaluation Scheme

Si No.	Exam	Marks	Coverage/Scope of Examination
1	T-1	15	Unit 1 and 2
2	T-2	25	Till Unit 5
3	T-3	35	Till Unit 7
4	Article Review	10	Students are tasked with reading three academic articles of a common theme in their choice as approved by the instructor and submit a review of the same. (Individual Assignment)
5	Research Proposal	15	The students are required to prepare a research proposal on

			any topic on the interface between Social Sciences and STEM. (Group Assignment)

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	2	1	3	X	3	3	3	2	2	X	3	2.3
CO-2	1	3	1	2	X	3	3	3	2	2	1	3	2.18
CO-3	1	3	1	3	X	3	3	3	2	2	2	3	2.36
CO-4	1	3	1	3	X	3	3	3	3	3	1	3	2.45
CO-5	2	3	1	3	X	3	3	3	3	3	1	2	2.45
Average	1.2	2.8	1	2.8	X	3	3	3	2.4	2.4	1	2.8	2.34

Introduction to the Study of Language

COURSE CODE:

COURSE CREDITS: 3

CORE/ELECTIVE: Elective

L-T-P: 3-0-0

Pre-requisite: None

Course Objectives

1. Develop interest for studying and analyzing languages among technical students.
2. Talk about linguistic theories- phonetics, phonology, morphology, syntax and semantics- to discuss how these branches of knowledge employ certain ideas and tools to study languages across the world.
3. To understand how languages function on the level of independent sounds, combined sounds, meaningful words, and meaningful sentences.
4. Explore interdisciplinary domains such as sociolinguistics, psycholinguistics and neurolinguistics
5. Discuss briefly other practical applications of linguistics, such as, computational linguistics.

Course Outcomes:

SNo	Course Outcomes	Level of Attainment
CO-1	Understand and learn the basics of linguistics	Assessment and Usage
CO-2	Enable students to learn the linking of sounds, formation of words, structure of sentences, and exchange of meaning in languages	Assessment and Usage
CO-3	Understand the critical link between language learning and human brain	Familiarity
CO-4	Understand the power-dynamics involved with languages in the contemporary world and the factors involved such as location, gender, media etc.	Usage
CO-5	Application of linguistic knowledge in other domains- such as neurology, computational linguistics, etc.	Familiarity

Unit	Contents	Lectures Required
1	**What is Linguistics?** • Why is the study of language important? • Origin of Languages • Language and Brain • Components of Linguistics	8
2	**Phonetics and Phonology** • What is phonetics? • Articulatory Phonetics- Place of articulation, Manner of Articulation • Acoustic Phonetics- Pitch, Loudness, and Quality of Sounds • Organisation of Speech Sounds- Phonology • Syllables, Stress, and Intonation	8
3	**Morphology** • Introduction to Morphology • Word Formation • Morphs, Morphemes and Allomorphs • Inflections and Derivations	6
4	**Introduction to Syntax** • Word Order in Languages • Rules and Constraints • Phrases • Constituents of a sentence and Constituency Tests	8
5	**Introduction to Semantics** • What constitutes as meaning in language? • Lexical Relations • Entailment and Implicature • Logic and Truth in Language • Ambiguities in Language	6
6	**Sociolinguistics** • Gender and Language • Multilingualism and Diglossia • Code Mixing and Code Switching • Language and Colonialism • South Asia as a Linguistic Area	6

Suggested Books

1. Victoria Fromkin, Nina Hyams, Robert Rodman: *An Introduction to Language*, 10th Edition, Wadsworth CENGAGE Learning, 2014.
2. John Lyons: *Language and Linguistics: An Introduction,* Cambridge University Press, 2003

Suggested Reference Books

1. Peter Ladgeford, Keith Johnson: *A Course in Phonetics,* 7th edition, Wadsworth Publishing, 2014.