

Value Added Courses under Model Curriculum

Sl No.	VAC
1.	Environmental Studies & Disaster Management
2.	Ethics and Values
3.	Contemporary Cross Cutting Issues
4.	Yoga for all
5.	Understanding India
6.	Understanding Odisha
7.	Management Concepts and Practices
8.	Operations Research
9.	Organizational Behaviour
10.	Research Methodology
11.	Revised Indian Society

Environmental Studies & Disaster Management

SEMESTER-I

For Under Graduate Compulsory Courses for Arts, Science and Commerce

FULL MARK-100 (Credit-3)

Unit 1: Multidisciplinary nature of environmental studies (8Period)

Definition, scope and importance

Need for public awareness

Environmental Pollution

Definition

• Cause, effects and control measures of:-

- a) Air pollution
- b) Water pollution
- c) Soil pollution
- d) Marine pollution
- e) Noise pollution
- f) Radiation pollution

Unit 2: Natural Resources: (8Period)

Renewable and non-renewable resources:

Natural resources and associated problems.

- a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources : World food problems, changes caused by agriculture and Overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies.
- e) Energy resources : Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

Biodiversity:-

Introduction-Definition; Biogeographically classification of India

India as a mega diversity nation. Hot spots of biodiversity, Threats to biodiversity. Endangered and endemic species of India. Conservation of biodiversity. In Situ and Ex-situ conservation of biodiversity

Unit-3: Disaster Management (8 Period)

1. **Disaster Management:** Types of disasters (natural and Man-made) and their causes and effect)

2. **Vulnerability Assessment and Risk analysis:** Vulnerability to various disasters (Flood, Cyclone, Earthquake, Heat waves, Desertification and Lightning)
3. **Institutional Framework:** Institutional arrangements for disaster management (National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), Disaster Management Act, 2005, District Disaster Management Authority (DDMA), National Disaster Response Force (NDRF) and Odisha Disaster Rapid Action Force (ODRAF)
4. **Preparedness measures:** Disaster Management cycle, Early Warning System, Pre-Disaster and Post-Disaster Preparedness, strengthening of SDMA and DDMA, Community Preparedness for flood cyclone, heat waves, fire safety, lightening and snake biting. Stakeholders participation, Corporate Social Responsibility (CSR)
5. **Survival Skills:** Survival skills adopted during and after disaster (Flood, Fire, Earthquake, Cyclone and Lightning), Disaster Management Act-2005, Compensation and Insurance

Unit 4: Social Issues and the Environment

(6 Period)

A.

- a) Environmental Ethics: Issues and possible solutions.
- b) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies
- c) Environment Protection Act
- d) Air (Preservation Control of Pollution) Act
- e) Water (Preservation Control of Pollution) Act
- f) Wildlife Protection Act
- g) Forest Conservation Act
- h) Solid waste management Cause, effect and Control Measure of Urban and Industrial waste
(Role of each individual in conservation of Natural resources and prevention of pollution)

B. Human Population and the Environment

Population Ecology: Individuals, species, population, community
Human population growth, population control method
Urbanisation and its effect on society

Unit 5: Field work

(15 Periods of 30 hrs)

- Visit to an area to document environmental assets: river/forest/flora/fauna, etc.
- Visit to a local polluted site- Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

ETHICS & VALUES

Credit point: 3

Full mark -100

Total Hours: 45

COURSE OUTCOME

- Development of a good human being and a responsible citizen
- Developing a sense of right and wrong leading to ethically correct behavior
- Inculcating a positive attitude and healthy work culture
- To equip the students to prepare themselves national and state level civil service and other competitive examination.

COURSE CONTENTS

UNIT-I- ETHICS AND HUMAN INTERFACE

[5 Hours]

Learning Outcome-

- ✓ *Understand the basic concept of ethics and its relevance in life*
- Ethics and Human Interface: Essence, Determinants and consequence of ethics and human action.
- Dimensions of Ethics in private and public relationship
- Human Values: Tolerance, Compassion, Rationality, Objectivity, Scientific Attitude Integrity, Respecting conscience and Empathy etc.
- Mahatma Gandhi and Ethical Practices: Non-Violence, Truth, Non-hatred and love for all, concern for the poorest, objective Nationalism and Education for man making. Relation between Ends and Means.

Subject Teacher: Philosophy/Political Science or Any other Teacher.

UNIT-II- ETHICS AND MAJOR RELIGIONS AND CIVILIZATIONS

[7 hours]

Learning Outcome-

- ✓ *Be familiar with ethical principles and values promoted by major religious traditions and civilization*
- Hinduism- Dharma and Mokhya (out of 4 goals of life Dharma, Artha, Kama and Mokhya), Concept of Purusartha, Nisakama Karma(work without attachment to results), Concept of Basudev Kutumba and Peace (Whole world including all animals, plants, inanimate beings and human form one world)
- Ten Commandments: (Christianity and Judaism Tradition)
- Islamic Ethics: Justice, Goodness, Kindness, Forgiveness, Honesty, Purity and Piety
- Egyptian- Justice, Honesty, Fairness, Mercy, Kindness and Generosity
- Mesopotian-Non-indulgence in lying, stealing, defrauding, maliciousness, adultery, coveting possession of others, unworthy ambition, misdemeanors and injurious teaching.
- Buddhism-Arya Astangika Marg: Right View, Thought, Speech, Action, Livelihood, Efforts, Attention and Concentration.
- Jainism-Right faith, knowledge and conduct(Triratna)

- Chinese-Confucianism- Respect for Autonomy, Beneficence, non-maleficence and justice. Taoism: No killing, No stealing, No sexual misconduct, No false Speech and No taking of intoxicants.

Subject Teacher: History/Philosophy/Political Science or Any other Teacher.

UNIT-III- CONSTITUTIONAL VALUES, GOOD CITIZENSHIP, PATRIOTISM AND VOLUNTEERISM

[10 Hours]

Learning Outcome-

- ✓ *Students Learn about constitutional values of India, Civic Sense and good Citizenship (both National and International) Patriotism and need for Volunteerism*
- Salient Values of Indian Constitution: Sovereign, Socialist, Secular, Democratic, Republic, Justice, Liberty, Equality and Fraternity
- Patriotic values and ingredients of National Building, Examples of great Patriots, Rani Laxmi Bai, Bhagat Singh, Mangal Pandey, Birsa Munda, Laxman Naik, Subhas Chandra Bose and Khudiram Bose.
- Law abiding citizenship
- Concept of Global citizenship in contemporary world
- Volunteerism- concept and facts of Volunteerism, building a better society through Volunteerism, Blood Donation, Social work, Helping the Aged, Promotion of Green Practices and Environment protection.

Subject Teacher: Philosophy/Political Science /History/ or Any other Teacher.

UNIT-IV- WORK ETHICS

[6 hours]

Learning Outcome-

- ✓ *Understand the concept of work ethics, ethics in work place and ethical practices to be adopted by various professionals*
- The concept of professionalism.
- Professional ethics at work place
- Core values needed for all professionals. Reliability, Dedication, Discipline, Productivity, Co-operation, Integrity, Responsibility, Efficiency, Professionalism, Honesty, Purity and Time Management, Accountability, Respect Diversity, Gender Sensitivity, Respect for others, Cleanliness, Rational Thinking, Scientific Attitude, Clarity in Thinking. Diligence, cleanliness and Environment Consciousness.
- Codes of conduct for Students(both in College and Hostels), Teachers, Business professional, Doctors, Lawyers, Scientist, Accountants, IT professionals and Journalist.
- Practical ethics in day to day life.

Subject Teacher: Commerce/Philosophy/Education/History/ or Any other Teacher.

UNIT-V-ETHICS AND SCIENCE AND TECHNOLOGY

[7 Hours]

Learning Outcome-

- ✓ *Understand how Science is related to ethics and values has ethical implications.*
- Ethics of Science and Technology. Are science and Technology ethically neutral? Are Science and Technology Value Free?
- Ethics of scientific Research ,Innovation and Technology
- Ethics of Social Media, Modern Gadgets
- AI and Ethics

Subject Teacher: Philosophy or Any Science Teacher

UNIT-VI- ETHICS AND VULNERABLE SECTIONS OF SOCIETY

[10 hours]

Learning Outcome-

- ✓ *Understand how various vulnerable sections of our society are treated unequally and what needs to be done to address their inequality*
 - ✓ *Understand dimensions of substance abuse*
1. **Women and family**—Gendered practices in the family, marriages (dowry, child marriage, women's consent).
Women and work—women's work at home and at work place, pay gap, gendered roles, harassment at work place and working women and role conflict.
Women and Society— Gender sensitive language, property right, marriage-divorce/Separation and women's right; violence against women
 2. **Issues Relating to Children:** Nutrition and health , Child Exploitation: Child labour ,trafficking, sexual exploitation
 3. **Issues Relating to Elderly Persons :** Abuse of Elders, Financial insecurity, Loneliness and Social insecurity, Health Care Issues, Needs for a happy and Dignified Ageing
 4. **Issues Relating to persons with disability:** Rights of PWD, affirmative action, prevention of discrimination, providing equal opportunity, various scheme for empowering PWD and social justice for PWD.
 5. **Issues Relating to Third Gender:** Understanding LGBTQ, Social justice for them, Removal of discrimination, Affirmative action and Acceptance of diversity of gender.

Subject Teacher: Sociology/political Science /Anthropology or Any Science Teacher

Sample Questions-

1. Birsa Munda belongs to which state of India?[1 mark]
2. Recall at least 4 constitutional values from the preamble to India constitution.[2 marks]
3. Explain utility of being Punctual.[5 marks]
4. Explain the ethical principles a scientist should follow.[8 marks]

Course material: To be developed by OSHEC and DDCE, Utkal University. Video Lectures will be also prepared by OSHEC and VTP, Utkal University. There shall be no internal examination for this course. The Term End Examination shall be conducted by the respective Universities. Student would engage in self-study and colleges shall conduct at least 4 doubt clearing session for each unit by engaging subject teachers as indicated above. The Principal may assign responsibility to any teacher.

Contemporary Cross-Cutting Issues

Credit point: 3

Full mark -100

Total Hours: 45

COURSE OUTCOMES

- UGC and NAAC emphasize the coverage of contemporary cross cutting issues in the curriculum of Graduate Studies.
- NAAC has identified following issues: Gender, Human Rights, Sustainable Development, Climate Change and Environmental Protection Etc. In addition to above presently A.I is fast emerging as a cross cutting issue. The proposed course under Value Added Category proposes to address the above issues.
- The students will be cognizant of contemporary cross cutting issues at the national and global level. Develop an understanding of all the issues identified such as: Gender, Human Rights, Sustainable Development, Climate Change, Environment Protection and AI etc.

Students will contribute and act actively to meet the challenges of cross cutting issues.

COURSE CONTENTS

UNIT- I GENDER

[8 hours]

Learning Outcome:

- ✓ *To understand the concept of gender and sensitize students about gender related issues.*
- **Meaning of Gender and Gender related Concepts:**
Meaning and definition of gender, difference between sex and gender, socialization and gender stereotypes, care work and differential pay
- **Demographic aspects of Gender:**
Sex selections, overall sex ratio and social consequences
- **Knowledge and Gender:**
Historical perspective on gender in academics, contribution of women writers, gender in language and literature
- **Issues and Response:**
Transgender and social exclusion, sexual harassment and policies, development index-gender gap

(Subject Teacher- Sociology/Political Science/Anthropology or Any other)

UNIT- II HUMAN RIGHTS

[9 Hours]

Learning Outcome:

- ✓ *To Understand evolution of Human Rights from the earliest times and learn basics of Human Rights at National and Global Level*
- **Understanding Human Rights:**
Meaning and Definition of Human Rights; differences between right and human rights, Human Rights Law and Humanitarian Law
- **Evolution of Human Rights :**
Developments prior to French Revolution, The French Declaration of Rights of Man and of the Citizen (1789), The US Bills of Rights (1791), Universal Declaration of Human Rights (1948)
- **Three Generation of Rights :**
First Generation Rights- Civil and Political Rights, Second Generation Rights- Social, Economic and Cultural Rights, Third Generation Rights- Solidarity /Group /Collective Rights, The Advance of Science and Human Rights
- **Human Rights in India:**
Protection of Human Right Act, 1993 and 2006, National Human Right Commission (NHRC), Protection of Human Right Amendment Act, 2019
- **The Human Rights Issues in the World:**
Arbitrary deprivation of life; War crimes; Issues of Surveillance, Censorship, Refugees and religious minorities; Terrorism and Genocide; Cybercrime
- **Human Rights Issues in India:**
Domestic violence, Ethnic/Caste violence, Violation of the Rights of aboriginals/ indigenous people, human trafficking, Issues of Displacement, Protective Laws of the Government.

(Subject Teacher- Political Science/History/Law or Any other)

UNIT- III SUSTAINABLE DEVELOPMENT

[7 hours]

Learning Outcome:

- ✓ *To understand the meaning and evolutionary growth of sustainable development goals (SDGs)*
- ✓ *To acknowledge challenges and responses of Sustainable Development*
- **Meaning and Evolution of SDGs:**
Meaning, definition and principles of sustainable development, evolutionary growth of the concept of Sustainable Development Goals (SDGs), Green growth

- **Challenges to Sustainable development:**
Agriculture, population & food security; public health and nutrition; education; natural resources, climate change; unemployment and poverty
- **Responses to the challenges of sustainable development:**
Public policy (community participation and participatory learning), technology and engineering, and the inter-linkage between sustainable development and governance

(Subject Teacher- Economics/Geography/Political Science/History or Any other)

UNIT- IV CLIMATE CHANGE ESSENTIALS

[7 hours]

Learning Outcome:

- ✓ *To understand meaning and factors of Climate Change.*
- ✓ *To understand the global impact of climate change and the response towards it.*
- **Understanding Climate Change:**
Meaning and definition of climate change, Drivers of climate change: natural and anthropogenic
- **Impacts of Climate Change:**
Climate change as threat to human wellbeing and the planet, evidence of rapid and intensifying changes across the world
- **Global response to Climate Change:**
Historical mooring of the global response towards climate change; Role of major international bodies and steps taken to address the issues of climate change

(Subject Teacher- Geography or Any Science Teacher)

UNIT- V ENVIRONMENT PROTECTION

[7 hours]

Learning Outcome:

- ✓ *To understand the need for environmental protection, basic concepts and the efforts taken at national and global levels.*
- **Understanding Environment and Environmental Protection:**
Components of environment, Ecological Footprint, Living planet index and bioprospecting, Need of protection of the Natural Capital (Natural resources and ecosystem services)
- **Challenges and Response towards Environmental Protection:**
Extinction of species, Types of Biodiversity conservation (In-situ and Ex-situ), National and International efforts towards Conservation, Environmental ethics and Economics

(Subject Teacher- Any Science Teacher)

UNIT- VI Artificial Intelligence

[7 hours]

Learning Outcome:

- ✓ *To understand what is AI and how its, effect on humanity*

- ✓ *To comprehend the interdisciplinary nature of AI and its impacts on various domains.*
- ✓ *To discuss strategies for addressing challenges and maximizing benefits of AI in society.*

- **Introduction to Artificial Intelligence**

Definition and scope of AI, Historical background and evolution, AI applications across different sectors.

- **Ethical Considerations**

Ethical dilemmas in AI development and deployment, case studies highlighting ethical challenges (e.g., bias, privacy concerns), Strategies for promoting ethical AI practices

- **Socio-Economic Implications**

Explorations of societal impacts of AI on employment, education, healthcare, etc., examination of AI's role in exacerbating or mitigating social inequalities, analysis of AI's influence on economic growth, productivity and job market, fostering inclusively and accessibility in AI technologies.

- **Legal and Regulatory Frameworks (30 Minutes)**

Overview of existing legal frameworks for AI, Challenges in regulating AI technologies, International perspective on AI Governance

- **Environmental Sustainability**

AI's contributions to Environmental Sustainability and Challenges, exploration of Energy Consumption, E-waste, and Carbon Footprints of AI technologies, solutions for minimizing AI's Environmental Impact

- **Integrating AI into Human Rights**

Examination of AI's implications for Human Rights including Privacy, Freedom of Expression, and Access to Information, Strategies for safeguarding Human Rights in AI Development and Deployment

- **Future Trends and Reflection**

Overview of Emerging Trends and Future Directions in AI, Ideas for promoting responsible AI Innovation and addressing Cross-Cutting Issues

(Subject Teacher- Computer Science/Mathematics/Any Science Teacher)

Sample Questions-

1. Define Human Rights in one Sentence. [1 mark]
2. List two positive impacts at AI. [2 marks]
3. Write a paragraph on sustainable development Goals. [5 marks]
4. Critically examine India's efforts to preserve Bio-diversity. [8 marks]

Course material: To be developed by OSHEC and DDCE, Utkal University. Video Lectures will be also prepared by OSHEC and VTP, Utkal University. There shall be no internal examination for this course. The Term End Examination shall be conducted by the respective Universities. Student would engage in self-study and colleges shall conduct at least 4 doubt clearing session for each unit by engaging subject teachers as indicated above. The Principal may assign responsibility to any teacher.

Yoga for All

Credit point: 3

Full mark -100

Total Hours: 45

Practical Hour: 3 credits x 30 hrs= 90 hrs spread over 40/60 days

COURSE OUTCOMES (COs):

On completion of this course, the learners will be able to:

CO1: Understand the importance of yoga as a holistic approach to health and well-being.

CO2: Develop awareness about the benefits of practising yoga in education.

CO3: Perform actions skilfully **in day-to-day life**.

COURSE CONTENTS

UNIT I: introduction to Yoga

LO: Understand the historical development of yoga in India.

LO: Reflect upon the scope and importance of yoga in education.

- What is yoga-concept of Hatha Yoga: control over body and mind.
- Need and importance of yoga in education- Yoga in physical education and sports science.
- Thinkers of yogic education and their contributions- Patanjali and Astanga Yoga, Sri Aurobindo.

Unit-II: Yoga for Memory and Concentration

LO: Demonstrate yogic practices including asana, pranayama and meditation.

- Meditative asana and pranayam-, Padamasana, Anulom-Vilom Pranayam Bhramari Pranayam-steps, benefits and precautions.
- Mudra-Gyanmudra, Brahmanjali-process and practice.

Unit-III: Stress Management through Yoga

LO: Develop skills to apply yoga for health and personality development.

LO: Adopt and practice various stress reduction techniques in their daily life.

- Relaxation asanas: Sukhasana, Balasana/Ananda Balasana, Shabaasana.
- Yoga Nidra-steps and benefits.
- Mindfulness stress reduction technique- process and practice.

Unit-IV: Yoga for Special Needs and Teaching of Yoga

LO: Understand the importance of yoga for different age groups.

LO: Adopt strategies to manage students in yoga class.

- Yoga for women, children and the aged.
- Principles and methods of teaching yoga.
- Basics of yoga class management and educational tools of yoga teaching.

Methods of Evaluation

No theoretical examination. Continuous evaluation through observation by Trainer on a day to day basis and final performance to be examined by both internal and external examiners

Mode of Course Transaction: Learning and practice of Asana, Pranayam and Meditation.

Suggested Readings

- Cook, C.P.(2017). Mindfulness and Yoga in Schools: A Guide for Teachers and Practitioners. Springer.
- Dasgupta, S.N.(2005). Yoga Philosophy in relation to other system of Indian Thought. New Delhi: Motilal Banarsidass Publishers.
- Iyengar, B.K.S.(2006). Light on Yoga. New York: Harper Collins Publishers.
- Krishnamurti, J.(2001) *The Book of Life*. Penguin Books.
- Swami Satchidananda(2012).The Yoga Sutras of Patanjali. New York: Start Publishing.
- Swami Vivekananda(2017). The Complete Book of Yoga. Delhi: Teenage Publishers.
- International Journal of Yoga. Mumbai: Medknow Publications.
- <https://www.youtube.com/playlist?list=PLui6Eyny-UzzWwB4h9y7jAzLbeuCUczAl>
- <https://www.youtube.com/watch?v=UEEsdXn8oG8>
- <https://www.youtube.com/watch?v=AB3Y-4a3ZrU>

Understanding India

Credit point: 3

Full mark -100

Total Hours: 45

COURSE OUTCOME

- To familiarize the students with the history, culture, geography, polity and economy of India
 - To enable them to gain basic understanding of India to prepare for various competitive examinations both at national and state level.
- UGC under NEP 2020 has suggested a course on understanding India under Value Added Course

COURSE CONTENTS

UNIT-I GEOGRAPHY OF INDIA

[11 hours]

- ✓ **Learning Outcome :** *To familiarize the learner with geographic features of India.*
- Physiographic divisions of India, Drainage , Climate of India
- Characteristics of Indian Agriculture,
- Major Crops: production and distribution of rice and wheat, cotton, sugarcane
- Major Industries and minerals: iron ore, coal, petroleum, natural gas
- Demographic structure: Distribution and growth, census in India

UNIT- II UNITY IN DIVERSITY

[12 hours]

- ✓ **Learning Outcome:** *To enable the students to understand how India is plural and multidiversified society. To make the students aware how diversity has been a source of strength for nationalism in India both Pre and Post-Independence period.*
- Ethnic, linguistic, geographic, religious and cultural diversity and unity of India.
- The Idea of India: Jambudipa Bharat Varsha, Uttar Patha, Dakhina Patha, Hindustan and India and ‘Bharat’
- Evolution of Syncretic Indian culture during 1000 CE to 1800 CE : Religion (Suffi/Bhakti) Art and Architecture, Music and literature
- Socio- economic, Political and Cultural impact of British Rule: An outline of India’s freedom struggle(1857-1947)

UNIT- III INDIAN POLITY AND ITS POLITICAL IDENTITY

[11 hours]

- ✓ **Learning Outcome -** *To know about the Indian polity and its distinctive features*
- Salient features of Indian constitution (Republic, Federal, Parliamentary, Democracy, Secular, Separation of power, Centre-State Relationship, Panchayat- Raj
- Fundamentals Rights and duties, Directive Principles of State Policy and Affirmative Action
- India’s Foreign Policy, International Trade Policy and Global Standing

UNIT- IV INDIAN ECONOMY

[11 hours]

Learning Outcome:

- ✓ *To familiarize students of hurdles to development*
- ✓ *To analyze the mechanism of economic transformation in India*
- Concept of development :Core Values of development, Sustainable development and Social development
- Poverty: Poverty line, concepts of absolute and relative poverty, MDPI and Poverty alleviation-measures
- Social Sector Initiatives: Quality education, human capital development, health care, rural development
- Economic growth since independence in Agricultural, Industrial and Service Sectors and Sectorial contribution to GDP in India
- Regional Imbalance: An analytical approach(Convergence/Divergence approach)
- Fiscal Federalism: System of Devolution of Funds
- Economic challenges of 21st century

Text Books

1. Unity in Diversity, R.K. Mookorjee
2. Freedom struggle of India, Barun De, Bipan Chandra and Amle Tripathy, NBT, Govt. of India
3. An Advanced History of India, Roychoudhury Dutt and Majumdar
4. Indian Economy , Mishra and Puri, Himalaya Publication
5. India Year Book, Govt. of India, Publication Division
6. Indian Economy- *Dutta and Sundaam*
7. An Introduction to Constitution of India- *D.D. Basu*
8. Indian Economy by Uma Kapila
9. Indian Polity, M. Laxmikanth, Tata Mc graw Hill

Sample Question

1. Who used the term “Bharat Varsha” in an inscription for the first time in India’s history? [1 mark]
2. State the course of R. Ganga by identifying at least 4 states of India through which it passes. [2 marks]
3. Enumerate explain the major challenges faced in the 21st century by India [5 marks]
4. Write a critical essay on Center State Relationship in India.[8 marks]

N: B

- ✓ *A single text book covering all aspects is not readily available. It shall be developed by OSHEC/DDCE Utkal University/OSOU/ OTBP & P and similar other organization.*
- ✓ *VTP lectures shall be prepared.*

Understanding Odisha

Credit point: 3

Full mark -100

Total Hours: 45

COURSE OUTCOME

- To familiarize the students with Odisha, its history, linguistic heritage, religion, culture, literature, geographic features, tribes and their culture, dance and music and contemporary features.
- To enable the students to develop an informed perspective about their land, people, their past and present and the challenge they face.
- To enable the students to face competitive examinations for jobs under Govt. of Odisha

COURSE CONTENTS

Unit- I ODISHA'S PHYSICAL AND HUMAN GEOGRAPHY [9 hours]

✓ **Learning Outcome:** *Familiar with the physiography, drainage, climate and forests in Odisha*

- Physiography, Drainage systems, Climate, natural vegetation
- Major Industries and Minerals in Odisha : Iron Ore, Coal, Bauxite and Chromite
- Steel and Aluminum industries
- Growth and distribution of population

Unit- II AN OUTLINE OF POLITICAL HISTORY OF ODISHA [9 hours]

✓ **Learning Outcome :** *To enable the students to familiarize themselves with the chronology of Political History , formation of Odisha in modern days and freedom movement*

- Ashoka and Kharavela
- An outline of Dynastic History of Odisha: Bhaumkaras, Somavamsies, Gangas and Gagapatis
- Odisha under Mughals and Marathas
- Movement for Separate Province of Odisha and freedom struggles Odisha

UNIT- III AN INTRODUCTION TO ODISHA'S CULTURE AND HERITAGE

[9 hours]

✓ **Learning Outcome :** *Understand Essence of Odisha's Culture, Art, Architecture, Dance , Music, Religion, and Literature*

- Temple Architecture in Odisha
- History of Odia Literature from ancient period to independence including Bhakti Literature, Development of Odia Script
- Dance and Music : Odissi, Gotipua, Chhau, and Folk
- Religion in Odisha: Shaivism, Vaishnavism and Neo-Vaishnavism(Chaitanya), Shakti cult, Jagannath Culture, Islam and Christianity in Odisha
- Odisha Cuisine
- Major Festival of Odisha

UNIT- IV TRIBES OF ODISHA

[9 hours]

✓ **Learning Outcome:** Odisha has a large concentration of Tribal Population; students would develop an understanding of their culture, and develop an appreciation at their ways of life.

- Essentials of 62 Tribes of Odisha : Major Tribes and PVTs, festivals, beliefs, art and craft

UNIT- V CONTEMPORARY ODISHA

[9 hours]

✓ **Learning Outcome:** To be cognizant of contemporary Odisha

- Districts of Odisha – An Outline
- Education – Primary, Secondary, Higher education including Technical.
- Tourism in Odisha including Eco-tourism
- Industry, Agriculture, Public Health, Service Sector (including IT)

Text Books

- Odisha Reference Year book (Latest Edition) by B.K. Publication Pvt. Ltd

Reference

- History of Odisha by Prof. Atul Chandra Pradhan
- History of Odia Literature by Mayadhar Mansingh
- Odisha Review and Utkal Prasanga (Current Issues)

Sample Question

1. Dhamsa is the dance form_____ Tribe.[1 mark]
2. Name the three types of temple architecture of Odisha.[2 marks]
3. Trace the growth of IT industry in Contemporary Odisha.[5 mark]
4. Write an essay on Jagannath Culture.[8 mark]

Management Concepts and Practices

Credit point: 3

Full mark -100

Total Hours: 45

COURSE OUTCOME

After completion of this course, students will be able to

- Understand the concept and functions of management
- Apply current trends in management in their personal and professional career
- Identify appropriate management techniques for managing self as well as business
- Develop decision making skills to manage different organizational functions

COURSE CONTENTS

Unit 1: Planning and Decision making

[12 hours]

✓ *Learning Outcome: Gain conceptual understanding about the functions of management*

- Nature, Purpose, and Importance of Planning, Types of Planning
- Decision Making: Process and types. Relationship of planning and decision making.

Unit 2: Organizing and Staffing

[11 hours]

✓ *Learning Outcome: Develop proficiency in managing organizational team work.*

- Concept of Organizing, Formal and Informal Organizations, Teamwork: Types and Stages of Team Building.
- Staffing: Meaning of Recruitment, Selection, Socialisation process and Training. Importance and limitations of online staffing practices.

Unit 3: Directing and Controlling

[11 hours]

✓ *Learning Outcome: Demonstrate skills of directing and controlling manpower within the organisation.*

- Directing: Functions and techniques, Importance and Process of Controlling, Types of Controlling and challenges.
- Importance of communication in management practices. Process and types and obstacles in communication process.

Unit 4: Role of Managers in Managing Change

[11 hours]

✓ *Learning Outcome: Acquire skills of self-management to implement change in the organisation.*

- Developing Skill components, Self-management and Challenges faced by a manager. Importance of motivation in self-growth, leadership qualities
- Change management, types and resistance to change. Process for implementing change

Textbooks

- "Management Concepts and Practices" by T. Ramasami and S.K. Acharya (HPH)
- "Principles of Management" by Sharma & Gupta (Kalyani Publishers)

Suggested Books

- "Management" by VSP Rao & V H Krishna (Excel Books)
- "Principles and Practices of Management" by L. M. Prasad (S. Chand Publishers)

Sample Question

1. What is planning?[1 mark]
2. Differentiate between formal and informal organization. [2 marks] [50 word]
3. Discuss various types of communication. .[5 marks] [300 words]
4. What do you mean by change management? Discuss the process for implementing change.
[8 marks] [Within 800 words]

Operations Research

Credit point: 3

Full mark -100

Total Hours: 45

COURSE OUTCOME

After completion of this course, students will be able to

- Understand the concept and scope of Operation Research
- Apply Big M method for solving Linear Programming Problems(LLP)
- Identify various phases of Operations Research
- Solve Transportation problems by using NWC and LCM methods
- Appreciate the necessities to know constraints and objectives of a project

COURSE CONTENTS

UNIT 1 INTRODUCTION TO OPERATIONS RESEARCH [10 Hours]

✓ *Learning Outcome*

Understanding the importance and characteristics of operation research.

- Definition and Scope of Operations Research, Historical Development and Characteristics, Phases of Operations Research.
- Historical development and importance of OR in decision making

UNIT 2 LINEAR PROGRAMMING AND TRANSPORTATION PROBLEM

[15 Hours]

✓ *Learning Outcome : Formulating Linear Programming to solve Operation Research Problems*

- Formulation of Linear Programming Problems.
- Linear inequalities in two variables. Their graphs as half planes

UNIT 3 ASSIGNMENT PROBLEM AND QUEUING THEORY

[8 Hours]

✓ *Learning Outcome: Using graphs to solve LPP*

- Graphical Solution of Linear Programming Problems, Simplex Method including two phase methods
- Big M Method as a method of solution of LPP

UNIT 4 NETWORK ANALYSIS AND DECISION THEORY

[6 Hours]

✓ *Learning Outcome: Applying NWC and LCM methods to solve Transportation problems*

- Transportation Problem: Structure, Basic Feasible Solution
- Solution Methods (NWC Method, LCM,)

UNIT 5 INVENTORY CONTROL

[6 Hours]

✓ *Learning Outcome : Designing decision flow in an organizations for optimizing individual efficiencies*

- Network Analysis: PERT and CPM, Construction
- Critical Path, Time Analysis, Decision Theory: Bayes' Theorem, Probability, Decision Trees

Text Books

1. Introduction to Operational Research by V.K. Kapoor (Sultan Chand & Sons)
2. Operations Research by P.K. Gupta & Man Mohan (Sultan Chand & Sons)

Suggested Reading

1. Operations Research by P.R. Vittal & V. Malini (Margham Publications)
2. Operations Research Theory and Applications by Sharma J. K (Laxmi Publications)
3. Operations Research by Sridhar Bhat K (Himalaya Publishing House)
4. Operations Research by Hiller F.S. and Lieberman G.J. (McGraw Hill)
5. Operations Research: An Introduction by Hamdy A.T (Pearson)
6. Operations Research by Sharma S. D (Kedar Nath Ram Nath).

Sample Questions

1. What do you mean by Operations Research? [1mark]
2. Briefly explain any two characteristics of Operation Research? [2 marks] [50 word]
3. Discuss the variables of linear inequalities with suitable examples.[5 marks] [300 words]
4. Compare and contrast between PERT and CPM. [8 marks] [Within 800 words]

Organizational Behaviour

Credit point: 3

Full mark -100

Total Hours: 45

COURSE OUTCOME

After completion of this course, students will be able to

- Analyse the behaviour of individuals and groups in organisation
- Manage conflict in organizational context.
- Understand the motivational factors for better productivity in organisation
- Analyse individual personality, attitude and behaviour in work place
- Handle the organisational stress and maintain work life balance

COURSE CONTENTS

UNIT 1: INTRODUCTION TO ORGANIZATIONAL BEHAVIOR

[12 hours]

✓ **Learning Outcome:** *The students will be able to gain an understanding about the concept, factors and fundamentals of organizational behaviour*

- Concept of Organisational Behaviour (OB),
- Factors influencing Organisational Behaviour.
- Disciplines contributing to OB and Challenges of OB
- Learning Styles and Processes

UNIT 2: FOUNDATIONS OF INDIVIDUAL BEHAVIOR

[11 hours]

✓ **Learning Outcome:** *The students will learn the importance of personality and attitude in individuals behaviour*

- Personality, meaning, determinants and traits of personalities
- Attitudes, Formation of attitude.
- Perception and Factors Influencing Perception
- Job Satisfaction, Factors influencing job satisfaction.

UNIT 3: MOTIVATION

[11 hours]

✓ **Learning Outcome:** *The students will understand the factors influencing motivation.*

- Motivation cycle and outcome
- Maslow's and Herzberg's theory of motivation
- Leadership and styles of leadership and types of leadership
- Role of Leader in minimising conflict and types and process of conflict Management

UNIT 4: STRESS MANAGEMENT AND CONTEMPORARY ISSUES

[11 hours]

✓ **Learning Outcome:** *The students will understand how stress affects the effectiveness of the employees and work life balance*

- Stress Management Techniques,
- Contemporary Issues in Organizational Behavior
- Work-Life Balance and Diversity of work force
- Quality of work life

Suggested Text Books:

- ✓ *Organizational Behavior* by K. Aswathappa (HPH)
- ✓ *Organizational Behavior* by Kavita Singh (Vikas Publications)

Suggested Books:

- ✓ *Organizational Behavior* by Robbins, Timothy Judge, Seema Sanghi (Pearson Prentice Hall)
- ✓ *Organizational Behavior* by Fred Luthans (McGraw Hill Inc.)
- ✓ *Managing Individual and Group Behavior in Organizations* by Daniel C. Feldman, Hugh Arnold (McGraw Hill)
- ✓ *Organizational Behavior* by Stephen McShane, Mary Von Glinow (Tata McGraw Hill)
- ✓ *Organizational Behaviour* by L.M. Prasad (Sultan Chand & Sons)
- ✓ *Organizational Behavior: Text, Cases & Games* by K. Aswathappa (Himalaya Publishing House)

Sample Question

1. What do you mean by organisational behaviour? [1mark]
2. Outline the factors influencing organisational behaviour. [2 marks] [50 word]
3. Explain the determinants and traits of personalities.[5 marks] [300 words]
4. Discuss about the Maslow's and Herzberg's Theory of Motivation.[8 marks]
[Within 800 words]

Research Methodology

Credit point: 3

Full mark 100

Total Hours: 45

COURSE OUTCOME

After completion of this course, students will be able to

- Understand the need and importance of research
- Develop skills to identify samples for various types of research
- Differentiate between different types of research
- Explore relevant literature review using primary and secondary sources
- Acquire proficiency to develop research proposal

COURSE CONTENTS

UNIT-I Introduction To Research Methodology

[12 Hours]

Learning Outcome-

- ✓ *The students will be able to gain insight about the meaning, purpose and types of research*
- Meaning, Significance, Objectives of research, Research methods v/s research methodology, Ethics for research
- Types of research -Pure and applied research, Qualitative and Quantitative research Exploratory, Descriptive, Experimental, Analytical, Action research. Case Study. Field Studies, Surveys.
- Criteria of good research , Planning of research –Selection of a problem for research, Formulation of selected problem, Hypothesis, Research design

Unit II Research Methods

[11 Hours]

Learning Outcome-

- ✓ *The students will understand various methods of research and their applicability*
- **Review of Literature** – Need for reviewing literature, what to review and for what purpose, Literature search procedure, Sources of literature, Note taking, Identification of Research Gap.
- **Data Collection Method-** Choice of methods for data collection, Observation- Types of observation. Experimentation- Planning and conducting experiment, Types of experiment- Laboratory and field, Interview – Definition, Characteristics and Types of Interviews-Structured, Unstructured, Focused, Clinical, Depth , Interviewing Process-Preparation, Introduction, Developing rapport ,Carrying the interview forward, Recording interview and Closing interview. Content Analysis-Meaning, Procedure, Recording units and applications.

- **Tools for Data Collection-** Tools-Observation Schedule, Interview guide, Interview schedule, Questionnaire, Rating Scale, Check List, Opinionnaire, Data Sheet, Schedule for institutions, Inventories.

UNIT-III Sampling Techniques, Field Work and Report Writing [11 Hours]

Learning Outcome-

- ✓ *The students will be able to understand various sampling techniques in research*
- ✓ *The students will develop skills of preparing research proposal and writing research report scientifically.*
- **Sampling-** Concept of population and sample, Characteristics of a good sample design. Basis of sampling, Sampling Techniques and Methods- Probability sampling -Simple Random sampling, Stratified sampling, Systematic random sampling, Cluster, Area sampling, Multi-stage sampling. Non- Probability Sampling-Convenience sampling, Purposive sampling, Quota sampling and Snow-ball sampling.
- **Field Work-** Nature of field work, Selection and training of investigators, Sampling frame, Field operations and Field administration.
- **Report Writing** – Research report format- Report outline, Prefatory items. Body of the report-Introduction Design of the study, Result, Findings and Discussion, Summary, Conclusions and Recommendations, Terminal items- Bibliography, Appendix, Style sheet- APA.

UNIT-IV Activities to Be Conducted

[11 Hours]

Learning Outcome-

- ✓ *Students will gain hands-on experience on application of research methodology*
- Identify the research gap through the review of literature.
- Collect data on a researchable topic through schedule questionnaire.
- Prepare a project report within one thousand words.
- Visit any organization and prepare a report by using case study method.
- Prepare a list of references on a topic by following APA style sheet.

Text books

1. C. R Kothari and Garg G, Research Methodology: Methods and Techniques, New Age International Publishers, Pvt ltd, New Delhi.
2. C. R Kothari and Garg G, Research Methodology: Methods and Techniques, New Age International Publishers, Pvt ltd, New Delhi
3. O. R Krishnaswami and M. Ranganatham, Methodology of research in Social Sciences. Himalaya Publishing House.

Reference Books:

1. Kumar R , Research Methodology,
2. Education and Communication for Development , O.P Dahama, O.P . Bhatnager.

E-resources:

1. <https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf>
2. <https://ebooks.inflibnet.ac.in/antp13/chapter/research-process-and-design/>

Subject Teacher- Any Teacher with Ph.D.

Sample Question

1. What do you mean by research? [1 mark]
2. Differentiate between fundamental and applied research? [2 mark] [Within 50 words]
3. Explain various steps of research proposal. [5 mark] [within 300 word]
4. Discuss the characteristics of good sampling and briefly explain about various types of probability sampling. [8 mark] [within 500 to 800 words]

Indian Society

Credit point: 3

Total Hours: 45

COURSE OUTCOMES

- After completing this course, the students will be able to demonstrate an understanding of composition of Indian society in terms of its diverse culture, complex social structure and will have a better understanding of the factors of unity and diversity that makes a our country as a unique nation.

COURSE CONTENTS

UNIT-I COMPOSITION OF AND APPROACHES ON INDIAN SOCIETY [10 hours]

✓ **Learning Outcome:**

Students will be able to explain the diverse composition of Indian society, approaches to study the Indian society, factors of unity and diversity.

- Diverse Composition: Religious composition, linguistic composition & racial composition
- Threat to National Integration (Communalism, Linguism, Regionalism, Casteism)
- Unity in diversity: Factors of unity
- Approaches to the study of Indian society: Structural-Functional, Marxian and Subaltern

UNIT-II HINDU SOCIAL ORGANIZATION

[10 hours]

✓ **Learning Outcome:**

Students will be able to demonstrate their understanding on various aspects of Hindu social organization.

- Features of Hindu Social Organization
- Ashrama Vyavastha and its relevance
- Purusarthas and Doctrine of Karma
- Relevance of Hindu Belief System in Contemporary Society

UNIT-III MARRIAGE, FAMILY, KINSHIP AND CASTE IN INDIA

[12 hours]

✓ **Learning Outcome:**

Students will be able to demonstrate their understanding pertaining to Marriage, Family, Kinship and Caste system among different communities and societies in India.

- Marriage: Meaning and Types of Marriage among the Hindu, Muslims and Tribes
- Joint Family and Kinship - Meaning, features & disintegration of joint family; Meaning, terminology and regional variations of Kinship.
- Caste: Meaning and features of caste System, Theories of the origin of caste system: Occupational, Religious and Racial
- Recent changes in Marriage, Family and Caste system in India

UNIT-IV ISSUES AND CHALLENGES OF CONTEMPORARY INDIA [13 hours]

✓ **Learning Outcome:**

Students will be able to understand major issues of the contemporary India along with its complexities, challenges and the process of change.

- Globalization and Indian society – Meaning of globalization, impact of globalization on Culture, Economy and Health.
- Social Exclusion and Inequality – Meaning, Types and Factors
- Social Empowerment of Disadvantaged – Meaning, Types and Importance

Text Books

1. Hasnain, N. and Hasnain, A. (2021) *IndiaIn Society - Themes and Social Issues*. New Delhi: Mc Graw Hill (Chapter 2 and 3)
2. Singh, Y. (2018). *Modernization of Indian tradition*. New Delhi: Rawat Publications.

References:

1. Kolenda, P. M. (2017). Region, Caste, and Family Structure: A comparative study of the Indian “joint” family. In *Structure and change in Indian society* (pp. 339-396). Routledge.
2. Mandelbaum, David G. (2003) *Society in India*. Vols. I & II Bombay: Popular Prakashan.
3. Prabhu, P. H. (1991). *Hindu social organization: A study in socio-psychological and ideological foundations*. Popular Prakashan.
4. Shah, A. M. (1998). *The family in India: Critical essays*. Orient Blackswan.
5. Shah, A. M. (2019). *The structure of Indian society: Then and now*. Taylor & Francis.
6. Uberoi, P. (ed.) (1993) *Family, Kinship and Marriage in India*, New Delhi: Oxford University Press.
7. Chaudhuri, Maitrayee. (2024). Globalization in Indian sociology: The invisible and the hypervisible. *Diogenes*. 65. 1-23. 10.1017/S0392192124000014.
8. N.M.P. Verma & Alpana Srivastava (2022). *The Routledge Handbook of Exclusion, Inequality and Stigma in India*. Routledge India.

E- resources

- (1) Sociology of Kinship Marriage & Family. CEC-UGC.
Link: <https://youtu.be/9lbjyiSdiTA?si=eEEAFcfNCMs3wKUR>
- (2) Kinship, Vidya-Mitra, UGC.
Link: <https://youtu.be/-84pft4MWSc?si=XdduVoKhJLMhFYDi>
- (3) Sociology of Caste in India, CEC-UGC.
Link: https://youtu.be/pykIo_3nGa0?si=n_--PuzPhaZXAIi
- (4) Study of Caste in India, CEC-UGC.
Link: <https://youtu.be/Vs3B2B7ntn4?si=MFqHQjkYpi4G5PMY>

- (6) Globalisation and its impact on India, Vidya-Mitra, MHRD
Link: <https://www.youtube.com/watch?v=ss2DQ2Gax54>
- (5) Social Inequality, Exclusion and Inclusion, DPUE DKPUCPA
Link: <https://www.youtube.com/watch?v=iCEXXdcmiLE>

Sample Question

Part-I

Fill in the blanks. (1x12)

- (a) _____ used the concept “purity and pollution” to define Indian caste system.

Part-II

Answer any 8 questions within two or three sentences. (2x8)

- (a) Define caste.

Part -III

Answer any 8 questions within 75 words each. (3x8)

- (a) Write a short note on ‘doctrine of karma’.

Part-IV

Answer all the questions within 500 words. (7x4)

- (a) Discuss the major factors of unity in India.

List of Subject based Value Added Courses under Model Curriculum

Sl NO.	Subject	List of VAC
1.	Biotechnology	Bio analytical tool
2.		Ethnopharmacology
3.		Integrated Omics
4.		Molecular diagnostics
5.	Psychology	Geriatric Care and Counselling
6.		Basic Counselling Skills
7.		Sports Psychology
8.		Early Childhood Education
9.	Sanskrit	Karmakandam
10.		Human Health and Yogic Science
11.	Philosophy	Gandhian Applied Philosophy
12.		Moral Dimensions of Environmental Issues
13.		Kautilya's Philosophy and Political Thought
14.	Sociology	Social Statistics and Computer Applications
15.	Social Work	Climate Change and Disaster Risk Reduction
16.		Understanding the Constitution of India
17.		Digital Fluency
18.	Law	Intellectual Property Rights (IPR)
19.	Commerce	Introduction to Artificial Intelligence
20.		Business Ethics and Values
21.	Home Science	Preschool And Creche Management
22.		Food Preservation And Processing
23.		Geriatric Care And Management
24.	Education	Ethical Practices and Education
25.		Economics of Education
26.	Physics	Computational Materials Modelling
27.	Journalism & Mass Communication	Creative Writing
28.		Environmental Journalism
29.		Sports Journalism

30.		Citizen Journalism
31.		Odia Journalism
32.	IRPM/PMIR	Corporate training and development
33.		Entrepreneurship and Start-up
34.	Mathematics	R-Programming (Practical)
35.		Mathematica (Practical)
36.		Maple
37.		SAGEMATH
38.		SCILAB
39.	Chemistry	Nanomaterial and nanotechnology
40.		Surfactants and Detergents
41.	Odia	ଶ୍ରୀଜଗନ୍ନାଥ ସାଂସ୍କୃତିକ- (Please Refer to Detail Syllabus of Odia)
42.		ଆଦିବାସୀ ସାଂସ୍କୃତିକ- (Please Refer to Detail Syllabus of Odia)
43.		ଓଡ଼ିଶାର ସାଂସ୍କୃତିକ ପରିଚୟ- (Please Refer to Detail Syllabus of Odia)

Bio-analytical Tools

Course objective:

The objective of this course is to provide the students with the understanding of various analytical techniques used in biotechnology-based research and industry. The course will acquaint the students with the various instruments, their configuration and principle of working, operating procedures. In this course, the students will be exposed to basic concepts related with techniques and instrumentation widely used in Biotechnology.

Learning Outcome:

At the end of the course students will be able perform biochemical assays, electrochemical techniques, spectrophotometry and chromatography. Apply basic principles of different analytical techniques in analytical work. Use microscopy, centrifugation and electrophoretic techniques. Use various techniques for solving industrial and research problems.

UNIT-I

Simple microscopy, phase contrast microscopy, fluorescence and electron microscopy (TEM and SEM), pH meter, absorption and emission spectroscopy; Immuno-cytochemistry: Principles, techniques and application.

UNIT-II

Ultraviolet-visible absorption spectroscopy and Fluorescence spectrophotometry : Principle, Instrumentation and application. Other types (IR, NMR, ESR and MASS) of spectrophotometry: Basic principle and application. Elementary idea about X-ray crystallography, API- Electrospray and MALDI TOF.

UNIT-III

Introduction to the principle of chromatography. Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration, affinity and ion exchange chromatography, gas chromatography, HPLC. Centrifugation techniques: Basic principles of sedimentation, Types of centrifuges, Types of rotors, Methods in preparatory ultracentrifugation (differential and density gradient centrifugation, centrifugal elutriation). cell fractionation techniques, isolation of sub-cellular organelles and particles.

UNIT-IV

Electrophoretic techniques: General principles, support media, electrophoresis of proteins (SDS-PAGE, native gels, gradient gels, isoelectric focusing gels and two-dimensional gels), electrophoresis of nucleic acids (Agarose, pulse-field and sequencing gels).

Introduction to PCR and Q-PCR, Western blotting.

Text Book:

- ✓ *Principle and Techniques of Biochemistry and Molecular biology, 7th ed By Keith Wilson and Jhon Walker, Cambridge Press*
- ✓ *Rodney Boyer, Modern Experimental Biochemistry, Pearson Education; 3 Edition*
- ✓ *Freifelder D, (1982) Physical biochemistry, application to biochemistry and molecular biology, 2nd Edition, W.H Freeman & Company, San Fransisco.*
- ✓ *R. Scopes (1994), Protein Purification – Principles and practices, 3rd Edition, Springer Verlag.*
- ✓ *D. Holme & H. Peck (1998), Analytical Biochemistry, 3rd Edition, Longman.*

Ethno pharmacology

Course Objective:

This course aims to discover natural remedies such as effective drugs based on the therapeutic use of plants. This will provide students idea about innovative approach of plant based drug discovery.

Learning Outcome:

- Appreciate the need to conserve floristic and cultural diversity of the region.
- Rescue and document Ethnomedicine for sustainable use of plant resources.
- Understand the need for development of new drugs for safe and more rational use of herbal preparations.
- Develop laboratory skill in testing of herbal drugs and new commercial products.

UNIT-I

Introduction, scope and relevance. Brief account of Phytochemistry, pharmacodynamics and pharmacokinetics. Difference between herbal/botanicals and pharmaceutical medicine. Classification and sources of crude drugs. Quality, safety and efficacy of herbal medicines/ nutraceuticals. Role of ethnopharmacology in drug development.

UNIT-II

Basic definition and types of toxicology, Regulatory guidelines for conducting toxicity studies as per OECD, Alternative methods to animal toxicity testing. Biopiracy, Intellectual Property Rights (IPR). Ethnopharmacology and IPR issue. Integrated drug development programme, technology transfer and commercialization of Traditional medicine.

UNIT-III

Biological screening of herbal drugs- introduction and need for phytopharmacological screening. In vitro Screening methods used for herbal drugs: Antimicrobial screening of herbal drugs, Screening for anticancer activity, Screening for antioxidant activity, Screening for antiurolythetic activity.

UNIT-IV

In vivo Screening methods used for herbal drugs: Screening for anti-inflammation and analgesic activity, Screening for antiulcer activity, Screening for antidiuretic activity, Screening for liver related disorders. Database on pharmaceutical uses of plants.

Text Books:

- ✓ *Traditional plant medicines as sources of new drugs. P J Houghton in Pharmacognosy Trease and Evan's.16 Ed .2009*
- ✓ *Jose Boban K. (1998). Tribal Ethnomedicine: Continuity and change. APH publishing corporation 5, Ansari Road, Darya Ganj, New Delhi*
- ✓ *Medical Pharmacology, PadmajaUdaykumar. Sixth Edition, CBS Publishers & Distributors Pvt Ltd*

Integrated Omics

Course Objectives:

- To understand the concept of genomics and its relevance to biotechnology. The course aims to make Students know about various components of genome and to compare genomes of organisms of different phylogenetic lineages.
- The objectives also include knowledge of transcriptomics and proteomics and their applications. In addition, they will learn about methods of studying genetic materials obtained from various environmental samples.

Learning Outcome:

Students will be able to

- Work on multi-omics data integration projects and computational biology
- Learn the command line and statistical package of all programs.
- Understand how different layers of biological blueprints interact
- Adopt rapidly to high-throughput omics approaches to analyze biological samples.

UNIT-I

1. Introduction to Genomics, DNA sequencing methods manual & automated: Maxam & Gilbert and Sanger's method. Next Generation Sequencing (Pyrosequencing, Ion torrent, Illumina, SOLID, PacBio, Nanopore).
2. Genome Sequencing: Shotgun & Hierarchical (clone contig) methods, Computer tools for sequencing projects: Genome sequence assembly software.
3. Genome mapping Genetic and physical maps; markers for genetic mapping; methods and techniques used for gene mapping, physical mapping, linkage analysis, cytogenetic techniques, FISH technique in gene mapping, somatic cell hybridization, radiation hybrid maps, in situ hybridization, comparative gene mapping.

UNIT-II

1. Identification and classification of organisms using molecular markers- 16S rRNA typing/ sequencing, SNPs and Pharmacogenomics; use of genomes to understand evolution of eukaryotes, track emerging diseases and design new drugs; determining gene location in genome sequence, Human and other vertebrate Genome, Personal genomics, The minimal genome and the Barcode of Life.
2. Transcriptome analysis for identification and functional annotation of gene, Contig assembly, chromosome walking and characterization of chromosomes, mining functional genes in genome, gene function- forward and reverse genetics, gene ethics; protein-protein and protein-DNA interactions; protein chips and functional proteomics; clinical and biomedical applications of proteomics; introduction to metabolomics, lipidomics, metagenomics and systems biology, concept of epigenome and epigenomics.
3. Managing and Distributing Genome Data: Web based servers and softwares for genome analysis: ENSEMBL, VISTA, UCSC Genome Browser, NCBI genome. Selected Model Organisms' Genomes and Databases.

UNIT-III

1. Introduction to protein structure, Chemical properties of proteins. Physical interactions that determine the property of proteins. Short-range interactions, electrostatic forces, van der waal interactions, hydrogen bonds, Hydrophobic interactions.
2. Determination of sizes (Sedimentation analysis, gel filtration, SDS-PAGE); Native PAGE, Determination of covalent structures Edman degradation.

UNIT-IV

1. Aims, strategies and challenges in proteomics; Protein separations, protein analyses, Quantitative proteomics, Identification and analysis of proteins by 2D gel electrophoresis, Isoelectric focusing, Spot visualization and picking, Tryptic digestion of protein and peptide fingerprinting;
2. Mass spectrometry, mass spectrum (base peak, molecular ion, fragment ion, metastable ion), Ion source (MALDI, electrospray, chemical ionization), mass analyzer (quadrupole, TOF, Ion trap); Detector (multiplier), Clinical proteomics, Protein-protein interaction: solid ELISA, pull-down assay, coimmunoprecipitation, yeast-two hybrid system, application, proteome databases.
3. Proteome analysis to drug development and toxicology, Phage antibodies as tools for proteomics.

Text Book

- ✓ Charles Malkoff, 2016. *Exploring Genomics, Proteomics and Bioinformatics*, Syrawood Publishing House.
- ✓ Liebler, D. C. (2002). *Introduction to Proteomics: Tools for the New Biology*. Totowa, NJ: umana Press.
- ✓ A. Malcolm Campbell *Discovering Genomics, Proteomics and Bioinformatics*, Pearson Education India; 2 edition

Suggested Readings

- ✓ Dunham, I., 2003. *Genome Mapping and sequencing*. Horizon Scientific.
- ✓ Graur, D and W H Li, 2000. *Fundamentals of molecular evolution*. Sinauer Associates.
- ✓ Hartwell, L. H., L. Hood, M. L. Goldberg, A. E. Reynolds, L. M. Silver and R. G. Veres. 2004. *Genetics from Genes to Genomes*. McGraw Hill.
- ✓ Robert Weaver, *Molecular Biology*, 5th Edition, McGraw-Hill, 2012.
- ✓ *Genomes*, by T.A. Brown, Garland Science, 3rd Edition, 2006
- ✓ Anthony J.F. Griffiths, Susan R. Wessler, Richard C. Lewontin, William M. Gelbart, David T. Suzuki, Jeffrey H. Miller, *An Introduction to Genetic Analysis*, Eleventh Edition,
- ✓ Primrose, S. B., Twyman, R. M., Primrose, S. B., & Primrose, S. B. (2006) *Principles of Gene Manipulation and Genomics*. Malden, MA: Blackwell Pub

Molecular Diagnosis

Course Objective:

This course aims to detect the genomic variants, aiming to facilitate detection variants, diagnosis and monitoring response to therapy.

Learning Outcome:

Students will be able to

- Perform molecular techniques including nucleic acid extraction.
- Get idea related to conventional and real-time PCR and sequencing techniques.
- Understand the concept of quality assurance in molecular diagnostics.

Unit-I

Historical Perspective of clinical diagnosis and molecular diagnostics; Nucleic acid based diagnosis: Extraction of Nucleic acids: sample collection, methods of extraction from various diagnostic materials, assessment of quality and quantity, storage; Nucleic acid hybridization: Blotting Techniques and their interpretations: Southern and Northern Blotting methods and applications in clinical diagnosis; Polymerase Chain Reaction: Principle, components, optimization and analysis of PCR products; PCR based methods for mutation detection and gene expression: Real Time PCR, Electrophoresis: PAGE; Application of electrophoresis in DNA Diagnosis- SSCP, heteroduplex analysis, denaturing gradient gel, detection of mismatched nucleotides/ RNA-DNA duplexes; RFLP and DNA sequencing.

Unit-II

Testing DNA variation for Disease association: SNPs; Methods of typing: Traditional approaches (PCR-Sequencing), Microchips (Affymetrix) and Taqman; Microarray in the analysis of gene expression; DNA microarray platforms: cDNA analysis, oligonucleotide arrays; Introduction to SAGE, CGH, array CGH and SNP arrays; Analysis of DNA methylation; Methylation in health and disease; Principle and inheritance DNA methylation in pathology and cancer; PCR based methods in detection of methylation; Primer Designing, Application of DNA methylation in disease diagnosis: cancer (malignancies) and imprinting disorders.

Unit-III

Flow Cytometry and LCM: Principle; Clinical applications: enumeration of peripheral blood cells in HIV infection and Immunophenotype Characterization in various blood disorders; Laser Capture Microdissection and separation of normal and aberrant cells: application and perspectives in molecular diagnostics; Molecular Cytogenetics: Chromosomal abnormalities and indications of chromosomal evaluation; Fluorescence in situ Hybridization; General Procedures of FISH, M-FISH, SKY and CGH; Clinical applications of FISH: Correlation with the pathobiology of the disease, disease prognosis and monitoring, correlation with molecular data; Protein based molecular diagnostics: Immunoproteomics and detection methods based on Antigen-Antibody interactions; ELISA; Western Blotting and Far Western Blotting applications and perspectives: Immunohistochemistry and Immunocytochemistry: Methods and interpretations: applications in tumor diagnosis and infectious diseases, Correlation with molecular data.

Unit-IV

Quality assurance in molecular diagnostics: Quality assessment, preanalytic, analytic and post analytic phases; Verification of Molecular Assays; Standards and Standardization of Molecular Diagnostics; Laboratory development of molecular diagnostics: Implementation, validation, verifications (analytical and clinical) quality control and quality assurance of the testing process; Examples of molecular diagnostics of some common genetic and non-genetic diseases (Trinucleotide Repeats: Fragile X Syndrome, DMD. Endocrine disorders- Diabetes mellitus, Cystic Fibrosis, Chronic Myeloid Leukemia, Human HIV-1.

Text Books:

- ✓ *WB Coleman and GJ Tsongalis, Molecular Diagnosis for the Clinical Laboratories, 2nd Edition, Human Press, 2006.*
- ✓ *2. Iankowski and Polak, Clinical Gene Analysis and Manipulation: Tools, Techniques and Troubleshooting, 1st Edition, Cambridge University Press, 1996.*
- ✓ *Francesco Falciani, Microarray Technology Through Applications, Taylor & Francis, 2007.*
- ✓ *Darby & Hewiston, In Situ Hybridization Protocols, Third edition, Humana Press, 2006.*
- ✓ *Sharpe & Carter, Genetic Testing, Care, Consent & Liability, Wiley-Liss, 2006.*

Geriatric Care and Counselling

Course Outcomes: The course aims at training students in skills to provide palliative and hospice care to the elderly and dependent senior citizens. Physical comfort and psychological counseling will instill in the elderly a sense of security, confidence, independence and desire to live. Physical, social and emotional supports are extremely essential to fight depression and loneliness to lead a meaningful life. Completion of the course will generate employment opportunities by providing home care services to the elderly population.

Unit I: Understanding Ageing

- (i) Concept of Ageing; Theories of Aging: Programmed Theory and Damage Theory, Ageism: Stereotypes and Prejudices towards old people; Successful ageing.
- ii) Mental and Behavioral issues in old age; Diseases during old age: Hypertension, Diabetes, Alzheimer's, Depression, and Dementia.

Learning outcome: The understanding of ageing, ageism along with health issues will prepare the learner for realistic perception about senior citizens.

Unit II: Counseling in Old age

- (i) Need and importance of counselling in old age; Issues in older adulthood: Retirement, loneliness, dependence, illness, disability, bereavement, and acceptance of death; Counselling the Aged.
- (ii) Promoting healthy ageing: Physical, Psychological, and Social Factors; Reducing Caregiver's stress and burnout: Self-care, Relaxation and Enjoyment

Learning outcome: The understanding of counselling needs will prepare the learner for extending care and counseling for the aged as well as the caregivers.

Practical

- (i) **Bed-side Care giving:** Acquiring Skills in Bed making, Personal hygiene/brushing teeth/combing/shaving, Sponging and bathing, Changing position, Measuring Temperature/Pulse/B.P./Respiration, Back care, Propped up position, Usage of bed pan/urinal /diapers, Nebulisation, Steam inhalation, Small dressing.
- (ii) **Understanding lived experience**

Student will prepare a case report on the lived experience of an elderly person based on personal meeting in the field. The report will include the objective of the field work, method of data collection and analysis, and the summary of analysis and interpretation to reflect their understanding about old age experiences and possibility of extending care.

Learning outcome: Hands-on experience with regard to bedside care as well as direct interaction with older adult will provide adequate exposure to the students.

Text Books / Readings

- ✓ *Human Development: D. E. Papalia , S.W. Olds & R.D Feldman, McGraw-Hill Publishing*
- ✓ *Introduction to Health Psychology-Linda Brannon, Jess Feist, Wadsworth Publishing*
- ✓ *Positive Psychology (The Scientific and Practical Explorations of Human Strengths): C.R.Snyder S.J. Lopez & J.T. Pedrotti, Sage Publication*
- ✓ *Counselling: A comprehensive profession, Gladding, S.T., Pearson publication*
- ✓ *Promoting Healthy Aging: Physical, Psychological, and Social Factors: Grace Rhine, <https://www.apa.org/ed/precollege/topss/2017-grace-rhine.pdf>*

Reference Books:

- ✓ *Life Span Human Development : C.K. Sigelman, Wadsworth, Inc*
- ✓ *Sukhamayabarddhakya; J.P.Das & Geeta Das; A K Mishra Publishers*
- ✓ *Sunset years of life : A multi-dimensional study of rural elderly by Chakrabarti, Prafulla, Urbee Prakashan,*
- ✓ *Health psychology-Shelly. E. Taylor, McGraw-Hill;*
- ✓ *Counselling and Psychotherapy with older people: Paul Terry, Palgrave Macmillan publishers*

Basic Counseling Skills

Course Outcomes:

- To help student understanding the basics of counselling for mental health and the core imperatives of a counsellor.
- To gain basic knowledge on counselling relationship building with clients and understanding basic counselling skills.
- Helping students to gain knowledge on current counselling approaches and application of counselling among youth.

Unit- I: Counselling Basics:

- **Counselling Basics:** Definition, Goals and Scope of Counselling, Building Counselling Relationships: Rapport Building, Trust, Confidentiality
- **Counselling Process:** Counselling Interview, Qualities of an Effective Counsellor, Ethics in Counselling.

Suggested Activity: *Trust Walk/Trust Fall*

Learning Outcome:

- Students will be able to gain knowledge on basics of counselling and develop insight about the role of a counsellor.

Unit- II: Micro Skills and Key Issues in Counselling:

Micro Skills: Active Listening, Paraphrasing, Reflecting and Summarizing; Questioning and Exploration Skills

Key Issues in Counselling: Transference, Counter-transference, Confrontation, Termination

Suggested Activity: *Role Plays & Video Analysis*

Learning Outcome:

- Students will be able to acquire knowledge on some key issues in counselling and basic counselling skills required for a counsellor

Unit- III: Current Counselling Practices and Applications of Counselling among youth

Counselling Approach: Behavioural Counselling, Cognitive Behavioural Approach (CBT)

Application of Counselling: Dealing with problem among Adolescents/young adults: Substance Abuse, Relationship Issues and Career Issues

Suggested Activity: *Case Study Analysis*

Learning Outcome:

- Students will have basic ideas about current counselling practices and application of counselling in dealing with issues of adolescents/young adults.

Text Books:

- ✓ Gladding, S.T. (2009). *Counselling: A comprehensive profession (6th Ed.)*. New Delhi: Pearson India
- ✓ Margaret H. (2014). *Counselling Skills and Theory (4th Ed.)*. Hodder Education

Reference Books:

- ✓ Seligman. L. and Reichenberg. L. W (2019). *Theories of Counselling and Psychotherapy*, Pearson India Education Services Pvt. Ltd.
- ✓ Hawton K., Paul. M. S., Kirk J. & Clark D. M. (1989) *Cognitive Behaviour Therapy for Psychiatric Problems: A Practical Guide*, Oxford University Press
- ✓ Burnard Philip. (1995). *Counselling Skills Training – A sourcebook of Activities*. New Delhi: Viva Books Private Limited.
- ✓ Barki B.G. & Mukhyopadhyay B (2008), *Guidance and Counselling; A Manual 10th reprint*, Sterling
- ✓ Feltham, C and Horton, I. (2000). *Handbook of Counselling and Psychotherapy*. London: Sage.
- ✓ Nelson-Jones. (1995). *The theory and practice of counselling*. 2ndEdn. London: Holt, Rinehart and Winston Ltd

Course Outcomes: The course will result in sharing knowledge about the basics of sports psychology, understanding the role of motivation in sports, making the students understand the role of arousal, anxiety and stress in sports performance, and understanding about the basic concepts of personality and its role in sports performance.

UNIT-I: Basics of Sport Psychology

Meaning, Definition, Importance and Scope of Sport Psychology; Historical Development, History of Sports Psychology in India; Methods in Sports Psychology; Role of Sports Psychologist

Learning Outcome: Students will be able to understand the basics of sports psychology.

UNIT-II: Motivation and Leadership

Types of motivation and their implications in Sports; Motivation-Performance Relationship; Achievement Motivation and Competitiveness, Group dynamics and leadership in sports.

Learning Outcome: Student will be able to define the role of motivation and group dynamics in sports.

UNIT-III: Stress and Anxiety in Sports: Definitions and meaning of stress and anxiety; Sources of Stress and Anxiety; Coping with stress; Management of Anxiety; Arousal- Performance Relationship in Sports

Learning Outcome: Student will be able to relate to the role of arousal, anxiety and stress in sports performance.

Text Books:

- ✓ Ciccarelli, S. K & Meyer, G.E (2008). *Psychology*. New Delhi: Pearson.
- ✓ Cox, R. (2006). *Sport Psychology*. McGraw-Hill Education.
- ✓ Glassman, W. E. (2000). *Approaches to Psychology*. Buckingham: Open University Press.

Reference Books:

- ✓ *Applied Psychology* by Smarak Swain, New Vishal Publications, New Delhi.
- ✓ Jarvis, M. (2006). *Sport Psychology: A Students handbook*. Rutledge.
- ✓ Morgan, C. (2017). *Introduction to Psychology*. McGraw Hill Education.
- ✓ Passer, M.W., Smith, R.E., Holt, N. & Bremner, A. (2008). *Psychology: The Science of Mind and Behavior*. McGraw-Hill Education. UK
- ✓ Perry, J. (2016). *Sports Psychology: A Complete Introduction*. Kindle Edition.
- ✓ Robbins, J. E & Madrigal, L. (2016). *Sport, Exercise and Performance Psychology*. Springer Publisher Company.
- ✓ Weinberg, R. S., & Gould, D. (1995). *Foundations of Sport and Exercise Psychology*. Champaign, IL: Human Kinetics.

Early Childhood Education

Course Outcomes: The completion of this course will result in understanding of fundamental learning processes and mechanisms involved during early childhood years that has important repercussion on cognitive, linguistic, and psychosocial maturity of a child. Since it is important for both parents and teachers to understand their role in early stimulation without burdening the young mind, this course is meant for all students in general and aspiring preschool professionals in particular.

Unit-I: Introduction to Early Childhood Education

(i) Meaning, significance and objectives of Early Childhood Education (ECE); Issues Influencing the Practice of Early Childhood Education, Understanding child's rights to recognize young children as participants in their own development to create responsive environments

(ii) Significance of Play; Programme planning and evaluation in early childhood education

Learning Outcome: The knowledge regarding background and concept of ECE will be acquired along with child right perspective.

Unit –II: Role of family and teacher in childhood

(i) Role of parents: Critical years of learning of a child; preparing enriched environment for infants and toddlers; children with disabilities; culturally appropriate practices.

(ii) Role of Teachers: Preschool years and goals of preschool, school readiness and holistic development of a child; children with special needs and inclusive classroom

Learning Outcome: Students will be clear about the role and contribution of family and teachers during childhood.

Practical (Any two)

(i) Conduct a case study of a child from Anganwadi / pre-school regarding her participation in classroom learning activities.

(ii) Visit a preschool and write a detailed report on its use of early stimulation learning aids.

(iii) Visit a preschool for special children and prepare a report on its teaching-learning practices.

Text Books:

- ✓ Fundamentals of Early Childhood Education, 9th Edition, G. S Morrison, and Mary Jean Woke, L. Griffin, Pearson Education, 2021.
- ✓ Introduction to Early Childhood Education: Preschool Through Primary Grades, by Jo Ann Brewer, Sixth Edition, Pearson New International Edition, 2014
https://api.pageplace.de/preview/DT0400.9781292052113_A24582025/preview-9781292052113_A24582025.pdf
- ✓ Early Childhood Education: An Introduction, R.Kapoor, R.Soni & K.K. Vasishta, 2021
<https://ncert.nic.in/dee/pdf/Earlychildhood.pdf> . NCERT, New Delhi

Reference:

- ✓ National Early Childhood Care and Education (ECCE) Curriculum Framework, Ministry of Women and Child Development, Govt of India, 2023
https://wcd.nic.in/sites/default/files/national_ecce_curr_framework_final_03022014%20%282%29_1.pdf

Unit-I Gayatri- Mantrah, Sajyatyagah, Tulasi Cayanavidhih, Puspa Cayanavidhih, Deha Suddhih, Asanasuddhih, karanyasah, Anganyasah, Pacopacarapuja.

Unit-II Kalasapuja, Samkalpah, Dasopacara Puja, Ganesha Puja.

Unit-III Homavidhih, Sodaopacara Puja, Saraswati Puja.

Unit-IV Vivahavidhih.

Core Readings:

- ✓ Nityakarma o Istapuja, Ed. Visnu Charan Mishra, Gitayana Press & Publications, Mahanadi Vihar, Cuttack, 2006.
- ✓ Paurohitya Karmapaddhati, Ramadasa Tripathy, MLBD, Delhi, 2008

Suggested Readings:

- ✓ *Nityakarma Pujaprakash, Lalvihari Mishra, Gita Press, Gorakhpur*

Unit-I Patanjali Yogasutra (Samadhipada: Atha Yoganusasanam, Yogascittavrttinirodhah, Pramana-Viparyaya-Vikalpa-Nidra-Smrtayah, Pratyaksanumanagamah Pramanani, Viparyayo Mithyajnanamatadrupapratistham.

Unit-II Sabdajnananupati Vastosunyo Vikalpah, Abhavapratyayalambana vrttinidra, Anubhuta-visayasampramosah Smrtih, Abhyasavairagyabhyam tannirodhah, Tatra sthithau Yatno'bhyasah, Drstanusravikavisayavitrnsasya vasikarasanjna Vairagyam.

Unit-III Asanas: Suryanamaskara, Siddhasana, Padmasana, Baddha Padmasana, Yogamudra, Vajrasana and Savasana.

Unit-IV Bandha & Pranayama: Mulabandha, Uddyanabandha, Jalandharabandha, Mahamudra, Recaka Kumbhaka, Puraka Kumbhaka.

Core Readings:

- ✓ *Patanjala Yogadarsan, Ramashankar Tripathy, Chaukhamba Krishnadasa Academy, Varanasi, 2013*
- ✓ *Hathayoga pradeepika, SMYM Samiti, Kaivalyadhama, Lonavala, 1998*

Suggested Readings:

- ✓ *Asana, Pranayama, Mudra, Bandha , Swami Satyananda Saraswati, Bihar School of Yoga, Munger*
- ✓ *Yogasana Vijnana, Swami Dharendra Brahmachari, Dharendra Yoga Publications, New Delhi, 1953.*
- ✓ *Suryanamaskara, Swami Satynanda Saraswati, Bihar School of Yoga, Munger, 1983.*

Introduction:

This course on applied philosophy is devoted to discovering how philosophical theories, principles, and methods can be applied to real-world issues and practical domains. After going through this, students may be able to apply philosophical thinking can be applied to a wide range of practical issues and domains. They would be equipped with the analytical skills, critical thinking abilities, and ethical awareness needed to engage with real-world problems and contribute to positive social change.

Course Description:

Gandhian applied philosophy refers to the practical application of the principles and teachings of Mohandas Karam Chand Gandhi or Mahatma Gandhi in various aspects of life, including politics, economics, social welfare, and personal conduct. Here are some key principles of Gandhian applied philosophy and how they can be applied

Course Outcomes:

After completing this course,

- Students will indiscriminately benefit from the Philosophical ideas of Gandhi and their applications.
- They will be inspired by Gandhi's ideal as well as activism which is the outcome of his experiments. Gandhi's concepts of Democratic socialism, Truth, and ahimsa and their unmistakable adoption in his life will influence the students to lead a perfect social moral, and spiritual life.

Unit- I: Application of Gandhian Ethics: Satyagraha (Truth Force), Sarvodaya (Welfare of All): Ahimsa (Nonviolence): Satyam Eva Jayate (Truth Alone Triumphs). These concepts will be taught with explications of applications by Gandhi ji.

Unit-II: Gandhi's struggle for a Just Society, Equality and Human Freedom., uplifting the downtrodden, abolition of untouchability, Constructive Programmes for Swachhata (Cleanliness), against social Evils, cast, and other discriminations, will be taught with examples from his life.

Unit-III: Gandhi's promotion of the Cottage Industry, Swavalambana sīlata (Self-Reliance), Swadeshi, Criticism of industrial civilization, Grama Swaraj, and Trusteeship, will be taught with examples.

Unit –IV: Gandhi's Experimentalism, Method of Social Action, Kinds of Satyagraha, Methods of Satyagraha. Ideals of Education: Basic Norms & Method of Education, Education for a Happier & Peaceful Society. World Peace.

Prescribed Books:

- ✓ The Philosophy of Mahatma Gandhi, by D.M Datta
- ✓ Social & Political Thought of M.K. Gandhi- Jaya Tanuja Bandopadhyay

Reference Books-

- ✓ *"The Moral and Political Thought of Mahatma Gandhi"* by Raghavan Iyer.
- ✓ *"Gandhi: His Life and Message for the World"* by Louis Fischer
- ✓ *"Gandhi: An Autobiography - The Story of My Experiments with Truth"* translated by Mahadev Desai
- ✓ *"Gandhi Today: A Report on India's Gandhi Movement and Its Experiments in Nonviolence and Small Scale Alternatives"* by Mark Shepard.

- ✓ *"Gandhi's Philosophy and the Quest for Harmony" by Anthony J. Parel*
- ✓ *"The Essential Writings of Mahatma Gandhi" edited by Judith M. Brown*
- ✓ *"Gandhi and Beyond: Nonviolence for a New Political Age" by David Cortright*

Sample Questions: 1 for Part- I Objective; Part- II Very Short Type (in 50 Words); Par-III Short Type (in 250 Words); Par-IV Long Type (in 800 Words);

Unit I

1. Satyagraha is advocated by _____.
2. What is the meaning of Satyam Eva Jayate?
3. What is Non-violence according to Gandhi? Describe.
4. How satyagraha is related to present-day life? Describe.

Unit II

1. God is truth and truth is God is said by _____.
- 2.. What is social order according to Gandhi?
3. How did Gandhi fight against social evil?
4. Elaborate on Gandhi's concept of a just society.

Unit III

1. Sarvodaya means _____.
2. What does Gandhi mean by Gram Swaraj?
3. What is trusteeship?
4. How did Gandhi criticize industrial civilization at that time?

Unit IV

1. Satyagraha is Gandhi's philosophy of _____ resistance.
2. What are the kinds of Satyagraha?
3. Discuss Gandi's view on Basic education.
4. Elaborate Gandhi's view on world peace.

Moral Dimensions of Environmental Issues

Introduction:

This course on the moral dimensions of environmental issues is intended to enable students to develop ethical considerations and apply values, and principles underlying human interactions with the natural world. Students will learn to apply the moral dimensions of environmental issues and the ethical principles and values that inform environmental decision-making and action. They would be equipped with the knowledge and skills needed to critically engage with environmental challenges and contribute to ethical and sustainable solutions.

Course Description: This course offers an in-depth examination of the ethical considerations and moral dilemmas surrounding human interactions with the environment. Through interdisciplinary perspectives, students will explore philosophical, cultural, and socio-political aspects of environmental ethics, addressing topics such as biodiversity conservation, climate change, environmental justice, sustainability, and ecological stewardship.

Course Outcomes:

This course aims to provide students with a comprehensive understanding of environmental ethics, empowering them to critically engage with environmental challenges and contribute to the development of ethical solutions for a sustainable and just future. It will enable,

- To understand the foundational principles and theories of environmental ethics.
- To critically analyze ethical dilemmas and conflicts arising from human-environment relationships.
- To explore the intersections of ethics, policy, and environmental decision-making.
- To cultivate a sense of environmental responsibility and ethical stewardship.
- To engage in ethical reasoning and decision-making processes to address environmental challenges.

Learning Outcomes:

Unit -1

This unit will Introduce Environmental Ethics, Define the scope of environmental ethics
Historical development and key concepts

Unit - 2

- This unit will enable me to have preliminary knowledge of value systems associated with the environment and to recognize the Ethical Theories applicable to Environmental Values, like Utilitarianism, deontology, virtue ethics, and their application to environmental issues and Intrinsic value vs. instrumental value of nature

Unit -3

This unit introduces the Human-centered vs. life-centered vs. ecosystem-centered ethical perspectives

Unit-4.

This unit will impart righteous judging capabilities to the students.

Course Components:

Unit- 1 A. Environmental Theories: Anthropocentrism, Biocentrism, and Ecocentrism

Rights of nature and legal personhood for ecosystems; Environmental Justice, Principles of justice in environmental decision-making, Environmental racism, equity, and distributional impacts: Sustainability and Intergenerational Ethics, Ethical considerations in sustainable development, Responsibilities to future generations and intergenerational justice

Unit – 2 Biodiversity Conservation and Animal Ethics: Ethical implications of species extinction and habitat destruction, Animal rights, welfare, and ethical treatment of animals, Climate Change Ethics, Ethical dimensions of climate change mitigation and adaptation.

Unit 3. Responsibilities of individuals, nations, and corporations: Environmental Ethics in Policy and Practice, Ethical dilemmas in environmental policy-making and resource management, Corporate social responsibility, and environmental ethics in business.

Unit-4. Environmental Ethics: Environmental Virtue Ethics, cultivating ethical virtues for environmental stewardship, Role models and exemplars in environmental ethics, Ethical Activism and Advocacy, Strategies for promoting environmental awareness and engagement, Role of civil society, NGOs, and grassroots movements in environmental advocacy

Recommended Textbooks:

- ✓ *"Environmental Ethics: An Introduction to Environmental Philosophy" by Joseph R. DesJardins*
- ✓ *"Environmental Ethics: Readings in Theory and Application" edited by Louis P. Pojman and Paul Pojman*
- ✓ *"Environmental Ethics: Concepts, Policy, and Theory" by Donald VandeVeer and Christine Pierce*
- ✓ *"Ethics and the Environment: An Introduction" by Dale Jamieson*
- ✓ *"The Ethics of the Environment" by Robin Attfield*

Reference Books:

- ✓ *"Environmental Ethics: An Anthology" edited by Andrew Light and Holmes Rolston III*
- ✓ *"Environmental Philosophy: From Animal Rights to Radical Ecology" by Michael E. Zimmerman et al.*

E-Resources

- ✓ Stanford Encyclopedia of Philosophy - Environmental Ethics.
- ✓ Internet Encyclopedia of Philosophy - Environmental Ethics
- ✓ Ethical Theory and Moral Practice Journal
- ✓ Environmental Ethics Journal
- ✓ The International Society for Environmental Ethics (ISEE)

Sample Questions: 1 for Part- I Objective; Part- II Very Short Type (in 50 Words); Par-III Short Type (in 250 Words); Par-IV Long Type (in 800 Words);

Unit I

1. According to Anthropocentrism who are more important?

2. Difference between Biocentrism and Ecocentrism
3. What is Environmental racism?
4. Explain, What are the Responsibilities to future generations and intergenerational justice.

Unit II

1. Write one Bio-diversity Conservation in Odisha.
2. The book Animal Rights is written by whom & how ethics is related to animal rights?
3. How ethics can solve the problem of Climate change?
4. Discuss Ethical dimensions of climate change mitigation and adaptation.

Unit III

1. Write down the name of one Environmentalist.
2. What is CSR?
3. Define Environmental Ethics in Policy and Practice.
4. What are the responsibilities of Individuals in the context of environmental Ethics?

Unit IV

1. Peter Singer is related to _____ ethics.
2. what is ethical activism?
3. How can we apply ethical principles in the context of the environment?
4. Elaborate Role models and exemplars in environmental ethics...

Introduction:

This course on Kautilya, (Chanakya), focuses on his contributions to Philosophical and political theory, statecraft, and governance in ancient India. Students will have a fair understanding of Kautilya's philosophy and political thought as presented in the Arthashastra. They would be equipped with the knowledge and analytical tools needed to critically engage with Kautilyan's ideas and their implications for political theory and practice.

Course Outcome:

This course provides a comprehensive examination of Kautilya's Arthashastra, a classical Indian treatise on statecraft, economics, and political philosophy. Students will explore Kautilya's theories of governance, diplomacy, and ethical leadership, and their relevance to contemporary political discourse.

Learning Outcomes:

Unit- 1 Overview of Kautilya and his achievements amidst all adversity may encourage the students to keep up resilience.

Unit- 2 Kautilya's Governance may introduce the service model of governance and not a ruling mode of governance.

Unit- 3 Knowledge of Kautilya's Economic and Administrative system

Unit- 4 Kautilya's Political Systems.

Unit-I

A. Introduction to Kautilya and the Arthashastra, Historical context and background of Kautilya, Overview of the Arthashastra and its significance in Indian political thought;

B. Kautilyan Political Philosophy: Fundamental concepts of Kautilya's political philosophy: raja-dharma (duties of a king) and *danḍaniti* (policy of punishment)

Comparison with other Indian philosophical traditions and Western political theory

Unit II

A. Kautilya's principles of statecraft and governance: Analysis of the roles and responsibilities of the king, ministers, and officials in the administration, Kautilya's ethical principles for rulers and administrators:

Discussion of ethical dilemmas and moral responsibilities in governance

B. Kautilya's economic theories and policies: taxation, revenue generation, and public expenditure in the Arthashastra. Kautilya's approach to diplomacy and international relations

Strategies for dealing with foreign powers, alliances, and warfare

Unit III

Kautilya's legal system and principles of justice: Analysis of criminal law, civil law, and administration of justice in ancient India

Unit IV

A. Application of Kautilyan Principles: Contemporary relevance of Kautilya's ideas in politics, governance, and leadership, Case studies and discussions on applying Kautilyan principles to modern-day challenges

B. Comparative Perspectives: Comparison of Kautilya's political thought with other classical and modern political theories, Exploration of similarities and differences in approaches to governance and statecraft.

C. Critiques and Interpretations: Critiques of Kautilya's ideas from historical and contemporary perspectives, Interpretations, and debates among scholars on the meaning and intent of the Arthashastra.

D. The text Chanakya Niti to be studied and the verses and their meanings may be used wherever applicable.

Textbooks:

- ✓ *"The Arthashastra" translated by Patrick Olivelle*
- ✓ *"Kautilya's Arthashastra: A Philosophical and Scientific Treatise on Public Administration" by R.P. Kangle*
- ✓ *"Kautilya's Arthashastra: The Way of Financial Management and Economic Governance" by Shamasastri R.*

Reference Books

- ✓ "Kautilya's Arthashastra: Philosophy of Strategy" by Avinash Dharmadhikari
- "Kautilya and His Arthashastra" by R. Shamasastri
- "Kautilya's Arthashastra: A Critical Study" by Ramkrishna Mukherjee
- "Kautilya: the True Founder of Economics" by Balbir S. Sihag
- "Kautilya's Arthashastra: An Intellectual Portrait" by Roger Boesche

E-Resources:

https://drive.google.com/file/d/1lROGV6o_Pp-oMiq9mvt1hifghipS6nQX/view?pli=1
<https://www.epaperpdf.com/chanakya-neeti-pdf-download/>

Sample Questions: 1 for Part- I Objective; Part- II Very Short Type (in 50 Words); Par-III Short Type (in 250 Words); Par-IV Long Type (in 800 Words);

Unit I

1. Anvikṣiki means _____.
2. Why Kautilya was so famous?
3. Which dynasty was established by Kautilya? Elaborate with historical context
4. What are the main contentions of Kautilya's work? Describe.

Unit II

1. _____ is the other name of Kautilya.
- 2.. What is the ethical dilemma?
3. What is Rajadharma of Kautilya?
4. Elaborate Dandaniti of Kautilya.

Unit III

1. _____ was the king of Magadha at the time of Kautilya.

2. What were the systems of Kautilya?
3. Describe Kautilyān Leadership?
4. Compare the Kautilyan Admi administration with that of the Modern Day.

Unit IV

1. Satyagraha is Gandhi's philosophy of _____ resistance.
2. Why Kautilya is so adored?
3. Discuss the Kautilya Niti.
4. Elaborate on Kautilya's viewpoint of the Roles of administrators.

Social Statistics and Computer Applications

Statistics is numerically expressed. In those numbers the social scientist tries to find trends of events so that shape critical thinking, evaluate policies, and take informed decisions. Numbers do not speak for themselves, but they need to be contextualized to unravel degrees of inequality and vulnerability among groups. They can be used for better understanding every aspect of society by finding trends among human population.

Course Outcome:

This course would help students develop skills on social statistical techniques and computer applications enhancing their chances of employability.

Unit I: Measures of Central Tendency

- Data: Meaning, Nature, Types
- Mean: Computation, Types, Merits and Limitations
- Median: Computation, Partition Value, Merits and Limitations
- Mode: Computation, Properties, Merits and Limitations

Learning Outcomes:

- Measures of central tendency informs us on a value that works as a reference point for comparing and understanding human population better. Students would learn to calculate the measures of central tendency.

Unit II Measures of Dispersion

- Mean Deviation
- Standard Deviation
- Coefficient of Variation
- Lorenz Curve and Ginni's Coefficient of concentration

Learning Outcomes:

Measures of dispersion informs us on the limitations of measures of central tendency and tells us on the significance of working on variations around a central value.

Unit III Skewness, Kurtosis Correlation and Regression Analysis

- Skewness, Kurtosis
- Bivariate distributions, Characteristics of Association,
- Chi square, t-test, Analysis of Variance,
- Correlation and Regression.

Learning Outcomes:

- Correlation and regression are statistical measurements that informs us about the definite relation between two variables. This unit would help students develop the skills of calculating them and understanding the nature of relationship between variables.

Unit IV Computer application in social science research

- Introduction to Computer Applications: MS Word, Excel, Powerpoint.
- Macro data analysis and computer application: Excel, Stata.
- Methods and use of macro-statistics and secondary sources: Analysis of Data published by Census of India, NSSO.
- Application of Computers in Social research (e.g. SPSS).

Learning Outcomes:

- This unit helps students learn about the basic computer applications that macro data and data from secondary sources could be analysed. This unit can provide the skills to social science students to use computer applications for social science research.

Lesson Plan

Unit	Thrust Areas	Method	Total No. of Classes	References
I	Measures of Central Tendency Data: Meaning, Nature, Types Mean: Computation, Types, Merits and Limitations Median: Computation, Partition Value, Merits and Limitations Mode: Computation, Properties, Merits and Limitations	Theoretical and Tutorial Class	15	Babbie, E. R. (2020). <i>The practice of social research</i> . United States: Cengage. (Chapter 13 and 14). Judith Handel. 1978. <i>Introductory Statistics for Sociology</i> . NJ: Prentice- Hall Inc. (Chapter 7)
II.	Measures of Dispersion Mean Deviation Standard Deviation Coefficient of Variation Lorenz Curve and	Theoretical and Tutorial Class	15	Babbie, E. R. (2020). <i>The practice of social research</i> . United States: Cengage. (Chapter 14) Judith Handel. 1978. <i>Introductory Statistics for Sociology</i> . NJ: Prentice- Hall Inc. (Chapter 8 and 9)

	Ginni's Coefficient of concentration			
III	Skewness, Kurtosis Correlation and Regression Analysis Skewness, Kurtosis Bivariate distributions, Characteristics of Association, Chi square, t-test, Analysis of Variance, Correlation and Regression.	Theoretical and Tutorial Class	15	Babbie, E. R. (2020). <i>The practice of social research</i> . United States: Cengage. (Chapter 16) Judith Handel. 1978. <i>Introductory Statistics for Sociology</i> . NJ: Prentice- Hall Inc. (Chapter 14, 15, 23 and 24)
IV	Computer application in social science research Introduction to Computer Applications: MS Word, Excel, Powerpoint. Macro data analysis and computer application: Excel, Stata. Methods and use of macro-statistics and secondary sources: Analysis of Data published by Census of India, NSSO. Application of Computers in Social research (e.g. SPSS).	Theoretical and Tutorial Class	15	Babbie, E., Halley, F., & Zaino, J. (2007). <i>Adventures in social research: data analysis using SPSS 14.0 and 15.0 for Windows</i> . Pine Forge Press. Computer Applications in Social Science Research, IGNOU. Link: https://egyankosh.ac.in/bitstream/123456789/63507/2/Unit-16.pdf

Text Books:

- ✓ Babbie, E. R. (2020). *The practice of social research*. United States: Cengage.
- ✓ Judith Handel. 1978. *Introductory Statistics for Sociology*. NJ: Prentice- Hall Inc.

- ✓ Babbie, E., Halley, F., & Zaino, J. (2007). *Adventures in social research: data analysis using SPSS 14.0 and 15.0 for Windows*. Pine Forge Press.
- ✓ Singh, A.K. (2022). *Tests, measurements and research methods in behavioural sciences*. New Delhi: Bharati Bhawan Publishers and Distributors.

Reference Books:

- ✓ Anthony Capon, J.1988. *Elementary Statistics for the Social Sciences*. Wadsworth Publishers.
- ✓ Bryman, Alan. 1988. *Quality and Quantity in Social Research*, London: Unwin.
- ✓ De Vaus, David. 2002. *Analysing Social Science Data: 50 Key Problems in Data Analysis*, New Delhi, Sage Publications.
- ✓ Irvine, J., I. Miles and J. Evans (eds.) 1979. *Demystifying Social Statistics*, London: Pluto Press.
- ✓ Madge, John. 1970. *The Origins of Scientific Sociology*. London: Tavistock.
- ✓ Marsh, Catherine. 1988. *Exploring Data*. Cambridge: Polity Press

E-resources:

1. Computer Applications in Social Science Research, IGNOU.
Link: <https://egyankosh.ac.in/bitstream/123456789/63507/2/Unit-16.pdf>

Sample Questions

Part-I

Fill in the Blanks (1x12)

- (a) The Gini coefficient is a statistical measure of _____ in a population.

Part-II

Answer any 8 questions within two or three sentences. (2x8)

- (a) Define mean.

Part -III

Answer any 8 questions within 75 words each. (3x8)

- (a) What are the limitations of Median?

Part-IV

Answer all the within 500 words each. (7x4)

- (a) Explain the procedure for computing mean and standard deviation in excel.

Climate Change and Disaster Risk Reduction

Course Objectives

- To understand the challenges of climate change
- To gain a comprehensive understanding of the Disaster Management Cycle.
- To get acquainted with disaster management policies and laws in India.
- To discuss community-based disaster management practices and understand disaster risk and vulnerability.

Teaching Learning Process

- Lecture
- Assignment
- Individual and Group Presentation

Learning Outcomes

- Able to examine the impacts of climate change globally and particularly in Odisha, and to understand the relationship between the greenhouse effect, climate change, and various types of disasters.
- Able to demonstrate awareness of policies and Laws
- Able to analyze social dimensions of climate change and disasters

Unit I: Climate Change and Disaster

- Concept, nature, and severity of climate change. Causes of climate change. SDGs- 13: Climate Action. Impact of climate change: globally in general and Odisha in particular. Greenhouse effect, climate change and disaster.
- Definition, Types of disaster (natural and manmade disaster), mining disaster, tropical cyclone, flood, lightning, forest fire, earthquake, and Tsunami.

Unit II: Disaster Management Cycle:

- Disaster phase, Response phase, Recovery phase, Risk reduction phase, Preparedness phase. The Process of Disaster Management: mitigation, preparedness, response, and recovery.
- Sendai Framework for DRR: 2015- 2030

Unit III: Disaster Management Laws, Policy, and Institution:

National Disaster Management Act (2005), National Policy on Disaster Management (2009), National Disaster Management Agency (NDMA), State Disaster management Agency (SDMA), National Disaster Response Force (NDRF), National Institute of Disaster Management (NIDM), India Disaster Resource Network (IDRN). The role of INGOs and NGOs.

Unit IV: Disaster Risk Reduction (DRR) Fundamentals

Community based disaster management practices (case studies). Understanding disaster risk and vulnerability. Disaster Warning and Evacuation: Factors influencing evacuation. Social dimensions of climate change and disasters. Gender responsive approaches in DRR.

Reading List:

- ✓ Anandha Kumar K.J and Ajinder Walia (2013) *India Disaster Report*, NIDM: New Delhi.

- ✓ *Community Based Disaster Preparedness (2013) Course Book*, Assam State Disaster Management Authority & Doctors For You
- ✓ Gupta. Anil K et, al (Ed) (2014). *Training Module Mainstreaming Climate Change Adaptation and Disaster Risk Reduction into District Level Development Plans*, NIDM: New Delhi.
- ✓ Gadnayak, B B and Routray, J K (2010), *A path to disaster resilient communities*, Lambert Publishing Academy, Germany. <https://www.lappublishing.com/catalog/details/store/hu/book/978-3-8433-6666-3/a-path-to-disaster-resilientcommunities?search=Bibhuti%20Bhusan%20Gadanayak>
- ✓ *National Policy on Disaster Management (2009)*, NDMA, Government of India, New Delhi <file:///C:/Users/User/Downloads/national-dm-policy2009.pdf>
- ✓ *National Disaster Management Act (2005)*, NDMA, Government of India, New Delhi file:///C:/Users/User/Downloads/DM_act2005.pdf
- ✓ *State Disaster Management Policy (2005)*, Government of Orissa Revenue Department, Odisha <https://www.osdma.org/plan-and-policy/state-disaster-management-plan/#gsc.tab=0>
- ✓ *Odisha State Action Plan on Climate Change (2018-23)*, Forest & Environment Department Government of Odisha 3 <file:///C:/Users/User/Downloads/State%20Action%20Plan%20on%20Climate%20Change%202018-23.pdf>
- ✓ *Building Disaster Risk Reduction in Asia: A Way Forward ADPC Looks Ahead To 2015* <file:///C:/Users/User/Downloads/kobe.pdf>
- ✓ *Disaster Risk Reduction Information Kit for Media, Scaling-up Community-Based Disaster Risk Reduction in Lao PDR* file:///C:/Users/User/Downloads/2016-pt37Na-ADPCInformation_Kit_for_Media_Lao_PDR.pdf
- ✓ Satendra and Kaushik. D (2013) *Forest Fire Disaster Management* NIDM: New Delhi.
- ✓ *Disaster Risk Reduction in the United Nations (2009) Roles, mandates and areas of work of key United Nations entities*, UNISDR. file:///C:/Users/User/Downloads/9866_DisasterRiskReductionintheUnitedNat.pdf
- ✓ Vogelbacher (2013) *Flood Disaster Risk Management* NIDM: New Delhi.
- ✓ Kaushik. A.D. (2012) *Flood Risk Mitigation and Management: A Training of Trainers Module*, NIDM: New Delhi.
- ✓ *Major epidemic and pandemic diseases* <file:///C:/Users/User/Downloads/12-EPIDEMIC-HR.pdf>
- ✓ *Noncommunicable diseases & Communicable diseases* <https://www.who.int/our-work/communicable-and-noncommunicable-diseases-and-mentalhealth>
- ✓ Kaushik. A.D. (2012) *Flood Risk Mitigation and Management: A Training of Trainers Module*, NIDM: New Delhi.

Understanding the Constitution of India

Course Objectives

- To understand the constitutional values embodied in the preamble and the unique features of the Indian Constitution
- Understand the institutions of government and politics and distinguish between government and governance
- Appreciate the importance of Democracy
- To highlight the professional responsibility of social workers to address systemic discrimination and inequality through political action.

Teaching Learning Process

- Lecture
- Assignment
- Individual and Group Presentation

Learning Outcomes

- Able to assess the challenges to democracy, such as the role of caste, religion, regionalism, and issues surrounding press freedom and elections.
- Able to define governance and differentiate it from government
- Able to cover the domains of political social work, including engagement in political processes, influencing policy, and participation in governance at various levels.

Unit – I: The Constitution of India

Constitutional Values embodied in the preamble to the constitution of India. The unique features of the constitution of India- Division and balance of powers between the Legislature, Executive and Judiciary, Federalism, Protective Discrimination- Scheduled Areas (Part X of the Constitution) and Reservations (Part XVI of the Constitution)

Unit-II: Democracy

India as a constitutional democracy. Principles of Democracy. Dimensions of Democracy: Social, Economic and Political. Decentralization: 73rd and 74th Constitutional Amendment Acts. Challenges to Democracy: Role of Caste, religion, and regionalism, Control of press freedom. Elections: Duties of a citizen.

Unit-III: Governance

Meaning and Concept. Stakeholders of Governance. Governance and Government. World Bank Governance Indicators. Good governance initiatives in India. Challenges to good governance.

Unit-IV: Political Social Work Practice

Professional responsibility to challenge systemic discrimination and institutional inequalities through political action. The domains of political social work: engaging individuals and communities in political processes; influencing policy agendas and decision-making; holding professional and political staff positions; and seeking and holding elected office.

Reading List

- ✓ Constitution of India.
<https://cdnbbsr.s3waas.gov.in/s380537a945c7aaa788ccfcdf1b99b5d8f/uploads/2023/05/2023050195.pdf>
- ✓ Basu, D.D. (2022) *Introduction to the Constitution of India*, 26th Edition, Lexis Nexis: India
- ✓ Chakrabarty, Bidyut. (2018) *Constitutional Democracy in India*, Routledge: India
- ✓ Kothari, R. (1989). *State against democracy: In search of humane governance*. Apex: New Delhi
- ✓ Kothari, R. (1970). *Politics in India*. New Delhi: Orient Blackswan: New Delhi
- ✓ Kothari, R. (1995). *Caste in Indian politics*. Orient Blackswan: New Delhi
- ✓ Bhargava, R., Vanaik, A. (2010) *Understanding Contemporary India: Critical Perspective*. Orient Blackswan: New Delhi
- ✓ Singh, B. P. (2008). *The challenge of good governance in India*. *Social Change*, 38(1), 84-109.
- ✓ Prasad, R. N. (2002). *Governance of India: issues and perspectives*. Concept Publishing Company.
- ✓ Corbridge, S. (2005). *Seeing the state: Governance and governmentality in India* (Vol. 10). Cambridge University Press.
- ✓ Reisch, M., & Jani, J. S. (2012). *The new politics of social work practice: Understanding context to promote change*. *British Journal of Social Work*, 42(6), 1132-1150.
- ✓ Powell, F. W. (2001). *The politics of social work*. *The Politics of Social Work*, 1-192.
- ✓ Fisher, R. (1995). *Political social work*. *Journal of Social Work Education*, 31(2), 194-203.

Digital Fluency

Course Objectives

- To develop skills for locating, evaluating, and using digital information effectively and responsibly.
- To introduce common digital tools and technologies including word processing, presentation software, and spreadsheets.
- To emphasize responsible use of social media and online communities and the implications of digital footprints
- To explore effective communication techniques in digital environments, such as email etiquette and online messaging

Teaching Learning Process

- Lecture
- Assignment
- Individual and Group Presentation

Learning Outcomes

- To understand the importance of evaluating the credibility of online sources and proper citation and referencing of digital content
- Enhanced skills in using digital tools to create, learn, and share content online effectively
- Have imbibed values important in digital work including privacy, security, and intellectual property rights
- Able to use collaborative tools and platforms for managing online discussions, virtual meetings, and group projects

Unit-I: Digital Literacy

Locating, evaluating and using digital information online. Evaluating the credibility and reliability of online sources. Proper citation and referencing of digital sources

Unit-II: Digital Capabilities

Introduction to common digital tools and technology. Use of digital tools to learn, create, and share online. Word processing, presentation software, spreadsheets.

Unit-III: Digital Principles

Values when working digitally. Digital privacy and security. Intellectual property rights and copyright laws in the digital world. Responsible use of social media and online communities.

Unit-IV: Digital Communication and Collaboration

Effective communication in digital environments (email etiquette, online messaging, etc.) Collaborative tools and platforms for teamwork and group project. Managing online discussions and virtual meetings

Intellectual Property Rights (IPR)

The value-added course in Intellectual Property Rights (IPR) is designed to provide Undergraduate students with a comprehensive understanding of the legal frameworks and Principles governing intellectual property. Through an exploration of patents, copyrights, trademarks, and international conventions, students will gain insights into the protection and management of intellectual creations across various domains.

COURSE OBJECTIVES:

- To familiarize students with the fundamental concepts of intellectual property, including patents, copyrights, trademarks, and their characteristics.
- To explore the legal frameworks and international agreements governing intellectual property rights, such as the Berne Convention, Paris Convention, Madrid Agreement, and TRIPS.
- To equip students with knowledge of the essentials of patents, including registration procedures, rights of patentees, and issues related to infringement and compulsory licensing.
- To enable students to understand copyright law, covering topics such as the subject matter of copyright, ownership rights, economic and moral rights, fair use, and infringement.

COURSE OUTCOMES:

- Students will demonstrate a clear understanding of the basic concepts and nature of intellectual property rights, including patents, copyrights, and trademarks.
- Students will be able to analyze and interpret the provisions of international conventions and agreements related to intellectual property rights and their implications for legal protection.
- Students will develop practical skills in navigating the registration procedures and understanding the rights and obligations associated with patents, copyrights, and trademarks.
- Students will gain the ability to evaluate legal issues and apply relevant legal principles to real-world scenarios involving intellectual property disputes, infringement claims and protection strategies.

LEARNING OUTCOMES:

- Understand the rationale and importance of intellectual property protection in fostering innovation, creativity, and economic development.
- Analyze the legal frameworks and international agreements governing intellectual property rights and their impact on global trade and commerce.
- Apply legal principles to assess the eligibility, registration, and enforcement of patents, copyrights, and trademarks in various industries and sectors.
- Develop critical thinking skills to evaluate the ethical, social, and economic implications of intellectual property rights on society, culture, and technology.

COURSE STRUCTURE

Unit I Introduction to IPR

(a) Basic concept of Intellectual Property

- (b) Characteristics and Nature of Intellectual Property right
- (c) Justifications for protection of IP
- (d) International Conventions and agreements - Berne Convention, Paris Convention, Madrid Agreement, TRIPS

Unit II Patents

- (a) Essentials of patents
- (b) Registration and term of patent
- (c) Rights of patentee, Compulsory licenses and Government use of patent
- (d) Infringement

Unit III Copyright

- (a) Subject matter of Copyright
- (b) Ownership of copyright
- (c) Rights of owner-Economic Rights, Moral Rights
- (d) Fair Use and Infringement

Unit IV Trademark

- (a) Trademark: Conventional and Non-conventional Marks, Concept of distinctiveness
- (b) Absolute and relative grounds of refusal
- (c) Procedure for registration and Term of protection
- (d) Infringement and Passing Off

SUGGESTED BOOKS:

- ✓ *Intellectual Property: Patents, Copyright, Trademarks and allied rights - W R Cornish,*
- ✓ *Universal Law Publishing*
- ✓ *Indian Patent Law and Practice - Kalyan C. Kankanala, Arun K. Narasani & Vinita*
- ✓ *Radhakrishnan; Oxford University Press*
- ✓ *Patent law essentials: a concise guide - Durham, Alan L - Quorum Books*
- ✓ *Law relating to patents, trademarks, copyright designs, geographical indications - BL*
- ✓ *Wadehra, Universal Law Publishing*
- ✓ *Intellectual property; patents, trademarks and copyrights - Stim, Richard Thomson*
- ✓ *Learning*
- ✓ *Patent law – P Narayanan Eastern Law House*
- ✓ *Intellectual Property Law, Lionel Bently & Brad Sherman, Oxford.*
- ✓ *Intellectual Property Law, P. Narayanan, Eastern Law House*

Introduction to Artificial Intelligence

Course Objectives

- Understand the Fundamentals of Artificial Intelligence (AI).
- Explore AI Problem-Solving Methods.
- Learn Machine Learning Basics.
- Familiarize with Natural Language Processing (NLP).
- Introduction to Computer Vision.
- Ethical and Societal Implications of AI.
- Hands-on Experience with AI Tools and Technologies.
- Critical Thinking and Problem-Solving Skills.

Course Outcomes

After completion of the course, learners will be able to:

- Foundational Knowledge of AI.
- Proficiency in AI Problem-Solving Techniques.
- Understanding of Machine Learning Concepts.
- Competence in Natural Language Processing.
- Knowledge of Computer Vision Principles.
- Awareness of Ethical and Societal Issues.
- Hands-on Experience with AI Tools.
- Critical Thinking and Problem-Solving Abilities.

Unit 1: Introduction to Artificial Intelligence

Understanding Artificial Intelligence, Definition and Scope of Artificial Intelligence, Historical Overview and Evolution of AI, Importance and Applications of AI in Business and Commerce, Foundations of AI, Types of Artificial Intelligence: Narrow vs. General AI, Key Concepts: Machine Learning, Deep Learning, Neural Networks, Ethical and Societal Implications of AI, AI in Business Decision Making, Role of AI in Business Strategy, Decision Making, Marketing, Sales, Finance, and Operations, AI Applications in practical life, Case Studies of Successful AI Implementation in Business, AI constituents, Graphical Processing Unit. (GPU), Internet of Things (IoT). Advanced Algorithm. Application Programming Interfaces (API), Natural Language Processing (NLP), Cognitive Computing, Neural Network, Computer Vision, Machine Learning and Deep Learning.

Unit 2: Machine Learning Fundamentals

Introduction to Machine Learning, Basic Concepts: Supervised, Unsupervised, and Reinforcement Learning, Algorithms and Models: Regression, Classification, Clustering, Evaluation Metrics for Machine Learning Models, Practical Applications of Machine Learning, Predictive Analytics: Forecasting Sales, Demand, and Trends, Customer Segmentation and Targeting, Fraud Detection and Risk Management

Unit 3: Deep Learning and Neural Networks

Introduction to Deep Learning, Neural Networks: Structure and Functionality, Deep Learning Architectures: Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Applications of Deep Learning in Commerce and Business, Practical Applications of Deep Learning, Image Recognition and Classification, Natural Language Processing (NLP) and Sentiment Analysis

Unit 4: AI Tools for Various Common Uses

25 real tools used in common applications

Business Ethics and Values

Course Objectives

This paper will develop the understanding of ethical issues in business and how to manage those. It will also make the students understand how in the long run ethical practices.

Course Outcomes

After completion of the course, learners will be able to:

- To understand ethics and moral standard and their importance in personal, social and business activities;
- To appreciate the process of ethical reasoning.

Unit-1: Ethics, Values, Morale, Value of Management Ethics, Nature and Value of Management, Need for Ethical Decision by Managers, Management Integrity, Types of Integrity and Developmental Integrity.

Unit-2: Understanding the Need for Ethics, Ethical Values, Myths and Ambiguity, Ethical Codes, Ethical Principles in Business, Theories of Ethics, Absolutism vs. Relativism, Teleological Approach, Deontological Approach, Kohlberg's stages of Moral Development

Unit-3: Evolution of Business Ethics, Evaluating Business Ethic, Traditional and Contemporary Theories, Managing Ethical Dilemmas, Ethical Decision Making, Employee and Business Ethic

Unit-4: Ethical and Value-based Leadership, Ethical Culture in Organization, Factors influencing Business Ethics, Characteristics of Business Ethics, Ethical aspects in Marketing, Finance, HR, Ethical decision making. Best practices.

Suggested Readings

- ✓ C.S.V. Murthy (2019), *Business Ethics and Corporate Governance*, HPH
- ✓ Sailendra Kumar & Alok Kumar Rai (2019), *Business Ethics*, 1st Edition, Cengage Learning
- ✓ A.C. Fernando (2012), *Business Ethics and Corporate Governance*, 2nd Edition, Pearson

Preschool and Creche Management

Course Outcome:

- Understand the principles of establishment and management of Crèche/Pre School.

Learning Outcome:

- Students will gain expertise to run a crèche and preschool.
- Students will be able to understand and manage the resources required for managing cheche and preschool.
- Students will gain knowledge about the functions of various authorities dealing with crèche and preschool.

Unit-I: Introduction to Management of Creche and Pre-School:

- Meaning, Need and Importance, Difference between Crèche, and Pre-School.
- Site Selection, Types of rooms, Arrangement of rooms, Ventilation, Lighting, and safety.
- Playground, Play Equipment-Types, Criteria for Selection, Safety Aspects, Storage Facility, Maintenance of Furniture and Equipment, Provision of safe drinking water and sanitary Facilities.

Unit-II: Personnel Management and Record Keeping:

- Role and Qualities of teacher, caretaker and other staff involved in welfare and care of children. Teacher Child Ratio, Record, Health Centre facility
- Pre-School programmes and curriculum Planning.
- Use of Audio-Visual Aids for Pre-School children.

Unit-III: Practical:

- Field visit to an established crèche/pre-school.
- Report writing

Reference Books:

- ✓ *Teaching and learning: the culture of pedagogy.* New York: P. Clarke Sage
- ✓ *Threads of Thinking: (Fourth Edition)* Nutbrown. C (2011), New York: Sage Global

Food Preservation and Processing

Course Outcome:

- To learn about methods and principles of food preservation.

Learning Outcome:

- Students will gain expertise to establish start up unit on Food preservation and processing. LO2: Students will get knowledge on schemes providing Micro Credit Linkage.
- Students will be acquainting with knowledge of quality Certification of food products.

Unit-I-Methods of Food preservation and Processing:

- Concept, Scope and importance of Food Preservation, Classification of food preservatives and additives
- Different Methods of Food processing
- Packaging, Labelling of processed food products,

Unit –II: Setting up a new start up unit:

- Quality certification and branding
- Machineries and equipment's required to set up the unit.
- Government schemes and micro credit linkage (MKUY and MSME)

Unit-III: Practical:

- Preparation and packaging of processed food product- Jam, Jelly, Sauce, Squash, RTS drink, Murraba, Candy, Pickle, Chips, Ragi papad.
- Field visit to a food processing unit.
- Report writing and presentation.

Reference Books:

- ✓ *Food Processing and Preservation, G. Subhalaxmi, Sobha A UDIP, Padmini S Ghugra, New Age International Publishing.*

Geriatric Care and Management

Course Outcome:

- Students will develop expertise in Geriatric Care and Management.

Learning Outcome:

- Students will develop expertise in Basic Geriatric care and Management LO2: Proficiency in geriatric menu planning.
- Exposure to various organizations dealing with geriatric

Unit-I: Biological Change:

- Aging theory and process, psychological aspects of aging, Age related physiological changes.
- Nutrition- Need of dietary alteration, energy needs of old, planning of the diet for elderly, diet related to degenerative changes and physical activity, RDA.
- Psychological changes-Personalities changes, Social Change, Changes in family and living arrangement, Depression, Coping with psychological changes of aging.

Unit -II: Common Diseases and Prevention:

- Common signs and Symptoms of diseases- Fever, Anemia, Syncope, Vertigo, Anorexia, Loss of Memory, Alzheimer, Respiratory disease, Heart disease, Metabolic disorder , Musculoskeletal disorder , CNS related health problem, Digestive problem, Vision, hearing, sleep disturbance, peri-menopausal , problem , Genitourinary problem, cancer.
- Risk and Prevention – Basic Geriatric Smoking, alcohol, Social Issues-Abuse, Neglect, Dependency, Physical in activity, Fall, Accident, deafness, Low Vision.
- Prevention- Health promotion, Nutrition Exercise, Screening, Prevention of accidents, Prevention of substance addiction, Smoking Cessation, old age home, NCD clinic, NGO for elderly.

Unit -III: Dietary Assessment and Report Preparation

- Dietary Assessment, Life Style, Anthropometric for Old People, Assessment of Risk and Prepare a Report preparation.
- Field Visit and report preparation: Old Age Home, Nursing Home and NGO for Elderly.

Reference Books:

- ✓ *An Introduction to Geriatrics by U. N. Panda.*
- ✓ *Manual on Nutrition and Therapeutic Diet by T.K. Indrani*

Ethical Practices in Education

COURSE OUTCOMES (COs):

On completion of this course, the learners will be able to:

- Apply important ethical concepts and theories to real world situations.
- Create learning ambience of educational Institution supporting holistic and sustainable development.
- Exhibit respectful treatment of others in an organizational context.

UNIT I: Ethical Values for Students

Learning Outcomes

- ✓ *Explore ethical principles in education.*
- ✓ *Understand virtues of volunteerism and social cohesion.*
- ✓ *Understand ethical issues relating to use of digital medium.*
- Concept and importance of ethics in education.
- Code of conduct for students.
- Concepts and facets of volunteerism and community living in campus including hostel.
- Cheating in examination, bullying and other fraudulent practices.
- Ethics and use of digital technology –cyber ethics, social media-WhatsApp, Facebook, Twitter and others.

UNIT II: Work Ethics for Teachers

Learning Outcomes

- ✓ *Understand professional ethics for teachers.*
- ✓ *Analyse the challenges and find solutions for developing ethical behaviour in education.*
- ✓ *Practice equality, unity and social justice in multicultural classroom.*
- Code of conduct for teachers.
- Work place behaviour and professional ethics-honesty, punctuality, time management, law abidingness, rational thinking etc.
- Multiculturalism classroom in Education.
- Inclusive practices in Education
- Challenges for ethical practices in institutions-schools and higher education institutions.

UNIT III: Ethics in Research

Learning Outcomes

- ✓ *Understand ethical practices and principles in research.*
- Scientific misconduct-Falsification, Fabrication and Plagiarism (FFP).
- Violation of Intellectual Property Rights, Intellectual honesty and research integrity.
- Best practices/Standard initiatives and guidelines- Committee on Publication Ethics (COPE) and other initiatives.

UNIT IV: Ethics for Leaders and Administrators

Learning Outcomes

- ✓ *Understand basic concept of leadership in the context of educational institution.*
- ✓ *Articulate different values which will contribute towards ethical leadership.*
- Ethical leadership in academic institutions: concept and traits of ethical leadership.

- Managing leadership-transformational leadership and self-management leadership.
- Organizational ethics-practicing group leadership and followership ethics.

Sample Question

1. Identify at least two principles of ethical conduct on the part of a student. (1 Mark)
2. Give two reasons, why teachers should follow ethical practices. (2 Marks, Within 50 words)
3. Explain Intellectual Property Rights relating to publication. (3 Marks, Within 300 words)
4. Critically examine the styles of leadership with reference to School Management. (8 Marks, within 500-800 words)

Mode of Course Transaction: Team Teaching, Dialogue, Peer-Teaching, Peer Group Discussion, Collaborative and Cooperative Learning, Field Trip, Self-Learning.

Suggested Activities

Each student will be required to prepare and submit a report on any one of the following:

- ✓ Develop a model Code of Conduct for Students, Teachers, Library and Hostel.
- ✓ Write a report by reviewing different types of leadership styles and find out the best one with reasons.
- ✓ Prepare an interview schedule for teachers and collect data about their perception towards an inclusive classroom.

Suggested Readings

- ✓ Blackburn, S. (2002). *Being Good: A Short Introduction to Ethics*. Oxford University Press.
- ✓ Driver, J. (2006) *Ethics: The Fundamentals*. *Wiley-Blackwell*.
- ✓ Fedoruk, L.M. (2022, Ed.). *Ethics and the Scholarship of Teaching and Learning*. Springer.
- ✓ Gensler, H. (2011). *Ethics: A Contemporary Introduction*. New York: Routledge
- ✓ Rachels, J. And Rachels, S. (2018). *Moral Reasoning*. In the elements of Moral Philosophy (7th. Ed.). McGraw Hill.
- ✓ Smith, A.W. (2018). *Education and Ethics*. Palala Press.
- ✓ Tiwari. K.N. (2007) *Classical Indian Ethical Thought*. Delhi: Motilal Banarsidass Publications.
- ✓ Vaughn, L. (2009). *The Power of Critical Thinking: Effective Reasoning about Ordinary and Extraordinary Claims*. Oxford University Press.
- ✓ https://iaeme.com/MasterAdmin/Journal_uploads/IJM/VOLUME_11_ISSUE_10/IJM_11_10_195.pdf
- ✓ <https://www.tandfonline.com/toc/ceae20/current>
- ✓ <https://www.gse.harvard.edu/ideas/news/23/02/critical-evaluation-educational-ethics>

Economics of Education

COURSE OUTCOMES (COs)

On completion of the course, the students will be able to:

- Develop an understanding of Economics of Education, Education as man making industry and investment.
- Familiar with the Cost benefit analysis, Cost Effective Analysis in Education and relationship between them.
- Understand the concept, sources and problems in Finance of Education.
- Acquire the knowledge about allocation of funds to Education discipline.
- Learn about central, state and institutional level plans.

Unit I: An Introduction to Economics of Education

LO: *Familiar with contents of economics of education*

- Meaning, definition, scope and importance of economics of education, the relationship between education and economic system.
- Education as man making industry - Education and consumption: Concepts, Significance and strategies.
- Education as investment: Concept, Significance and Strategies.

Unit II: Cost -Benefits Analysis in Education

LO: *Able to understand Cost Benefit Analysis for Education.*

- Meaning of cost-benefit analysis: its purpose and problems, Cost Benefit Analysis Vs Cost Effective Analysis in Education.
- Cost effectiveness analysis in education, Taxonomy of cost and Benefit of education.
- Concept of cost consciousness in Education, Input and Outputs: Concepts and Relationship between these two. Impact of LPG in Education.

Unit III: Financing of Education

LO: *Identify sources of financing education and associated issues.*

- Concept and principles of Educational Finance; Educational finance at Micro and Macro Levels.
- Sources of finance for education: private, public, fees and donation. The Grant-In-Aid System in Odisha and India.
- Problems of Finance in Education & Factors influencing Educational Finance.

Unit-IV: Allocation of funds to Education

LO: *Understand issues and challenges of public funding at Education in India.*

- The concept of five-year planning, priority for education under various five-year plans. Current rolling annual plan. Concept of budget allocation.

- Educational expenditure, national economy and national development, expenditure of education, public education at different levels (central & state) level in India.
- Types of plan-Central, state and institutional.

Sample Question

5. What is meant by economics? (1 Mark)
6. Write down any two benefits of privatization of education. (2 Marks, Within 50 words)
7. Elaborate the role of education for National Development. (5 Marks, Within 300 words)
8. Give an account of problems of finance in education and factors influencing educational finance. (8 Marks, within 500-800 words)

Practical:

- Analyse the budget of an educational institute. Prepare an estimate for establishing a laboratory (say computer) in a school.
- Prepare a budget for a cultural event in college or HEI.

Textbooks:

- ✓ Steve Bradley and Colin Green, *"The Economics of Education: A Comprehensive Overview"* Second Edition, 2018.
- ✓ Michael Lovenhem and Sarah Turner, *"Economics of Education"*
- ✓ Saumen Chattopadhyay, *"Education and Economics: Disciplinary Evaluation and Policy Discourse"*.
- ✓ Santosh Malhotra, *"The Economics of Elementary Education in India,"* Sage Publication.
- ✓ Pulla Rao, *"Economics of Education and Human Development in India"*.

References:

- ✓ Bhatnagar, R. P. Aggarwal V: *Educational Administration, Planning and Finance*: R. Lall
- ✓ Book Depot, Meerut.
- ✓ Carr. W. G.: *School Finance, School Economy Series* Stanford University Press, Stanford.
- ✓ Mishra, A.: *The Financing of Indian Education*, Asia Publishing House, New Delhi.
- ✓ Mukherjee S. N.: *Administration of Education, Planning and Finance*, Acharya Book Depot, Baroda.
- ✓ Sukla, P. D. *Administration of Education in India*, Vikash, New Delhi.
- ✓ Sukla, S. P.: *Educational Administration*, Vinod Pustak Mandir, Agra.
- ✓ Balsara, M. (1996) *New Education policy and Development Challenge*, New Delhi. Kanishka Publishers.
- ✓ Baxter C. And O'Leary, P. J. and Westoby A. (1977) *Economics and Education Policy a Reader* London Longman Group Ltd.
- ✓ Banker G. S. (1964) *Human Capital* New York: University press.
- ✓ Blaug. M (1972) *An Introduction to the Economics of Education* London: Penguin
- ✓ Blaug, M. (ed) (1968). *Economics of Education selected Readings*. Vol. 1 and 2 London: Penguin Books.
- ✓ Cohn, E. and Gesker (1990) T. G. *The Economics of Education* Oxford: Pergamon Press.
- ✓ Creedy J. *The Economics of Higher Education: analysis of Taxes Versos Fees* Able shot: Edward Elgar publishing limited.
- ✓ Enaohwo J. O (1990) *economics of Education and the planning Challenge*. New Delhi. Anmol Publications.

Computational Materials Modelling

Course Outcomes

- Basic understanding of Molecular Dynamic.
- Conceptual understanding of statistical Mechanics
- Conceptual understanding of different input script in molecular dynamic (LAMMPS)
- Basic understanding of density functional theory
- Apply the acquired knowledge solving problems using software tools . LAMMPS, Quantum Espresso

Unit 1

Introduction to the course, Some applications of MD simulations, Introduction to Bravais lattices and constructing simple crystals with MATLAB, Introduction to symmetry – 1, Symmetry Elements – 1, Symmetry elements-2, Plane groups and their Hermann-Mauguin(HM) symbols, Glide reflection; Examples of writing point group symbols; Wyckoff positions, generating 2D crystal with MATLAB using Bilbao crystallography website, Symmetry of space groups, Hermann mauguin symbols of space groups, Translational symmetry operators

Unit 2

The Space groups, Generation of crystals, Generation of monoclinic lattice, Introduction to Statistical Mechanics, Introduction to phase space, Introduction to phase average and time average, Canonical ensemble; Partition function.

Unit 3

Basic introduction to MD, input script for LAMMPS 1, Input script for LAMMPS 2, Input script for LAMMPS 3, Input script, for LAMMPS 4.

Unit 4

Density Functional Theory: Introduction, Kohn sham equation (KS orbitals, eigen values), Solving KS equation, self-consistency, Vibrational principle, Constraints, Direct diagonalization.

Computational Materials Modelling Lab:1 credit

- LAMMPS exercises 1, LAMMPS exercises 2, LAMMPS exercises 3, LAMMPS exercises 4, LAMMPS exercises 5, DFT with Quantum Espresso: Si2, Convergence Test, Si2 band, Si7vacancy

Text Book/References

- ✓ Lee, J.G. (2016). *Computational Materials Science: An Introduction, Second Edition (2nd ed.)*. CRC Press. <https://doi.org/10.1201/9781315368429>
- ✓ <https://archive.nptel.ac.in/courses/112/106/112106289/>

Creative Writing

Course Objective:

The course aims to provide students with the foundational skills, techniques, and creative processes necessary for expressing themselves effectively through various forms of media writing. Through a combination of theoretical study, practical exercises, and workshop-style feedback sessions, students will explore the craft of creative writing across genres such as fiction, and creative nonfiction. This course also aims to foster creativity, critical thinking, and self-expression while equipping students with the tools and confidence to pursue further writing endeavors.

Unit I

Basics of creative writing, Principles of good writing, Various formats of writing, differentiate between journalistic and creative writing, Characteristics of media writings, Drafting and revising.

Unit II

Various formats of news writing, writing features, writing articles, writing editorials, columns, middle, letter to editor, writing film reviews, Writing book reviews.

Unit III

Basics of radio writing, Radio talks, radio features, Basic of television writing, Writing for fictional and non-fictional programme.

Unit IV

Writing for web: characteristics of web writing, technical writing, blogs, online journalism, restrictions on publications, ethics and responsibility, Practical writing exercises- anecdotes, news story, features, captions, headlines, copywriting, reviews, press release.

List of Practical's:

1. Writing feature articles exploring human interest stories, profiles, or in-depth analyses on specific topics.
2. Writing editorial expressing personal viewpoints on current events or any social issues.
3. Writing columns on specialized topics or areas of expertise.
4. Composing letters to the editor addressing community concerns or responding to published articles.
5. Writing film reviews and book reviews analyzing plot, character development, themes, and overall impact.
6. Crafting radio scripts for various formats such as radio talks, interviews, radio features.
7. Developing scripts for Television News Programs.
8. Writing content for websites, blogs, and online publications.

Suggested Readings:

- ✓ *Batty Craig and Cain Sandra (2010). Media writing: A Practical introduction. Palgrave Macmillan.*
- ✓ *Stovel. J.(2006). Writing for Mass Media, 6th edition. Allyn and Bacon.*
- ✓ *Melvin Mencher (2006). News Reporting and Writing. 10th edition. McGraw-Hill.*
- ✓ *Strunk, William & White, E.B. (1999). The Elements of Style. Longman.*
- ✓ *Clark, Roy Peter (2006). Writing tools: 50 Essential Strategies for Every writer: Little Brown.*
- ✓ *Raman, Usha (2009). Writing for the Media, OUP.*

Environmental Journalism

Course Description: This course offers an exploration of the intersection between journalism and the environment. Students will examine the critical role of journalism in covering environmental issues, including climate change, biodiversity loss, pollution, and sustainability. Through a combination of theoretical discussions, case studies, and practical exercises, students will learn how to research, report, and write compelling stories about environmental topics for various media platforms.

Course Objectives:

- To understand the role and impact of environmental journalism in society.
- To develop the practical skills in researching, interviewing, and writing environmental stories for diverse media.
- To evaluate the environmental news for accuracy, balance, and ethical considerations.
- To develop the engaging storytelling techniques to produce environmental content.

Learning Outcomes:

- Articulate the significance of environmental journalism and its societal influence.
- Proficiency in crafting compelling environmental stories for various platforms.
- Ability to assess environmental news for biases and misinformation.
- Proficiency in creating multimedia environmental stories using data analysis tools.

Unit-I

Environment: its significance in the present context, major environmental issues and challenges, Impact of climate change, Environment and society, Environment Awareness and Role of Media, Environmental Journalism: need, scope and role in shaping public opinion, Key principles of environmental journalism.

Unit-II

Researching and identifying environmental issues, Green House Gas emissions, Developing sources and insight, Assessing impact of global warming on local level, Writing styles and structures for an environmental story, Interviewing techniques, Specialized reporting on specific environmental topics (climate change, biodiversity loss, pollution).

Unit-III

Critical analysis of environmental news coverage in print, radio and TV, Case studies of exemplary environmental journalism projects, Issues and Challenges while covering environmental stories, Globalization: The Green Politics vs The Politics of News, Corporate, politics, and advocacy groups influence in environmental reporting, Ethics in reporting on environmental issues.

Unit-IV

- Major Environmental Movements across the World, India and Odisha, Advocacy for environment
- Protection, People's rights and environment, Environmental Activist, Activist Vs Journalist, Prominent Environmental Journalist and their coverage, Organization working for Environment protection, Laws for environment protection in India.

Suggested Books:

- ✓ Acharya, Keya., & Noronha, Frederick. (2010). *The Green Pen: Environmental Journalism in India and South Asia*. Los Angeles: Sage Publications Pvt. Ltd.
- ✓ Verma K. Manish (2015) *Globalization and Environment, Discourse policies and practices* Jaipur Rawat Publications.
- ✓ Mathai, V.Manu. (2013). *Nuclear Power, Economic Development Discourse and the Environment: The Case of India*. New York: Routledge.
- ✓ Pringle, Laurence. (2000) *The Environmental Movement*. Harper Collins.
- ✓ Rangarajan, Mahesh, (Ed).(2007).*Environmental Issues in India :A Reader*. Dorling Kindersley (India) Pvt. Ltd.
- ✓ Rootes, Christopher. (2014). *Environmental Movements: Local, National and Global*. New York: Routledge.
- ✓ Wyss, Bob. (2008). *Covering the Environment: How Journalists Work the Green Beat?* Routledge.

E-Learning Resources:

- ✓ http://michiganintheworld.history.lsa.umich.edu/environmentalism/exhibits/show/main_exhibit/origins
- ✓ <https://www.tutor2u.net/business/reference/what-is-globalisation>
- ✓ <http://www.ecoindia.com/education/chipko-movement.html>
- ✓ <https://www.sciencedirect.com/topics/social-sciences/science-and-technology-studies>
- ✓ <http://theconversation.com/why-covering-the-environment-is-one-of-the-mostdangerous-beats-in-journalism-105477>

Model QP's

1. What is environmentalism?
2. Is environmental journalism a form of activism?

Sports Journalism

Learning Outcomes: after completion of this course, student will able to

- Explain the practice and theories of sports journalism and apply the practice.
- Understand the skills of sports journalism.
- Understand the evolution of sports careers and what opportunities exist.
- Create different types of sports stories in different media.
- Develop skills that relate to sports journalism jobs, from writing to broadcasting to statistics.
- Understand and follow proper sports reporting ethics.

Unit-I

Sports: its growing popularity, Major Sports Events: International, National & State Level, Rural & Tribal Sports, Sports Journalism: Scope and opportunity, Historical Perspective: Growth and development of sports journalism.

Unit-II

Major Sports Organisations of the world, National & state level, Sports Authority of India (SAI), Outstanding sports personalities in the country & state, Sports Awards in the state & Country, Sports Sponsorship & Corporatization of sports, coverage of sports in print, radio & television, popularity of sports films.

Unit-III

Sports Reporting Techniques, Types of sports stories, points to highlight in Sports story, Techniques to develop sports writing skill, Sports Feature, Sports Photography, Duty and responsibility of a sports reporter, Qualities and attributes of a sports reporter.

Unit-IV

Sports department in popular dailies, Role of sports editor & sub editor, Special Sports page, Special page, Sports column, Sports commentary in radio, Sports bulletin in TV, Ethics involved in sports reporting, Issues & challenges in sports journalism. Major sports magazine & weekly, Sports channels, Prominent Sports journalist of the country & state.

Suggested Readings:

- ✓ *Stofer, K.T., Schaffer, J.R., & Rosenthal, B.A. (2017). Sports Journalist: An Introduction to Reporting and Writing. New York, N.Y.: Rowman & Littlefield Publishers. ISBN: 978-0742561748.*
- ✓ *Srinivas Rao, Sports Journalism*
- ✓ *Andrews, Phil. (2014). Sports Journalism: A Practical Introduction. Sage Publications.*

- ✓ 2. Rosenthal, Brian A., Schaffer, James R., & Stofer, Kathryn T. (2009). *Sports Journalism: An Introduction to Reporting and Writing*. Rowman & Littlefield Publishers, Inc.
- ✓ Skinner, Peter. (2007). *Sports Photography: How to Capture Action and Emotion*. Allworth Press.

E-Learning Resources:

- ✓ <https://www.latrobe.edu.au/nest/the-impact-of-social-and-digital-media-on-sport/>
- ✓ <https://www.scholastic.com/teachers/articles/teaching-content/how-conductjournalistic-interview/>
- ✓ <https://www.wipo.int/ip-sport/en/broadcasting.html>
- ✓ <https://prhacker.com/sports-pr-definition>
- ✓ <https://www.biographyonline.net/sport/100-sporting-personalities.html>

Citizen Journalism

Course Description: This course intends to inculcate among students all the necessary basic qualities required for news writing, reporting and editing, and give an overview of the organizational structure of the newspaper industry.

Unit-I

Citizen Journalism: Background, Concept and Case Studies. News and types of News, Basics of news writing and news selection, Interviews: type and techniques, Platforms for Citizen Journalism, Introduction to social media.

Unit-II

ICT in journalism, Social Collaboration: Virtual community, wikis, blogs, instant messaging, collaborative office and crowd sourcing, Copyright and Censorship: Threats Facing Open-Source Journalism.

Unit-III

Cyber activism: Concept and Case Studies, Social publishing: Flickr, Instagram, YouTube, Sound cloud

Unit-IV

Civil Society and Citizen Journalism, Podcasting and Citizen Journalism, Issues and Challenges in citizen journalism, Fake News & Deep Fake.

Practical -

Creating and designing Blogs, Mobile Reporting, Preparing and Publishing Multimedia content, Designing Web Version/ Digital of Lab journals.

Suggested Readings:

- ✓ *Citizen Journalism, Global Perspectives. Stuart Allan and Einar Thorsen (Eds). NY: Peter Lang, 2009.*
- ✓ *Readings: Text: Citizen Journalism, Global Perspectives, Chapters 15 & 18.*
- ✓ *Text: Citizen Journalism, Global Perspectives. Chapters 2, 3 & 4. Online: Social Media, Human Rights, and Political Change by Sarah Joseph*
- ✓ *We the media: grassroots journalism by the people for the people by Dan Gillmor. First Edition, July 2004.*
- ✓ *We've got blog: how weblogs are changing our culture. Perseus publishing*
- ✓ *Felix, L. Stolarx, D. (2006). Video blogging & Podcasting, Focal Press.*
- ✓ *Mirabito, M., Morgenstern, B. L. (2004). New Communication Technologies, FocalPress*
- ✓ *Ward, M. (2002). Journalism Online, Focal Press.*

- ✓ *Citizen Witnessing: Revisioning Journalism in Times of Crisis*. Stuart Allan, NY: Peter Lang, 2013.

Odia Journalism

Course Description: This course is designed to understand the Odia journalism. Through a comprehensive exploration of the roles and responsibilities of language journalism in facilitating social transformation in Odisha, students will gain critical insights into the historical dimensions of Odia journalism.

Course Objectives:

- Provide students with an understanding of the history of Odia language press.
- Foster critical thinking and analytical abilities to assess the roles and responsibilities of language journalism in driving social change and development in Odisha.
- Instill a strong sense of journalistic ethics and integrity, emphasizing the importance of accuracy, fairness, and accountability in reporting.
- Empower students to contribute positively to society as responsible journalists committed to upholding the public interest and serving the diverse communities of Odisha.

Learning Outcomes:

After completion of this course, student will able to

- Understand Odia journalism's historical role in shaping Odia identity and nationalism.
- Analyze how Odia journalism has documented and disseminated key events and narratives contributing to Odia identity and nationalism.
- Evaluate the impact of Odia journalism on fostering unity and collective consciousness in Odisha.
- Critically assess contemporary challenges and opportunities for Odia journalism in preserving and advancing Odia identity and nationalism.

Unit-I

Early Phases of Odia Press, Odia Press in the Pre-Independence Era, Odia Press in the Post-Independence Era, Press and Language Movement.

Unit-II

Growth of Odia Journalism, Role of Christian Missionaries, The first Odia newspaper, Role of Odia Press in Social Reform, Role of Odia Press in the Growth of Odia Literature, Press and Vernacular Nationalism.

Unit-III

Study of early Odia Newspaper: Utkala Dipika, Sambada Bahika, Naba Sambad, Prabodha Chandrika, Utkala Darpana,

Unit-IV

New Journalism in Odisha, Studies on Odia newspapers: The Dainik Asha, The Samaj, The Prajatantra, The Dharitri, The Sambad; Eminent Odia journalists: Gouri Shankar Ray, Sashi Bhusan Rath, Gopabandhu Das, Godavarish Mohapatra, Harekrushna Mahatab, Radhanath Rath

Suggested Readings:

- ✓ Mohanty, S. (2015). Periodical Press and Colonial Modernity, Odisha 1866-1936, Oxford University Press.
- ✓ Mishra, Pritipuspa (2020). Language and the Making of Modern India Nationalism and the Vernacular in Colonial Odisha, 1803-1956, Cambridge University Press.
- ✓ Chatterjee, Mrinal (2010). History of Journalism in Odisha.
- ✓ Mohanty, S. K. (2019). Journalism and Mass Communication, OSOU Press.

Corporate training and development

Course Objectives:

- Understand the importance of corporate training in organizational success.
- Explore the foundational principles of adult learning theory.
- Learn how to conduct a thorough training needs analysis and design effective training programs.

Learning Outcomes:

- Analyse employee development strategies and apply them to identify and nurture high-potential employees within an organization.
- Demonstrate effective performance management skills, including setting SMART goals, delivering constructive feedback, and conducting performance evaluations.
- Implement strategies to foster a positive work environment and boost employee engagement and motivation.

Unit 1:

Introduction to Corporate Training and Development: Understanding meaning of Corporate Training, importance, Current trends and challenges in corporate training, conducting a training needs analysis, setting learning objectives, Designing effective training programs

Unit 2:

Training Delivery Methods and Techniques: Traditional Training Methods, Technology-Enabled Training, Blended Learning Approaches.

Unit 3:

Employee Development: Meaning, Development Strategies, Succession planning and career development, Coaching and mentoring programs

Unit 4:

Assessing Training Effectiveness: Evaluating Training Impact, Kirkpatrick's Four Levels of Evaluation, Measuring ROI and effectiveness.

Recommended Books:

- ✓ *"Corporate Training and Development: Text and Cases" by T.V. Rao, Raju Rao, and Taru.*
- ✓ *"Training and Development: Theories and Applications" by Dr. Kavita Singh.*
- ✓ *"Corporate Training: Blending Academic Rigour with Professional Relevance" by Dr. Udai Pareek.*
- ✓ *"Learning and Development" by Dr. Rajiv V. Thakur ..*
- ✓ *"Corporate Training: An Indian Perspective" by Dr. Udai Pareek and Dr. T.V. Rao*
- ✓ *"Training Needs Analysis and Evaluation" by Dr. Udai Pareek.*

Model Questions

1-Mark Questions:

1. Define "training needs analysis" in the context of corporate training.
2. What is the primary goal of performance appraisal in employee development?
3. Explain the concept of "blended learning" in training delivery methods.

4. What does ROI stand for in the context of training effectiveness evaluation?
5. Describe one key principle of adult learning theory.

2-Mark Questions:

1. Differentiate between training and development in the corporate context.
2. List two advantages of technology-enabled training methods over traditional training approaches.
3. Explain the importance of setting SMART goals in performance management.
4. Discuss two challenges associated with implementing a mentoring program in organizations.
5. Describe two techniques for assessing the effectiveness of training programs.

4-Mark Questions:

1. Discuss the steps involved in conducting a training needs analysis for an organization.
2. Compare and contrast instructor-led training (ILT) with virtual classroom training.
3. Explain the relevance of Kirkpatrick's Four Levels of Evaluation in assessing training effectiveness.
4. Describe the key components of a performance management system and their functions.
5. Discuss the role of coaching in employee development and its impact on organizational performance.

8-Mark Questions:

1. Evaluate the effectiveness of technology-enabled training methods compared to traditional classroom training, considering factors such as cost, accessibility, and learner engagement.
2. Design a comprehensive training program for new managers, outlining the learning objectives, training methods, and assessment strategies.
3. Analyze the challenges organizations may face in implementing a competency-based training approach and propose solutions to address these challenges.
4. Critically evaluate the role of organizational culture in fostering a learning environment, discussing its impact on employee engagement, retention, and performance.
5. Develop a framework for assessing the ROI of a leadership development program, including the metrics to be used and the methods for data collection and analysis.

Entrepreneurship and Start-up

Course Objectives:

- Equip students with the skills to generate innovative business ideas and validate their viability through market research and feasibility analysis.
- Enable students to develop robust business models that effectively address market needs, differentiate from competitors, and demonstrate long-term sustainability.
- Provide students with the ability to craft compelling pitches and presentations to secure funding, partnerships, and customer engagement, effectively communicating the value proposition of their start-up ventures.

Learning Outcomes:

- **Identify and Evaluate Business Opportunities:** Students will be able to identify promising business opportunities, conduct thorough market research, and assess the feasibility of their ideas.
- **Design and Refine Business Models:** Students will develop skills in creating and refining business models that align with market demands, generate revenue, and facilitate growth.
- **Effectively Communicate Business Concepts:** Students will gain proficiency in pitching their ideas and presenting their business concepts persuasively, enabling them to attract stakeholders and support for their start-up ventures.

Unit 1:

Introduction to Entrepreneurship: Definition and scope of entrepreneurship, Economic significance and contribution of entrepreneurs, Types of entrepreneurships, Characteristics and traits of successful entrepreneurs.

Unit 2: Business Planning and Strategy: Overview of different business models, Value proposition canvas and business model canvas, Market segmentation and targeting, Competitive analysis frameworks (e.g., SWOT analysis, Porter's Five Forces), Start-up funding sources.

Unit 3:

Launching and Scaling a Start-up: Business structure options, Compliance with industry regulations and licensing requirements, Recruiting and hiring strategies for start-ups, Managing organizational change and innovation.

Unit 4:

Entrepreneurial Success and Sustainability: Risk identification and mitigation strategies, Crisis management and resilience building, integrating social impact into business models, Implementing corporate social responsibility (CSR) initiatives.

Recommended Books:

- ✓ *"Entrepreneurship: Theory, Process, and Practice" by Donald F. Kuratko and Richard M. Hodgetts*
- ✓ *"New Venture Creation: Entrepreneurship for the 21st Century" by Jeffrey A. Timmons, Stephen Spinelli Jr., and Rob Adams*
- ✓ *"Essentials of Entrepreneurship and Small Business Management" by Norman M. Scarborough and Jeffrey R. Cornwall*
- ✓ *"Entrepreneurship: Successfully Launching New Ventures" by Bruce R. Barringer and R. Duane Ireland*
- ✓ *"Small Business Management: Launching & Growing Entrepreneurial Ventures" by Justin G. Longenecker, J. William Petty, Leslie E. Palich, and Frank Hoy*
- ✓ *"Entrepreneurship: Starting and Operating A Small Business" by Steve Mariotti and Caroline Glackin*
- ✓ *"Innovation and Entrepreneurship: Practice and Principles" by Peter F. Drucker*

Model Questions:

1-Mark Questions:

1. What is the primary purpose of market research in the context of start-up ventures?
2. Define the term "entrepreneurial mindset" in one sentence.
3. Name one technique used for idea validation in the start-up process.

4. What does SWOT analysis stand for?
5. Give an example of a legal structure commonly used by start-up businesses.

2-Mark Questions:

1. Explain the difference between a business model and a business plan.
2. Briefly describe the concept of minimum viable product (MVP) in the context of start-ups.
3. Why is it important for start-up founders to understand their target market?
4. Discuss two advantages of bootstrapping as a funding strategy for start-ups.
5. How does a lean start-up approach differ from traditional start-up methodologies?

4-Mark Questions:

1. Outline the steps involved in conducting market research for a start-up venture.
2. Discuss the significance of scalability in the context of start-up businesses.
3. Compare and contrast equity financing and debt financing as funding options for start-ups.
4. Explain the concept of product-market fit and its importance for start-up success.
5. Describe two common challenges faced by start-up founders and how they can overcome them.

8-Mark Questions:

1. Develop a hypothetical business model canvas for a start-up that aims to disrupt the online grocery delivery market.
2. Analyze the potential risks associated with entering a new market and propose risk mitigation strategies for a start-up expanding internationally.
3. Evaluate the role of social media marketing in the growth of start-up businesses, providing examples of successful campaigns.
4. Create a comprehensive pitch deck for a tech start-up seeking seed funding, including key slides and talking points.
5. Discuss the ethical considerations involved in data collection and usage for start-up ventures, highlighting best practices and potential pitfalls.

R-PROGRAMMING (PRACTICAL)

Course Objectives:

The objective of this course is to introduce students to R-programming language which is very useful in the field of data science.

Learning Outcomes:

After completion of this course, the students will be able to:

- Learn a new programming language in the field of data science
- Kindle the problem solving capability in statistics and statistical sciences.

List of Practicals

1. Simple Programs using Mathematical constant
2. Programs using complex functions
3. Numerical solutions of nonlinear equations and systems
4. Solving system of linear equations using Jacobi method
5. Program using Trigonometric and Hyperbolic Expressions
6. Finding Eigen values and Eigen vectors
7. Finding the volume of solid of revolution.
8. Plotting Points in the Plane and Space
9. Analyse data using Central Tendency and Measures of dispersion and distributions
10. Find the Laplace integral transforms for different functions.
11. Obtain the solution of the initial value problem in ODE and PDE

BOOK RECOMMENDED:

1. Programming with R by S.R. Mani Sekhar, T.V. Suresh Kumar, Madhavi Kasa, Sunil Kumar S. Manvi, Cengage Learning India Pvt. Ltd, 2017
2. R for Statistics by Pierre-Andre Cornillon, Arnaud Guyader, Francois Husson, Nicolas Jegou, Julie Josse, Maela Kloareg, Eric Matzner-Lober, Laurent Rouvière, Chapman and Hall, 2012
3. Statistics with R Programming by Dr. Sandip Rakshit, McGraw Hill Education (India) Pvt. Ltd, 2018.
4. Suggestive digital platforms web links: NPTEL/SWAYAM/MOOCs.

MATHEMATICA (PRACTICAL)

Course Objectives:

The objective of this course is to introduce students to mathematica language which is very useful in the simulation process dealing with mathematical modelling and also, in different branches of practical mathematics.

Learning Outcomes:

After completion of this course, students will be able to:

- Learn a new programming language in mathematics.
- Increase the problem solving capability in mathematics, plotting of 2D, 3D graphs and solving LPP problems.

List of Practicals

1. Solving higher degree equations.
2. Solving system of equations by matrix method and find the eigen values and eigen vectors of a matrix of order 4 by 4 or higher order.
3. Solving system of non-linear equations.
4. Finding the differentiation of different functions of second and third derivatives.
5. Finding the Integration of different functions with limits.
6. Evaluation of double integrals and triple integrals.
7. Solving ordinary differential equations and partial differential equations with initial condition.
8. Solving system of ordinary differential equations.
9. Creating and plotting 2-D and 3-D graphs.
10. Finding the volume of solid of revolution.
11. Solving linear programming problems
12. Solving problems in numerical analysis (Finding roots, interpolations, integration)

BOOK RECOMMENDED:

- ✓ Eugene Don, *Mathematica, Scham's Outline Series*, Mc Graw Hill Publisher, New York. (2009)
- ✓ Pragathi Gautam and Swapnil Verma, *Practical Mathematica*, Ane Books Publisher (2019).

BOOKS FOR REFERENCE:

- ✓ Ananta Kumar Bora, *Mathematica: A Research Book of Mathematics*, Scholarink Publishers (2017)
- ✓ Sal Mangano, *Mathematica Cookbook*, O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, USA (2010)

MAPLE

Course Objectives:

The objective of this course is to introduce students how to use the Maple graphical user interface, components of a Maple worksheet and to perform basic computations.

Learning Outcomes:

After completion of this course, students will be able to:

- Learn a new programming language in mathematics to find numerical solutions of initial value problems, nonlinear equations, Laplace transform of functions, eigenvalues and eigenvectors.
- Analyze data using central tendency, measure of dispersion and distributions.

List of Practicals

1. Simple programs using mathematical constant
2. Programs using complex functions
3. Numerical solutions of nonlinear equations and systems
4. Solving system of linear equations using Jacobi method
5. Program using trigonometric and hyperbolic expressions
6. Finding eigenvalues and eigen vectors
7. Plotting points, curves, surfaces in the plane and space
8. Analyze data using central tendency and measures of dispersion and distributions
9. Find the Laplace integral transforms for different functions.
10. Obtain the solution of the initial value problems in ODE and PDE.
11. Solving problems in numerical analysis (Finding roots, interpolations, integration)

BOOK RECOMMENDED:

- ✓ Inna Shingareva & Carlos Lizárraga-Celaya, Maple and Mathematica, A Problem Solving Approach for Mathematics *Second Edition*, Springer Wien New York.

SAGEMATH

Course Objectives:

The objective of this course is to introduce students to SageMath to use as a calculator which is very useful in solving mathematical problems of differential and integral calculus by plotting the graphs.

Learning Outcomes:

After completion of this course, students will be able to:

- Learn to plot 2-D graphs and 3-D graphs using SageMath.
- Learn to implement SageMath using templates and exceptional and handling concepts, make use of theoretical concepts to solve problems and visualize the output.

List of Practicals

1. Finding all local extrema and inflection points of a function.
2. Creating and plotting 2-D graphs and 3-D graphs.
3. Finding the surface area of given surface using package.
4. Finding the approximate roots using Newton's method.
5. Plotting and finding area between curves using integrals.
6. Finding the average of a function.
7. Finding the volume of solid of revolution.
8. Finding the solution for a system of linear equations.
9. Finding the divergence and curl of vector valued functions.
10. Using differential calculus to analyze a quintic polynomials features, for finding the optimal graphing window.

BOOKS RECOMMENDED:

- ✓ Razvan A. Mezei, An Introduction to SAGE Programming: With Applications to SAGE, Wiley, 2016. <https://doc.sagemath.org/pdf/en/tutorial/SageTutorial.pdf>.

SCILAB

Course Objectives:

The objective of this course is to introduce students to SciLab language to understand the linear algebra, numerical methods and plotting of 2-D, 3-D graphs.

Learning Outcomes:

After completion of this course, students will be able to:

- Learn to plot 2-D graphs and 3-D graphs using SciLab.
- Learn linear algebra and numerical methods using SciLab.

List of Practical

1. (a) Check whether the following Boolean statements are true or false based on the values of a, b, c, x, and y given below.
(i) $a > c$; (ii) $a = b$; (iii) $(2a+b)/x^2 < 1$; (iv) $x^2 + 2ab + b^2 \leq 23$; (v) $2ac = 2cb$
(b) Determine the result of the following calculations if $a = 2.3$, $b = -2.3$, $c = \pi/2$, $x = 2/\pi$, and $y = \sqrt{3}$:
(i) $(a^2 + bc + x)$; (ii) $\sin(c) + y/c$; (iii) $(a+c)/(x+y)$; (iv) $1/(\cos(c) + \ln(x))$; (v) $(a+c)^3 / b$.
(c) For the vectors u and v, calculate the following:
(i) $w = u+v$; (ii) $r = u/v$; (iii) $z = v*u$; (iv) $t = v*u$
2. Write a program for the following operations of the matrices A, B and C :
(i) Sum of two matrices
(ii) Product of two matrices
(iii) Product of Three matrices
3. Verify whether the given matrix is singular or non-singular and compute its inverse if exists.
4. Write a program for Cramer's rule to solve the simultaneous equations (maximum of three unknowns).
5. Write a program for Gauss Jacobi iteration method to solve the system of linear equations.
6. Solving the ordinary differential equations with initial condition and solving the system of ordinary differential equations.
7. Creating and plotting 2-Dgraphs.
8. Creating and plotting 3-Dgraphs.
9. Finding the approximate roots using Newton's method.
10. Finding the volume of solid of revolution.

BOOKS RECOMMENDED:

- ✓ *Hema Ramachandran and Achutsankar Nair, SCILAB , S. Chand Publishers, 2011.*
- ✓ *Stephen L. Campbell, Jean-Philippe Chancelier, and Ramine, Modelling and Simulation in Scilab/Scicos, 1st Edition, Springer*

Nano science and Nanotechnology

Course Objectives:

This course is based on the emerging area of nanotechnology that has the ability to transform techniques by which materials and products will be produced in the future with novel and superior properties to meet the global challenges. The goal of the course is to prepare and train students in this evolving technology which lies at the interfaces of chemistry, physics and biology. The course starts with fundamental concepts and then proceed to nanoscale phenomena and properties. Further, this is followed by discussions on the synthesis and methods for their characterization. Emerging and potential applications of nanomaterials are considered in the final segment of the course.

Course Outcomes:

- Understand the basic principles of nanomaterials and nanotechnology.
- Learn the synthesis and state-of-the-art characterization techniques for nanomaterials.
- Achieve the knowledge on the stabilities of nanoparticles due to various factors and the idea on recent applications of nanomaterials.
- Gain interest for opting research in the field of nanoscience in order to develop new functional nanomaterials and meet the current challenges of the society.

Unit-I: Basics of nanomaterial (10 hr)

Dimension of nanoregime, concepts of nanoparticle, nanomaterial, quantum dot, nanoscience and nanotechnology, Types of nanomaterials: 0D-, 1D-, 2D- and 3D-nanomaterials, Nanocomposites, Concepts of magnetic- and superparamagnetic nanoparticles, Properties of nanomaterials due to the effect of size and surface energy.

Unit-II: Synthesis and characterization of nanomaterials (15 hr)

Concepts of top-down approach and bottom-up approach, Solution phase vs. vapour phase synthesis, Solution based chemical methods of synthesis of metal-nanoparticles (Au, Pd, Pt, Ag) and metal oxide nanoparticles (Fe_3O_4 , ZnO), Use of reverse micelle in the synthesis of

nanoparticle, Sol-gel process. Surface plasmon resonance, Use of some important techniques to characterize nanomaterials: FT-IR spectroscopy, UV-Visible spectroscopy, Zeta potential analysis, Dynamic light scattering (DLS) measurement, Scanning electron microscopy (SEM) analysis, Transmission electron microscopy (TEM) analysis and powder X-ray diffraction.

Unit-III: Stabilization of nanoparticles (10 hr)

Electrostatic stabilization: Origin of surface charge at the solid-liquid interface, zero-point charge and isoelectric point, electric double layer at the solid-liquid interface, Helmholtz model, Gouy model, Stern model, interaction between two nanoparticles involving electric double layer, interaction between two nanoparticles having surface charges. Capping agents and their role in the steric stabilization of nanoparticles.

Unit-IV: Applications of nanomaterials (10 hr)

Medical fields: Biosensing, drug delivery, dendrimer-based nanomedicine, MRI contrast agent, nanoscale device in medical treatment; Applications of nanomaterials in energy storage and energy conversion devices, Waste water treatment by using nanoparticles, Nanoparticle catalyzed oxidation of CO to CO₂.

Text Books:

- ✓ A. K. Das, M. Das, *An Introduction to Nanomaterials and Nanoscience*, 1st Ed., CBS Publishers & Distributors Pvt. Ltd., 2017.
- ✓ F. J. Owens, C. P. Poole Jr, *The Physics and Chemistry of Nanosolids*, Wiley-Interscience, 2008.
- ✓ N. Kumar, S. Kumbhat, *Concise Concepts of Nanoscience and Nanomaterials* Scientific Publishers, 2023.

Reference Books:

- ✓ *Nanomaterials-Synthesis, Properties and Applications*, Edited by A. S. Edelstein and R. C. Cammarata, Institute of Physics Publishing, London, 1998.
- ✓ G. A. Ozin, A. C. Arsenault, L. Cademartiri, C. A. Mirkin, *Nanochemistry: A Chemical Approach to Nanomaterials*, RSC Publishing, 2005
- ✓ E. L. Wolf, *Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience*, Wiley-VCH, 2nd Reprint, 2005.
- ✓ D. C. Agrawal, *Introduction to Nanoscience and Nanomaterials*, World Scientific, 2020.
- ✓ B. S. Murthy, P. Shankar, B. Raj, B. B. Rath, J. Murday, *Textbook of Nanoscience and Nanotechnology*, 1st Ed., Orient Blackswan Pvt. Ltd., 2012.

Surfactants and Detergents

Course Objectives:

The objective of this course is to enrich the subject knowledge of students in terms of surfactants and detergents. This course is freshly designed which includes classification, synthesis mechanism, surface properties and industrial applications of the prepared oleo-derivatives.

Course Outcomes:

- Understand the basic chemistry and classification of surfactants and detergents.
- Gain knowledge on characterisation of surfactant assemblies.
- Describe synthesis methodologies and surface properties of anionic, cationic, non-ionic and amphoteric surfactants and detergents.
- Learn analytical skills/ methods in characterizing surfactants, detergents and builders.

Unit-I: Structural aspects of surfactants (12 hrs)

Surfactants, Classification (Anionic surfactants, Cationic head surfactant, Zwitterionic surfactants, Nonionic surfactant, Biosurfactants, Gemini surfactant, double tailed surfactant, Bolaform), Synthesis of Surfactant, Behaviour of Surfactants in aqueous and nonaqueous solution, Different types of interactions, Surface activity, Surface tension, Factors for organization of surfactants and types of organized assemblies, Hydrophobic interactions, electrostatic interactions, Critical micellar concentration (CMC), Factors affecting CMC, Methods of CMC determination. Aggregation number, Shape and Size of micelle.

Unit-II: Characterization and application of surfactant assemblies

Spectroscopic investigation and analytical methods, determination of polarity of micelle, structures of micelle, Determination of aggregation number, Industrial Applications of surfactants, Beneficiation of minerals, micellar catalysis, Drug delivery, Wetting, Dispersion and foaming.

Unit-III: Characterization and application of detergents

Detergents, Principal groups of synthetic detergents, Anionic detergents, Cationic detergents, Non-ionic detergents, Amphoteric detergents, Industrial methods of preparation of Detergents, Concept of hard and soft water, Removal of hardness of water, General idea of builders, additives, Manufacture of Shampoos. theories of glyceride structure, Hydrolysis of glycerides, Oils and fats, Use of oil in the manufacturing of soap, Principle of soap cleaning, Analysis of soaps as per BIS standards, The use of enzymes in detergents. Catalytic hydrogenation of oil, Recovery of Nickel from hydrogenated oil product.

Unit-IV: Analytical techniques and impact

Analytical techniques for synthetic detergents, surfactants and builders: Active matter, SO₃ content, molecular weight, amine value, moisture content, P₂O₅ content, silicate analysis, Na₂CO₃/ NaOH content, DOS in CMC etc. Biological effects and toxicity of surfactants, mechanism of biodegradability and eutrophication, estimation of biodegradability.

Text Books

- ✓ *B. K. Sharma, Industrial Chemistry, Part-1 and Part-2, Krishna Prakashan, 2023.*
- ✓ *P. K. Chattopadhyay, Modern Technology of Soaps and Detergents, 2003.*
- ✓ *M. Drew, Surfactant science and technology, John Wiley & Sons, 2005.*

References Books

- ✓ *R. J. Farn, ed. Chemistry and technology of surfactants, John Wiley and Sons, 2008.*
- ✓ *U. Zoller, ed. Handbook of detergents, part E: applications, Vol. 141, CRC Press, 2008.*
- ✓ *M. Showell, ed. Handbook of detergents, part D: formulation. Vol. 128, CRC Press, 2016.*
- ✓ *The complete Technology Book on Detergents, 2nd Ed., Niir Board, 2013.*
- ✓ *Soaps and Detergent Edited by K. S. Parasuram.*
- ✓ *Surfactants and Interfacial Phenomenon by M. J. Rosen.*
- ✓ *Catalysis in Micellar and Macromolecular Systems by E. J. Fendler and J. H. Fendler.*
- ✓ *The Manufacture of Soaps other Detergents and Glycerin Edited by Edgar Woollatt.*