V.S.R. Government Degree & P.G. College
Movva, Krishna DT. 521135

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MULTIDISCIPLINARY COURSES

S.No.	Semester-1	
	A student has to choose ONE course from among the six courses listed against the semester. Students are not permitted to choose the repeat courses already undergone at the higher secondary level or Intermediate level or 12th class and the major discipline chosen as the multidisciplinary course.	
1	Introduction to Social Work	Click Here
2	Principles of Psychology	Click Here
3	Indian History	Click Here
4	Principles of Biological Sciences	Click Here
5	Principles of Chemical Sciences	Click Here
6	Principles of Physical Sciences	Click Here

S.No.	Semester-2
No Multidisciplinary course is offered in Semester 2	

S.No.	Semester-3	
	A student has to choose ONE course from among the six courses listed against the semester. Students are not permitted to choose the repeat courses already undergone at the higher secondary level or Intermediate level or 12th class and the major discipline chosen as the multidisciplinary course.	
1	Introduction to Public Administration	Click Here
2	Principles of Management	Click Here
3	Principles of Accounting	Click Here
4	Basic Electronics	Click Here
5	Health and Hygiene	Click Here
6	Basic Mathematics	Click Here

S.No.	Semester-4	
	A student has to choose ONE course from among the six courses listed against the semester. Students are not permitted to choose the repeat courses already undergone at the higher secondary level or Intermediate level or 12th class and the major discipline chosen as the multidisciplinary course.	
1	Fundamentals of Economics	Click Here
2	Indian Philosophy	Click Here
3	Performing Arts	Click Here
4	Introduction to Geography	Click Here
5	Basic Statistics	Click Here
6	Introduction to Nanotechnology	Click Here

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Multidisciplinary Course

w.e.f. AY 2023-24

SEMESTER-I

Introduction to Social Work

Credits: 2 2 hrs/week

Learning Outcomes:

By successful completion of the course, students will be able to:

1. *Understand the basic concepts relating to social work practice, values, principles of social work and social problems in India*
2. *List out different approaches of providing help to the people in need.*
3. *Acquaint the process of primary methods of social work*
4. *Get to know the skills of working with individuals, groups and communities.*

Syllabus

Unit-I:(07Hrs)- Introduction to social work and concepts related to social work

Introduction to Social Work- Definition- Scope- objectives - Functions- social service, social welfare services, social reform, major social problems in India; Social work philosophy, values, objectives, principles, methods and fields of social work.

Unit-II:(09Hrs) Methods of Working with Individuals and Groups

Social case work –Definition-scope and importance of social case work, principles and process of social case work -Tools and techniques in social case work- Counselling skills. Social Group Work-Definition-scope- the need for social group work –Group work process - Principles of Group Work -Stages of Group Work-Facilitation skills and techniques.

Unit-III: (09Hrs)Workingwith Communitiesand Field Work in social work

Community – definition - characteristics- types- community organisation as a method of social work-definition-objectives-principles- phases of community organization - concepts of community development, community participation and community empowerment.

Field work in social work – Nature, objectives and types of field work - Importance of field work supervision.

Suggested Co-curricular Activities:(05 hours)

1. Divide the students into groups, each group containing not exceeding 10 students depending upon the total number of students in a class or section. Each group can search in internetabout any one of the institutions which work for the welfare of children or women or elderly or scheduled caste and scheduled tribe children or differently abled persons or Juvenile homes or Correctional homes or hospitals or Mahila Pragathipranganam or Swadhar project or any social welfare project or non governmental organizations (NGOs) to have an idea about welfare agencies working for the needy.
2. Ask each group to exchange and discuss the information with other groups in the classroom with the information they collected on Internet.
3. Group Discussion with the students- what type of community problems they observe in their villages/towns/cities? Ask them to tell what are the line departments which will help to solve the problems of their communities and suggest them what type strategies help the communities to empower.
4. Invited lectures/Training by local experts
5. Visit to a community
6. Assignments, Quiz etc.

References:

1. Chowdhary, Paul. D. (1992). Introduction to Social Work. New Delhi: Atma Ram and Sons.
2. Friedlander W.A. (1955). Introduction to social welfare, New York, Prentice Hall.
3. Government of India, (1987). Encyclopedia of Social Work in India (Set of 4 Volumes). New Delhi, Publications Division, Ministry of Information and Broadcasting.
4. Lal Das, D.K. (2017). Practice of Social Research – Social Work Perspective, Jaipur,
5. Rawat Publications.
6. Madan, G.R. (2009). Indian Social Problems (Volume 1 & 2). New Delhi: Allied publishers Private Limited.
7. Siddiqui, H.Y.(2007). Social Group Work. Jaipur: Rawat Publications
8. Pasty McCarthy &Carolin Hatcher, (2002). Presentation skills. The Essential Guide for Students. New Delhi, Sage Publications.
9. Websites on Social work methods.

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ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Multidisciplinary Course

w.e.f. AY 2023-24

SEMESTER-I

PRINCIPLES OF PSYCHOLOGY

Credits: 2 2 hrs/week

Unit I

Introduction: Definition, Origin of psychology, Psychology as a scientific study of behavior, applied fields of psychology Biological bases of behaviour

Sensory and perceptual processes: Structure and function of visual and auditory senses; Attention: selective, sustained and divided attention. Perception: Nature and determinants; Perceptual constancies

Unit II

Emotion and Motivation: Nature of emotion; components of emotions. Theories of emotion: James-Lange, Cannon-Bard and Schachter-Singer. Motivation: Nature and types; Maslow's hierarchy model

Unit III

Individual differences: Learning and memory: Learning – Definition, Classical and instrumental conditioning: principles of classical conditioning, schedules of reinforcement, Memory - Sensory, short-term and long-term memory; forgetting and its causes

Personality - Trait and type approaches; assessment of personality. Intelligence: Concept of IQ and measurement

Books recommended:

Baron, R. A. (2006). *Psychology* (5th Ed.). New Delhi: Pearson Education.

Ciccarelli, S. K., & Meyer, G. E. (2009). *Psychology*. Delhi: Pearson Education.

Coon, D., & Mitterer, J. O. (2007). *Introduction to Psychology: Gateway to mind and behaviour*. New Delhi:Cengage.

Gerrig, R. J., & Zimbardo, P. G. (2006). *Psychology and Life* (17th Ed.). New Delhi: Pearson Education.

Singh, A. K. (2009). *Uchachtar Samanya Manovigyan*. Varanasi: Motilal Banarasi Das.

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Multidisciplinary Course

w.e.f. AY 2023-24

SEMESTER-I

INDIAN HISTORY

Credits: 2 2 hrs/week

Learning Outcomes:

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

- Students will have an overall understanding of Indian history and culture from ancient to modern India.
- Learn about the changes in society, economy, politics, and culture under various dynasties.
- Know mediaeval Indian history and culture.
- Understand the greatness of the Mughals and their administration.
- Visualise how the Europeans are settled and how the colonials introduce various economic policies and their impacts.
- Know the stages of the Indian Freedom Struggle and the roles of Gandhi and Subash Chandra Bose.

Syllabus:

Unit-I

Ancient Indian History and Culture: What is History-Evolution of Man-Science and Technology in Harappan Civilisation-Vedic Literature- Difference between Jainism and Buddhism Philosophy-Ashoka Dhamma Policy-Science and Technology in Guptha Period- Chronology of Various Dynasties that ruled India (6^{th} Century BC to 1206 CE)

Unit-II

History and Culture of Medieval India: Delhi Sultanate: Rulers (Brief), Alla-Ud-Din-Khilji and Muhammad-Bin-Tuglaq Reforms-Greater Mughals (Brief)-Mughal Administration-Akbar Religious Policy-Mughal Art and Architecture-Bhakti Saints

Unit-III

History of Modern India: European Settlements-British Revenue Policies-Economic Impact of British Rule-Socio-Religious Reform Movements-Causes for 1857 Revolt-Indian Freedom Struggle: Vandemataram, Home Rule Movement-Gandhi's Role: Non-Cooperation Movements, Salt Satya Graha and Quit India Movement-Subash Chandra Bose-Partition of India.

Curricular Activities:

- Map-pointing/Collection of Historical news paper cuttings.
- Prepare a chart on Ancient, Medieval Dynasties and their rulers.
- Collect the various National Leaders photographs
- Prepare a list of Historical events in chronological order
- Unit Tests/Quiz/Debates/Workshops/Book Reviews/Seminars/Assignments.
- Collection of Articles and Books/Preparation of Videos/Charts
- Photos Exhibitions on Historical Importance/Visit to the Museums

References:

1. E.H. Carr., What is History, Penguin, 1961
2. R.S.Sharma., Ancient India, New Delhi, 1996
3. D.N.Jha, Ancient India: In Historical Outline, Manohar Publishers, 1999.
4. R.C.Majumdar, K.K.Dutta &H.C.Roy Chowdhuri (ed.), An Advanced History of India, Macmillan, 1948.
5. Romila Thapar., Early India: From the origins to 1300, University of California Press, 2004.
6. Ranabir Chakravarthi., Exploring Early India, upto 1300 A.D, Primus Books, 2016.
7. Satish Chandra., History of Medieval India, 800-1700, Oriental Blackswan, 2007.
8. Satish Chandra., Medieval India: From Sultanate to the Mughals, Part-I & II, Har Anand Publications, 2005.
9. I.H.Qureshi., The Administration of the Sultanate of Delhi, Oriental Books, 1977.
10. Harbans Mukhia., The Mughals of India, Wiley Publishers, 2008.
11. JhanF.Richards., The Mughal Empire, All Volumes, Cambridge University Press, 2012.
12. Sumit Sarkar., Modern India, Pearson India, 2014.
13. Śekhara Bandyopādhyāẏa.,From Plessey to Partition: A History of Modern India, Oriental Blakswan, 2004
14. V.D.Mahajan., Modern Indian History, S.Chand and Company Limited, 2020.
15. Bipan Chnadra, A.Tripathi, Barunde., Freedom Struggle, National Book Trust, 1987.

16. R.C.Dutt., The Economic History of India Under Early British Rule, K.Paul, Trench, Trubner& Company Limited, 2008.
17. Tirthankar Roy., How British Rule Changed India's Economy: The Paradox of the Raj, Springer International Publishing, 2020.
18. S.N.Sen., An Advanced History of Modern India, Macmillan India, 2010.
19. Ishita Banerjee-Dube., A History of Modern India, Cambridge University Press, 2015

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Multidisciplinary Courses

w.e.f. AY 2023-24

SEMESTER-I

PRINCIPLES OF BIOLOGICAL SCIENCES

Credits: 2 2 hrs/week

Learning Objectives: By the end of this course the learner can:

1. Acquire logic to evaluate fundamental biological concepts at various levels of biological organisation including the molecular, cellular, organismal and systems levels.
2. Communicate fundamental biological knowledge between tiers of biological organisation.
3. Apply common biological principles across all levels of biological organization.

Learning Outcomes: On completion of this course students will be able to:

1. Understand the relationship between structure and function at all levels.
2. Recognise the mechanisms underlying biological evolution, its patterns, and its significance as biology's overarching unifying principle.
3. Understand the contributions of biology to the resolution of medical, ethical, social, and environmental concerns in human affairs.

UNIT-I Diversity of Life

1.1 Introduction to Biology, Branches of Biology, Basic Principles of Biology
1.2 Biological Classification-Two kingdom and Five kingdom classification, Viruses, Viroid's and Lichens
1.3 Diversity in the living world, Taxonomic categories, Taxonomic aids
1.4 Plant organization-The form, structure and function of plant vegetative and reproductive organs, Classification of Plant Kingdom,
1.5 Basis of Animal Classification, Classification of Animal Kingdom

UNIT-II Biomolecules and metabolisim

2.1 Ultra structure of cell and Cell organelles (Structure and Functions), Plant cell vs Animal cell
2.2 Plant Physiology: Photosynthesis, Respiration, Transportation, Mechanisms of Nitrogen fixation.
2.3 Plant growth and development, physiology of flowering.
2.4 Human Physiology: Digestion, Respiration, Circulation
2.5 Male and female reproductive organs, gametogenesis, fertilization.

UNIT-III Principles of Biology

3.1 Genetics: Mendel's laws of inheritance, Genetic disorders- Colour blindness, Sickle cell anaemia.

3.2 Evolution: Geological time scale for evolution of plants and vertebrates, Origin and evolution of plants and man

3.3 Common Human Diseases: causing organism, prevention and treatment- malaria, dengue, AIDS, cancer, corona.

3.4 Common Plant Diseases: causing organism, prevention and treatment- Black spot, Leaf spots, Powdery mildew, Blight, Canker.

3.5 Biotechnology: Tools and process of recombinant DNA technology, Applications of biotechnology in agriculture, food industry, medicine and transgenic animals.

Text Books

1. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi.
2. Kotpal, R.L.2022. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut).
3. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.

Reference Books

1. Sreekrishna V. 2005. Biotechnology –I, Cell Biology and Genetics. New Age International Publ. New Delhi, India.
2. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.

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SEMESTER-I

PRINCIPLES OF CHEMICAL SCIENCES

Credits: 2 2 hrs/week

I. Course Outcomes: At the end of the course the student will be able to-

1. Understand the structure of atom.
2. Identify the isotopes and isobars.
3. Define acids and bases and predict the nature of salts.
4. Explain ionic and covalent bonding.
5. Describe the importance of Chemistry in daily life.

II. Syllabus:

Unit I: Matter, Atoms, Molecules & Nuclear Chemistry

Classification of matter, Dalton atomic theory, Thomson Model, Rutherford Model, Bohr's model of atom, quantum numbers, electronic configuration, Aufbau Principle, Pauli's exclusion principle, Hund's rule. Isotopes-Isobars, Nuclear decay, Band of Stability, Nuclear Reaction types, Nuclear Applications.

Unit II: Elements, Classification and Chemical Bonding

Classification of elements, Periodic Classification of elements based on electronic configuration, classification into types, classification into metals, non-metals and metalloids, periodic properties-atomic radii, ionisation enthalpy, electronegativity, Octet rule, ionic bond properties of Ionic compounds-covalent bond, properties of covalent molecule.

Unit III: Acids, Bases, Salts, Chemistry in Daily life

Definition, types and properties of Acids, Bases, Salts, strength of acids and bases, pH, Importance of Chemistry in daily life. (food, drugs, textiles, preservatives, soaps and detergents.)

III. List of Reference Books:

1. Inorganic Chemistry by Puri and Sharma
2. Basic concepts of Inorganic Chemistry by D.N.Singh

IV. Co-curricular activities:

Projects on Importance of Chemistry in food, drugs, textiles, preservatives, soaps and detergents.

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SEMESTER-I

PRINCIPLES OF PHYSICAL SCIENCES

Credits: 2 2 hrs/week

Course Objective:

The course "Principles of Physical Sciences " is designed to introduce arts students to fundamental concepts and principles of physical sciences, fostering a deeper understanding of the physical world and its interconnections with various disciplines.

Learning outcomes:

Upon completion of the course "Principles of Physical Sciences for Arts Students," students from arts backgrounds will be able to:

1. Understand the foundational principles of physical sciences: Students will develop a comprehensive understanding of the core principles and concepts in physical sciences.

2. Analyse and interpret scientific information: Students will acquire the ability to critically analyse scientific information and data related to physical sciences.

3. Apply physical science principles to real-world scenarios: Students will develop the skills to apply physical science principles to solve real-world problems and scenarios.

Syllabus:

Unit 1: Introduction to Physics

Nature of Physics: Overview of physics as a discipline, its scope, and its relationship to other sciences. Scientific Method in Physics: Introduction to the scientific method and its application in the study of physics. Measurement and Units: Understanding the principles of measurement, SI units, and the importance of accurate and precise measurements. Scalars and Vectors: Differentiating between scalars and vectors, understanding vector addition and subtraction.

Unit 2: Mechanics for Arts Students

Motion and Forces: Introduction to the principles of motion, including velocity, acceleration, and the laws of motion. Energy and Work: Understanding the concept of energy, different forms of energy, and the relationship between work and energy. Circular Motion: Exploring the principles of circular motion, centripetal force, and applications in real-world scenarios. Gravity: Introduction to the concept of gravity, Newton's law of universal gravitation, and its implications.

Unit 3: Waves and Optics for Arts Students

Waves: Understanding the properties and characteristics of waves, including wave types, wave motion, and wave interference. Sound Waves: Exploring the nature of sound waves, including properties of sound, sound propagation, and the Doppler effect. Light and Optics: Introduction to the behavior of light, reflection, refraction, and the formation of images by mirrors and lenses. Wave Optics: Understanding the principles of interference, diffraction, and polarization of light waves.

Reference Books:

1."Principles of Physics" by David Halliday, Robert Resnick, and Jearl Walker: This textbook covers the fundamental principles of physics, including mechanics, electromagnetism, thermodynamics, and modern physics. It provides a comprehensive introduction to the subject and includes numerous examples and exercises for practice.

2. "University Physics" by Hugh D. Young and Roger A. Freedman: This textbook is widely used in university-level physics courses. It covers a wide range of topics in classical physics, modern physics, and thermodynamics. It is known for its clear explanations and problem-solving approach.

3. "Concepts of Modern Physics" by Arthur Beiser: This book provides an introduction to the principles and concepts of modern physics, including quantum mechanics, atomic and nuclear physics, and relativity. It is suitable for students with a basic background in physics and mathematics.

4. "The Feynman Lectures on Physics" by Richard P. Feynman, Robert B. Leighton, and Matthew Sands: This three-volume set is based on the famous lectures given by physicist Richard Feynman. It covers a wide range of topics in physics, including mechanics, electromagnetism, quantum mechanics, and statistical mechanics. The lectures are known for their engaging style and intuitive explanations.

5. "Physical Science" by Bill Tillery: This textbook provides a comprehensive introduction to the principles of physical science, covering topics such as motion, forces, energy, waves, electricity, and magnetism. It is designed for introductory-level courses and includes numerous examples, illustrations, and practice problems.

6. "Fundamentals of Physics" by Jearl Walker, David Halliday, and Robert Resnick: This textbook is widely used in physics courses and covers the fundamental principles of classical physics. It includes a strong emphasis on problem-solving and conceptual understanding.

Student activities:

1. Conduct research on a famous physicist or a significant discovery in the field of physics. Write a short report highlighting the physicist's contributions or explaining the importance of the discovery. Include information about how the discovery impacted other scientific fields or technological advancements.

2. Watch videos or animations demonstrating circular motion, such as the motion of objects on a Ferris wheel or a car turning on a curved track. Identify the forces involved, including the centripetal force, and explain how they contribute to the object's circular motion. Discuss real-world examples where circular motion is significant, such as satellites orbiting the Earth.

3. Set up a wave demonstration using a rope or a slinky to visualize the properties of waves, such as wavelength, frequency, amplitude, and wave speed. Observe how these properties change when altering the parameters of the wave, such as tension or length.

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Multidisciplinary Course

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SEMESTER-III

INTRODUCTION TO PUBLIC ADMINISTRATION

Credits: 2 2 hrs/week

Course Description:

Introduction to Public Administration is an interdisciplinary course that provides an overview of the theory and practices of public administration. The course aims to familiarize students with the nature, scope, recruitment and accountability of public administrators in India.

Course Objectives:

1. Understand the concept and scope and evolution of public administration.
2. Understand the relationship between public administration and public policy.
3. Develop critical thinking and analytical skills to evaluate public administration practices.

Course Outcomes:

1. Awareness about the evolution and growth of the discipline of Public Administration.
2. Familiarity with the constitutional framework on which Indian Administration is based.
3. Understanding the in-built control mechanisms over constitutional bodies and administration in general.

Course Topics:

Unit: I

1. Introduction to Public Administration - Woodrow Wilson - Definition and nature and scope of public administration - Significance - Distinction between public and private administration

Unit: II

2. All India Services - Central Services - State Services - Importance of All India Services UPSC & SPSCs Powers and Functions - NITI Aayog

Unit: III

3. Accountability of Administration in India - Legislative - Executive – Judiciary - Judicial Activism - E-Governance in India - Good Governance initiatives – Functions and roles of Administrators

Activities:

1. Class participation and discussions
2. Field trips to government offices
3. Individual or group assignments
4. Student’s projects – Individual and group
5. Quizzes or Slip tests.
6. Presentations
7. Research papers

Books:

1. Public Administration by Awasthi & Maheswari
2. Indian Administration by Maheswari
3. Administrative Theories by Mohit Bhattacharya
4. Comparative Administration by Mohit Bhattacharya
5. Indian Government & Politics by B.L.Fadia

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MULTIDISCIPLINARY COURSE

w.e.f. AY 2023-24

SEMESTER-III

PRINCIPLES OF MANAGEMENT

Credits: 2 2 hrs/week

Unit – I:

Definition of Management, Functions of Management, Principles of Management, Levels of Management, Business Strategy-SWOT Analysis

Unit – II:

Purpose of Planning, Planning Process, Types of Plans, Objectives, Managing by Objectives (MBO); Organizing; Organization Structure, Formal and Informal Organization, Decision Making Process

Unit – III:

Directing, Motivation, Motivation Theories, Leadership Styles, Leadership Theories, Controlling, Process of Controlling, Types of Control-Budgetary and Non-Budgetary, Control Techniques, Cost Control, Purchase Control, Maintenance Control, Quality Control

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MULTIDISCIPLINARY COURSE

w.e.f. AY 2023-24

SEMESTER-III

PRINCIPLES OF ACCOUNTING

Credits: 2 2 hrs/week

Unit – I:

Need for Accounting, Definition, Objectives, GAAP, Accounting Cycle, Classifications of Accounts and its Rules, Book Keeping and Accounting, Double Entry Book-Keeping, Journalizing.

Unit – II:

Types of subsidiary Books, Cash Book, Three column Cash Book-Petty Cash Book (Including Problems), preparation of Trail Balance, Errors, Meaning, Types of Errors, Rectification of Errors.

Unit – III:

Need for Bank Reconciliation, Reasons for Difference between Cash Book and Pass Book Balances, Preparation of Bank Reconciliation Statement, Profit and Loss Account, Balance Sheet, Final Accounts with Adjustments, Accounting Package-Tally.

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Multidisciplinary Course

w.e.f. AY 2023-24

SEMESTER-III

BASIC Electronics

Credits: 2 2 hrs/week

UNIT-I: (10 hrs)

Brief History of Electronics, Overview of Atom and its particles, Voltage, Current & Resistance. Ohms Law, Series and Parallel Circuits, Short and Open circuit. Usage of Digital multimeter.

Power Sources: DC and AC, Electrical energy, consumption of electrical power, Kilowatt hour (KWh). Batteries: How to Choose a Battery, types, lead acid batteries, Nickel – Cadmium, Lithium – Ion & Solar cell.

Identifying Phase, Neutral and Earth on power sockets, Electric tester, First aid for electric shock. Basics of House wiring, Overloading, electrical circuit protection using Fuses, MCBs, earthing and its necessity, awareness of electrical safety tools.

UNIT-II: (10 hrs)

Classification of solids according to electrical conductivity (Conductor, Semiconductor & Insulator). Intrinsic & Extrinsic Semiconductors. Vacuum Tubes, Diodes, Transistors, ICs & Relays: advantages, disadvantages, applications, and their uses.

Transducers and Sensors: Advantages, various parts, types, and applications, LED, IR LED, Photo Resistor & Photodiode (Symbol & applications of each)

DC Regulated Power Supply, IC Voltage Regulators, UPS

Home Appliances: Electric geyser, micro wave oven and refrigerator

UNIT-III: (10 hrs)

Basics of Communication Systems: Transmitter, Receiver, Channel i) wired channels ii) wireless channels, Modulation, Demodulation.

Daily usage of Electronic Devices include: Mobile phones, Digital Camera, audio & video systems, TV (Television), Computer, Laptop, LED lights, GPS, iPod and Tablets, Wi-Fi and Internet. Importance of energy efficiency in electrical appliances.

Electronics in different fields: Information processing, Medicine and research, Computers and other electronic instruments, Automation.

Resource Material

(1) Electrical technology by V.K. Mehta & Rohit Mehta (S. Chand & Company Pubs.)

(2) Few references from Wikipedia free Encyclopedia.

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Multidisciplinary Course

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SEMESTER-III

HEALTH AND HYGIENE

Credits: 2 2 hrs/week

The course is designed to provide a complete guidance on health and hygiene systems, guidelines for implementing and role of government and public in maintaining a healthy life. At the end of the course the student shall be able to understand –

- the importance of health and hygiene in life
- the importance of nutrition for a healthy life
- different health care programmes of India
- basic concept of health impact assessment as a means of assessing the policies, plans and projects using quantitiative and qualitative techniques
- importance of community and personal health & hygiene measures
- Importance of food, social tenets, mental condition, physical activity on health

Learning Objectives:

- To provide knowledge on different health indicators and types of hygiene methods
- To impart knowledge on different health care programmes taken up by India
- To make student understand the latest concepts of health such as HIA, EIA, SIA and SEA
- To enable student with disaster mitigation strategies
- To create awareness on community health and hygiene
- To enrich knowledge on communicable and non-communicable diseases and their control
- To aware the student on the importance of food, social strategies, mental status and physical activities on health
- To introduce different community-based mobile apps on health to student and thereby to the community

Learning / Course Outcomes: On completion of this course, the students will be able to understand -

- What is a healthy diet
- How can we use available information to optimize our diet?
- Can nutrition be used for a healthy life?
- Is there a one-size-fits-all "good" diet or should we individualize our dietary goals?
- Disaster management and responsiveness of public in pandemic and epidemic diseases
- Assess the impact of policies on health and hygiene Health measures to consider while travelling
- Awareness in public through digital media viz., mobile apps

Unit I: Basics of Nutrition **10 Hrs.**

1. Nutrition – definition, importance, Good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning
2. Carbohydrates –functions, dietary sources, effects of deficiency.
3. Lipids –functions, dietary sources,effects of deficiency.
4. Proteins –functions, dietary sources, effects of deficiency.
5. Brief account of Vitamins- functions, food sources,effects of deficiency,
6. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc
7. Importance of water– functions, sources, requirement and effects of deficiency.

Unit II: Health **10 Hrs.**

8. Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies
9. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR (Indian Council of Medical Research), IDA (Indian Dietetics Association),WHO-India, UNICEF-India

10. National Health Mission: National Rural Health Mission (NRHM) Framework, National Urban Health Mission (NUHM) Framework
11. Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram(RBSK); India Newborn Action Plan (INAP); Adolecent Heatlh- Rashtriya Kishor Swasthya Karyakram (RKSK)
12. Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public

Unit III: Hygiene **10 Hrs.**

13. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (**WA**ter, **S**anitation and **H**ygiene) programme
14. Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); About Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Rogi Kalyan Samitis
15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places
16. Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantritva Abhiyan (PM Suman Yojana), My Hospital (Mera aspataal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP

REFERENCES

- **Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009)** *Textbook of Human Nutrition(3rd edition*) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
- **Swaminathan (1995)***Food & Nutrition*(Vol I, Second Edition) The Bangalore Printing &Publishing Co Ltd., , Bangalore
- **Vijaya Khader (2000)**Food, nutrition & health, Kalyan Publishers, New Delhi
- **Srilakshmi, B., (2010)***Food Science, (5th Edition)* New Age International Ltd., New Delhi

- Weblinks: https://nhm.gov.in/
    - National Rural Health Scheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49
    - National Urban Health Scheme: https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137
    - Village health sanitation & Nutritional committee https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225
    - About Accredited Social Health Activist (ASHA) https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=150&lid=226
    - Village Health Nutrition Day https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=152&lid=228
    - Rogi Kalyan Samitis https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=153&lid=229
    - Health Impact Assessment - https://www.who.int/hia/about/faq/en/ (suggested information only) http://www.euro.who.int/ data/assets/pdf_file/0011/261929/Health-in-Impact-Assessments-final-version.pdf?ua=1
    - WASH https://www.unicef.org/wash/ and https://www.unicef.org/wash/files/UNICEF_Strategy_for_WASH_2016_2030.PDF
    - Healthy Living https://www.nhp.gov.in/healthylivingViewall

Note: The above web links are from MoHFW, GoI. Teachers can prepare their notes from other resources also.

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

Multidisciplinary Course

w.e.f. AY 2023-24

SEMESTER-III

BASIC MATHEMATICS

Credits: 2 2 hrs/week

Course Outcomes

After successful completion of this course, the student will be able to

1. understand the concept of sets and relations
2. know the method of rationalisation in surds
3. understand Co-ordinate system and Locus
4. find the Point of intersection of two straight lines
5. find the Rank of a matrix.

Course Content

Unit – I : Algebra

Sets and Relations : Sets – Finite and Infinite sets – Equality of sets – Subsets – Power set – Universal set – Union and Intersection of sets – Relations – Equivalence relations –Examples.
Surds : Surd – Pure and Mixed surds **–** Similar surds – Monomial surds – Binomial Surds – Rationalisation.
Logarithms : Definition – Properties of Logarithms – Common Logarithms.

Unit – II : Co-ordinate Geometry

Co-ordinate system : Distance between two points – Division formula – Centroid – Areas of Triangles and Quadrilaterals.
Locus : Definition of Locus – Equation of Locus
Straight Line: Different forms – Reduction of general equation into various forms –Point of intersection of two straight lines

Unit – III : Matrices

Matrices: Types of matrices – Examples – Addition of Matrices – Subtraction of Matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose of a matrix and determinants – Minors and Cofactors – Adjoint of a matrix – Inverse of a matrix – Rank of a matrix – definition and examples.

Activities:
Seminar/ Quiz/ Assignments/ Problem Solving Sessions.

Reference Books :

1. Basic Abstract Algebra by P.B.Bhattacharya, S.K.Jain, S.R.Nagpaul, Cambridge University Press.
2. Co-ordinate Geometry by M.L.Khanna, Jai Prakash Nath Publications.
3. A Text book of Matrices by Shanti Narayan & PK Mittal, S.Chand Publications.

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SEMESTER-IV

FUNDAMENTALS OF ECONOMICS

Credits: 2 — 2 hrs/week

UNIT I- BASIC CONCEPTS (08 Hours)

Meaning of Economics, Nature and Scope of Economics, Micro & Macro Economics meaning and difference.

UNIT II- MICRO ECONOMIC CONCEPTS (10 Hours)

Theory of Demand and Supply, Meaning of utility, diminishing marginal utility; indifference curves analysis and consumers equilibrium; Production Function, Types of Costs and Revenue, Classification of Markets.

UNIT III- MACRO ECONOMIC CONCEPTS (12 Hours)

Meaning - Concepts and measurement of National Income ; Definition of Money-Types and Functions ; Evolution and Functions of Central Bank, Commercial Banks; Meaning of Inflation- causes and Anti-inflationary policies, Monetary and Fiscal Policy.

References:

Ahuja H. L. Principles of Micro economics, S. Chand Limited, Delhi.

Koutsoyiannis, A. (1990), Modern Microeconomics, Macmillian.

Gupta, S.B, Monetary Economics, S Chand & Co, New Delhi.

Dwivedi,D.N , Microeconomics-Theory & Applications‖, Pearson.

Stonier,A.W&Hague.Douglas.C ,A Text Book of Economic Theory, Pearson.

Ackley.G , Macroeconomics: Theory And Policy, Macmillan, New York

Dwivedi,D.N , Macroeconomics: Theory and Policy , Tata McGraw Hill Education

Jhingan, M.L , Macroeconomics ,Vrinda Publications, New Delhi.

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SEMESTER-IV

INDIAN PHILOSOPHY

Credits: 2 2 hrs/week

Learning Objectives:

The student should understand and appreciate the diverse philosophical theories of ancient India. The student should develop rational perspectives on pertinent questions of the world and human life, as viewed by ancient thinkers. The student should comprehend the intellectual heritage and legacy of free thinking in India.

Learning Outcomes: On successful completion of the course, the student

1. Understands what Philosophy is and its significance in human life.
2. Gains knowledge of Indian philosophical tradition and intellectual heritage.
3. Develops a critical understanding of philosophical theories of ancient systems.
4. Examines the rational character of Indian theories of knowledge.
5. Appreciates the ethical insights of ancient thinkers.

Unit-I

Introduction to Philosophy – Metaphysics, Epistemology and Ethics - Indian Philosophical Tradition – Vedas – Philosophical Speculations of Upanishads – Darsanas – Orthodox and Unorthodox Systems of Philosophy – Metaphysical Diversity – Overview.

Unit -II

Indian Epistemology – Knowledge – Sources of Knowledge (Pramanas) – Perception (Pratyaksha) – Inference (Anumana) – Sabda (Testimony) – Other Pramanas – Theories of Error – Nyaya Philosophy

Unit –III

Ethics – Morality and Ethics – Significance of Ethics in Indian Philosophy - Rita – Hedonism of Materialists - Dharma – Karma – Moksha - Ethics of Renunciation – Nirvana – Pamcha Vratas – Purusharthas - Duties of a Student - Varna and Asrama - Ethics of Bhagavad-Gita – Nishkama Karma – Sthithaprajna

Activities:
Group Discussions
Debates
Assignments
Essay Writing
PPT Presentation
Charts/Poster presentation

Reference Books:

- An Introduction to Indian Philosophy by Satishchandra Chatterjee and DM Dutta, Motilal Banarsidass Publishers, 2016
- The Essentials of Indian philosophy by M. Hiriyanna, Motilal Banarsidass Publishers, 1995
- A Source Book in Indian Philosophy by Dr. Sarvepalli Radhakrishnan, Princeton University Press, 2014
- A History of Indian Philosophy by Surendranath Dasgupta, the University of California, 1922
- A Critical Survey of Indian Philosophy by Chandradhar Sarma, Motilal Banarsidass Publishers, 2000.
- The Six Ways of Knowing by D. M. Datta, Open Source, 1960

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SEMESTER-IV

PERFORMING ARTS

Credits: 2 2 hrs/week

Learning Outcomes:

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

1. Acquire the basic knowledge in performing arts
2. Understand the modern stage and performance on the stage
3. Comprehend and improve the skills related to performing arts on the stage
4. Understand various Telugu folk arts and their significance
5. Know the modes of presentation and skills pertaining to folk arts.

SYLLABUS:

Unit-I: Introduction to performing Arts 06 Hrs

Arts – and its definition; Fine Arts; Arts - Learning &Imitation – Rasaas,Bhaavas and Rasa Sutra.Dasaroopakaas; Nrittha, Nrithya,Natya; Action – Kinds of Actions; Ancient Costume style .

Unit-II: Performing Arts – Stage Arts 10 Hrs

Origin of Drama (Theatre); Features of Stage; Varieties of Modern Telugu Drama; Famous Telugu Dramas.

Stage performance; Dramatic Actor and its definition; Actor–characteristics, Functions and Responsibilities.

Traits of an Actor – Diction, Articulation, Dialogue modulation, Time sense, Observation, Mime, Improvisation, Commentary,

Dress code, Make-up, lighting &Stage Direction.

Unit-III:Performing Arts – Forms 10 Hrs

Folk Arts, theirnature and significance – Brief introduction to Pagativeshaalu, Bommalaatalu, Veedhinaatakaalu, Yakshagaanaalu, Harikathalu, Burrakathalu, Oggukathalu, Chindu,Yakshagaanam, Kolaatamand Pulivesham.

Co-curricular Activities Suggested: (4 hrs)

1. Collection of information on modern stage plays, natakasamajams and audio visual material.
2. Providing training classes/inviting lectures with the help of local artists
3. Visit to a real time performing folk arts, if possible.
4. Mock experience classesof Stage plays and Folk arts.
5. Assignments, Group discussion, Quiz etc.

References:

1. Andhra Naataka Ranga Charithra –Mikkilineni Radha Krishna Murthy
2. Telugu SahithyaSameeksha (Vol-II) – Dr. G. Nagaiah
3. Telugu NaatakaVilaasam – Dr. P.S.RAppa Rao
4. Telugu JaanapadaVignanam – Prof. Tangirala Venkata Subba Rao
5. JaanapadaVignandhyayanam – Prof. G.S. Mohan
6. NaatyaSasthramu (VisleshanathmakaAdhyayanam) – Dr. P.S.RAppa Rao
7. SahithyaSilpaSameeksha – Prof. PingaliLakshmikantham
8. Nurella Telugu NatakaRangam – Prof. ModaliNagabhushanaSarma
9. Websites on Performing Arts.

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SEMESTER-IV

INTRODUCTION TO GEOGRAPHY

Credits: 2 2 hrs/week

Course Description:

This course serves as an introduction to the field of geography, exploring the fundamental concepts, theories, and methods used to study the Earth's physical features, human societies, and their interactions. Through lectures, readings, discussions, and practical exercises, students will develop a comprehensive understanding of geographic principles and how they shape our world.

Course Objectives: By the end of this course, students should be able to:

1. Define and explain key geographic concepts and terms.
2. Describe and analyse the Earth's physical features, including landforms, climate, and ecosystems.
3. Understand the spatial distribution of human populations, cultures, and societies.
4. Analyse the interactions between humans and the environment.
5. Interpret maps, globes, and spatial data.

Course Outcomes: Students will be able to:

1. Demonstrate understanding of fundamental geographic concepts.
2. Identify and describe the absolute and relative locations of different places on the Earth's surface, using latitude and longitude coordinates and geographic landmarks.
3. Read, analyse, and interpret various types of maps.
4. Analyse the ways in which human societies interact with and impact their environments.

Course Outline:

Unit 1:

Introduction – Definition – Scope – Importance of Geography – Geographic Tools and Methods – Five Themes of Geography – Structure and Composition of Earth

Unit 2:

Plate Tectonics and Continental Drift – Landforms – Hydrosphere – Climate and Weather Patterns – Ecosystems and Biodiversity - Distribution and Depletion of natural resources - Environmental Hazards.

Unit 3:

Population Distribution and Growth – Cultural Landscapes and Cultural Diffusion – Language, Religion, and Ethnicity – Urban and Rural Landscapes – Migration and Urbanization – Globalization and its Impacts

Activities:

1. Case Studies in Geography
2. Applying Geographic Knowledge to Real-World Scenarios
3. Regional Studies: Exploring Different Parts of the World

Assessment Methods:

1. Quizzes and Examinations
2. Individual or Group Projects
3. Class Participation and Discussions
4. Map Interpretation Exercises
5. Presentations
6. Research Papers

Recommended books:

1. "*Geography: Realms, Regions, and Concepts*" by Harm J. de Blij and Peter O. Muller
2. "*The Geography Book: Activities for Exploring, Mapping, and Enjoying Your World*" by Caroline Arnold
3. "*How to Lie with Maps*" by Mark Monmonier
4. "*The Penguin State of the World Atlas*" by Dan Smith

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SEMESTER-IV

BASIC STATISTICS

Credits: 2 2 hrs/week

Objective: To provide basic understating of general statistical tools and their elementary applications and to create awareness on Indian Statistical System.

Learning outcomes

Unit-I: To understand the concept of Statistics and its merits and demerits. Distinguishing primary and secondary data. Classification, Tabulation and Pictorial representation of data.

Unit - II: To understand the basic nature of data and how a single value describes the entire data set.Measuring the degree of departure of a distribution from symmetry and reveals the direction of scatterdness of the items.

Unit - III: To understand the spread of the data and to draw conclusions from the comparison of averages.

To understand the concept of correlation and regression and to learn the degree of association between two variables and establishing relationship between the variables.

Unit I: Meaning, scope and limitations of Statistics

Collection of data: Primary and Secondary, Classification and Tabulation, Construction of frequency distribution.

Graphical Representation: Histogram, Bar, Pie and Frequency polygon.

(8hrs)

Unit II: *Measures of Central Tendency*: Features of good average, Arithmetic Mean, Median, Mode. Empirical relationship between Mean Median and Mode and skewness based on central values. (8hrs)

Unit III: *Measures of Dispersion:* Range, Quartile Deviation(QD), Mean Deviation(MD), Variance, Standard Deviation(SD), relationship between QD, MD and SD.Familiarizationof the concepts relating to Correlation and Linear Regression line. (8hrs)

Books for Study:

1. Statistics (Theory, Methods, Application) D C Sancheti, V K Kapoor, Sultan Chand and Sons, New Delhi

2. Statistical Methods, S.P. Gupta, Sultan Chand and Sons, New Delhi

3. Statistics (Theory and Practice) B.N Gupta, Sahitya Bhavan, Agra

Web sites for free download books for Statistics
https://www.pdfdrive.com/introduction-to-statistics-books.html
http://www.freebookcentre.net/SpecialCat/Free-Statistics-Books-Download.html https://bookboon.com/en/statistics-ebooks
http://onlinestatbook.com/Online_Statistics_Education.pdf

Co-curricular activities:
Objective is to apply the theoretical concept to real life data which enhances the learning and interpretation ability to the current environment.

CoCA I: (i) Collect primary or secondary data and establish frequency distribution.
(ii) Suitable pictorial/ Graphical representation to the established frequency distribution

CoCA II: (i) Select the data and then calculate AM,Median and Mode and interpret the result.
(ii) Calculate the skewness based on central values and interpret the degree of departure of a distribution from symmetry and the direction of scatterdness of the items.

CoCA III: (i) Calculate the dispersion values of a data for a single or double data sets and todraw conclusions from the comparison of averages.
(ii) Select the bivariate data (for example, select marks of any two subjects of your course) and calculate the degree of association and establish the linear relationship and find the forecasting value.

CoCA IV: If there is an internet facility at your college/home, go through the Ministry of Statistics and Program Implementationsite *www.mospi.gov.in*to know about the Indian Statistical System and *https://desap.cgg.gov.in*or www.apdes.in to know about the Andhra Pradesh Directorate of Economics and Statistics(APDES) and its activities.

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SEMESTER-IV

INTRODUCTION TO NANOTECHNOLOGY

Credits: 2 2 hrs/week

Course Objective:

The objective of the course "Introduction to Nanotechnology" is to provide students with a comprehensive understanding of the principles, applications, and implications of nanotechnology from a multidisciplinary perspective.

Programme Outcomes:

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

1. Define and describe the fundamentals of nanotechnology: Students will develop a clear understanding of the basic concepts and principles of nanotechnology, including nanoscale materials, structures, and phenomena. They will grasp the unique properties and behavior of materials at the nanoscale and how they differ from macroscopic systems.

2. Understand the fabrication and characterization techniques in nanotechnology: Students will learn about the techniques and tools used to fabricate, manipulate, and characterize nanoscale materials and devices. They will explore techniques such as lithography, self-assembly, microscopy, spectroscopy, and nanofabrication methods.

3. Evaluate the ethical and societal implications of nanotechnology: Students will critically assess the ethical, social, and environmental implications of nanotechnology. They will explore issues related to privacy, health and safety, sustainability, and public perception, enabling them to make informed judgments and decisions regarding the responsible development and deployment of nanotechnology.

Syllabus:

Unit 1: Introduction to Nanotechnology

Overview of Nanotechnology: Definition, scope, and interdisciplinary nature of nanotechnology. Historical Development: Understanding the historical background and key milestones in the field of nanotechnology. Nanoscale Science: Introduction to the unique properties and phenomena at the nanoscale, including quantum effects and surface-to-volume ratio. Nanotechnology Applications:

Exploring the diverse range of applications of nanotechnology in various fields such as medicine, electronics, energy, and materials science.

Unit 2: Nanomaterials and Fabrication Techniques

Nanomaterials: Introduction to different types of nanomaterials, including nanoparticles, nanotubes, and nanocomposites. Understanding their synthesis, characterization, and properties. Top-Down Fabrication: Exploring top-down fabrication techniques, such as lithography and etching, used to create nanostructures and devices. Bottom-Up Fabrication: Introduction to bottom-up fabrication techniques, such as self-assembly and molecular nanotechnology, for the creation of nanoscale structures. Characterization Techniques: Overview of characterization techniques used to analyse and measure nanomaterials, including microscopy, spectroscopy, and diffraction methods.

Unit 3: Implications and Ethics of Nanotechnology

Environmental and Health Impacts: Understanding the potential environmental and health impacts of nanotechnology, including the risks associated with nanoparticles and nanomaterials. Ethical Considerations: Exploring ethical considerations related to nanotechnology, including privacy concerns, responsible research, and societal implications. Regulatory Framework: Introduction to the regulatory frameworks and safety standards for the development and commercialization of nanotechnology products. Future Perspectives: Discussing emerging trends, challenges, and future prospects in the field of nanotechnology, including advancements in nanomedicine, nanoelectronics, and nanomanufacturing.

Reference Books:

1. "Introduction to Nanotechnology" by Charles P. Poole Jr. and Frank J. Owens: This book provides a comprehensive introduction to the field of nanotechnology. It covers the basics of nanoscale science and engineering, fabrication techniques, nanomaterials, and various applications of nanotechnology.

2. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Prakash C. Ghosh: This book offers an overview of the principles and applications of nanotechnology. It covers nanomaterials, nanofabrication methods, characterization techniques, and the role of nanotechnology in different sectors such as electronics, medicine, energy, and environmental remediation.

3. "Introduction to Nanoscience and Nanotechnology" by Gabor L. Hornyak, Joydeep Dutta, et al.: This textbook provides a comprehensive introduction to nanoscience and nanotechnology. It covers the fundamental concepts, fabrication techniques, characterization methods, and applications of nanotechnology. It also discusses societal and ethical considerations related to nanotechnology.

4. "Nanotechnology: Basic Science and Emerging Technologies" by Mick Wilson, Kamali Kannangara, et al.: This book presents the fundamental concepts and emerging technologies in nanotechnology. It covers nanoscale physics, chemistry, materials science, and engineering aspects of nanotechnology. It also explores the potential impact of nanotechnology on various fields, including medicine, electronics, and energy.

5. "Introduction to Nanotechnology" by Poole and Owens: This introductory textbook covers the basics of nanotechnology, including nanoscale phenomena, nanomaterials, fabrication techniques, and applications in electronics, medicine, and energy. It provides a solid foundation for understanding the principles and potential of nanotechnology.

Student Activity

1. Assign students to create a timeline that highlights the key milestones and discoveries in the field of nanotechnology. They should include significant events, breakthroughs, and contributions from different scientists and researchers. Encourage students to incorporate visuals and descriptions to depict the historical development of nanotechnology.

2. Organize a class discussion or debate where students compare and contrast top-down and bottom-up fabrication techniques for creating nanostructures and devices. Assign students to research and present the advantages, limitations, and real-world applications of each technique. Encourage students to critically analyze and discuss the suitability of each technique for different scenarios.

3. Assign students to research and prepare a report on the potential environmental and health impacts of nanotechnology. Students should explore the risks associated with nanoparticles and nanomaterials, such as their release into the environment, bioaccumulation, and potential toxicological effects. They should analyse case studies and scientific literature to assess the current understanding of these impacts and propose strategies for risk assessment and mitigation.