St. Ann's College for Women

(Autonomous), Affiliated to Osmania University,

Accredited 'A+' Grade by NAAC (3rd Cycle),

College with Potential for Excellence by UGC,

Hyderabad- 500 028, India

Curriculum On Environment

ENVIRONMENTAL SCIENCES

SYLLABUS

SEMESTER -I

UNIT- I

Fundamentals of Environment & Ecosystem diversity

Definition, Scope and Importance of Environment Science

Components of environment & ecosystem, structure & function of ecosystem

Genetic, Species & Ecosystem diversity. Biogeographical classification of India- biodiversity at global, National & local levels. India as a mega diversity nation. Hot spots of Biodiversity, Endangered & endemic species of India

Threats to Biodiversity – habitat loss, poaching of wildlife, man-wildlife conflicts

Conservation of Biodiversity: In-situ & Ex-situ conservation of Biodiversity

UNIT- II

Social Issues & the Environment

Introduction to Renewable and Non-Renewable Resources, Use of Alternate energy sources, Sustainable development – water conservation, rain water harvesting, watershed management.

Equitable use of resource for sustainable life style, Role of an individual in conservation of natural resources.

Environmental ethics – Issues & possible solutions, consumerism & waste products, public awareness & people's participation.

UNIT- III

Environmental pollution

Definition, causes, effects & control measures – air pollution, water pollution, marine pollution, soil pollution, noise pollution, Nuclear hazards:

Role of individual in pollution prevention.

Disaster management: Floods, earthquakes, cyclones & landslides. Firework hazards & safety measures

UNIT- IV

Global warming and climate change

Earth's climate through ages; trends of global warming and climate change; the potential of different greenhouse gases (GHGs) causing the climate change; weather patterns, sea level rise.

Ozone layer – importance, depletion and causes; effects of ozone depletion; Acid rain & its impact on agriculture & human communities

Mitigation measures & solutions to overcome climate change; Clean development mechanism.

UNIT- V

Solid waste management

Introduction: sources and generation of solid waste, their classification and chemical composition, characterization of municipal solid waste, hazardous and bio medical waste.

Impact of solid waste on environment, human and plant health. Effect of industrial waste on air, water, soil. Industrial waste management and its importance.

4R-reduce, reuse, recycle and recover; segregation of waste-Dry waste and wet waste. Biological processing-composting, anaerobic digestion, aerobic treatment: mechanical & biological treatment, green technique for waste treatment.

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Month	Activities Planned
June	Orientation and enrollment of students
Eco club calendar	Observing World population day, wild life week, Ozone day, Habitat day, Water day, Energy conservation day etc
June/July	i) Plantation programme ii) Guest lecture
August	i) E-Waste seminar and collection OF E WASTE ii) Organic farming –Green Mitti internship iii) Newspaper Bag Making Workshop
September	i) WOW activity- Waste segregation ii) Celebrating festivals in Eco- friendly way-Seed Ganesha Activity iii) Upcycling waste-Plastic bottle crafts
October/Nov	i) Wild life week- photography contest/Painting/WALK ii) Recycling Activity
December	i) National park visit /Organic farm visit ii) Making Eco friendly products-Competition iii) Menstrual waste management awareness campaign
January	i) Vermicompost /Compost pile/Kitchen waste composting ii) Visit to Horticulture show iii) Collection of e waste in neighbourhood
February	i) Guest lecture on Menstrual Hygiene ii) Nature walk/Vegetable gardening
March	i) Competition-Essay writing/Quiz ii) Cloth bag designing

Environment Education CCA-Eco club Activities plans

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CCA Course Environment Education Plans For 2020-21

August:

1. Invited Talk on "Role of a student in reducing carbon footprint"

2. Celebrating Festivals in a Eco friendly way –Seed Clay Ganesha Idol making online workshop

3. Virtual talk competitions on Topic "Connecting to nature to preserve biodiversity" and a survey on Our College Biodiversity

Aug-Feb Screen TV shows movies, documentaries about themes: Restoring Ecosystem "Our oceans, Underwater World Climate change", Mangroves and Climate change

September:

1. Paper bag Making Workshop

2. Menstrual Hygiene and waste management activity

3. Organize Webinars on Ways to maintain environment sustainability in post lockdown, switching to ecofriendly alternatives 4.Promoting plastic and e waste collection at household level

October-Feb: Updating E- content on Instagram Dharini Eco club page and YouTube channel-Food Formulae (Channel to repurpose food consumption) Kitchen waste composting, Bioenzymes,Vermi composting Activities

November: Start an Eco blog to document sustainable Lifestyle progress

December to March Student projects: Collection of seeds, making seed ball, designing eco friendly products , ,

Organise Online quizes and competitions

January & February Reduce ,Reuse and Recycle activities

Student Internships: Green Mitti Internship program with Green Waves, Internship at Apna green products, Internship programs with WWF

CCA Course Environment Education Plans for 2022-23

July:Birds @St.Ann's-Biodiversity Conservation Activity, July 3 No Plastic Bag Day – Awareness session and Competition, July 26 International Day for the Conservation of the Mangrove Ecosystems-Invited Talk ,Plantation Drive

August: Paper bag Making Workshop, Session on Composting and waste segregation

September: Collection of seeds, making seed ball, designing eco friendly products , Clay Idol Making Workshop Sep 17,2022 National Cleanup Day –Competitions/Green challenges Cleanliness Drive

October: First week of October Wild Life week –Webinar ,activities on Wild life conservation, Screen TV shows movies, documentaries about themes on Sustainability on Fourth Wednesday of October –Observing Sustainability Day,

September : Animal Art projects with recycled materials, Sep 16 World ozone Day –Essay competition

November :Sessions on Climate Change, Carbon Footprint reducing Activities

December :Eco quizzes and competitions,Projects on Environmental issues

January & February Reduce, Reuse and Recycle activities

March: World Forests Day and Sparrow Day –Awareness activities

Student Internships: Green Mitti Internship program with Green Waves, Internship at Apna green products, Internship programs with WWF

DEPARTMENT OF NUTRITION

UG (Applied Nutrition and Public Health)

Course code: NUT 507 FOOD SANITATION AND HYGIENE:

Sem V

- **Disease transmission**
- **Water- sources- Impurities, and Principles of water purification- domestic and commercial.**
- **Food Borne Infections and Food Poisonings/ Intoxications,–Biological- bacterial: Typhoid, Cholera, viral: infectious hepatitis, fungal –afflatoxins and ergotism: protozoa: amoebiasis, trichinosis .Chemical-pesticide residues, and metallic contaminants:-lead arsenic, tin and mercury. Physical-dirt, dust, leaves, sticks and mud and stone particles.**

- **Food borne intoxications, Lathyrism, Bacterial- Staphylococcal, Botulism, clostridium perfringens.**
- **Food handling and public health- preventing food borne Illness, sanitation of food serving institution- (environmental hygiene), personal hygiene of food handler**
- **ISO guidelines**

Course code: NUT608 - PUBLIC HEALTH

Sem VIII

- **Introduction to Environment and Health - Definition - Role of Vectors and Pests.**
- **Malaria, Filariasis. Arthropods as vectors of human diseases Modes of disease transmission: vertical and horizontal transmission - biological, mechanical and contact - transmission cycle - interpersonal maintenance.**
- **Vector control at individual or at community or at both levels, Selection of appropriate control measures - Self-protection measures - Types of vector control - habitat destruction - prevention of fly pathogen contact - food protection - prevention of man fly contact - Mechanical - Biological and Chemical control.**
- **Malaria control program**

PG DIPLOMA: NUTRITION AND DIETETICS

Course code: DNUT 201 PUBLIC HEALTH AND EPIDEMIOLOGY -

Communicable Diseases & Control

Infectious disease epidemiology- definition- communicable disease, infection, Contamination , Disinfection. Mode of transmission: Direct and Indirect. Disease Cycle.

Communicable Diseases -Swine Flu/H1N1, hepatitis-A,B ,Tuberculosis, Typhoid , Gastroenteritis, HIV/AIDS

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Vector Borne: Malaria, Dengue

MSc- CLINICAL NUTRITION AND DIETETICS

Course code MNUT104: PUBLIC HEALTH AND COMMUNITY NUTRITION

Management during calamities and emergencies

- **Sanitation and hygiene**

Course code MNUT203: FOOD SAFETY AND QUALITY CONTROL

Water and waste management:

- **Uses of water**
- **Sources of water**
- **Contamination of water**
- **Hazards of water pollution**
- **Large scale purification of water**
- **Small scale purification of water**
- **Chlorination and methods of chlorination of waste management**
- **Disposal of solid waste**
- **Disposal of liquid waste or sewage**
- **Disposal of gaseous waste**

Department of Zoology

SEMESTER – VI

Paper VIII Aquatic Biology

Course code – ZOO: 608

UNIT – III Management of Aquatic Resources (15 periods)

3.1Aquatic pollution - Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills,

3.2 Eutrophication

3.3 Management and conservation

3.4 Water pollution acts of India

3.5 Sewage treatment and water quality assessment - BOD and COD.

Department of Microbiology

Course title: Microbial Diversity

Sem II

Course Code: MIC 202(Theory)

Teaching Hours: 60

UNIT 1

Basics of Biodiversity 15

• Introduction to Biodiversity

• Elements of Biodiversity -Ecosystem Diversity, Genetic Diversity, Species Diversity.

• Conservation of Biodiversity-In-situ & Ex-situ

• Value of Biodiversity –Consumptive, Productive, Social, Ethical, Aesthetic & Optional Values.

UNIT 4

Microbial Ecosystems 15

• Microbial interactions: Symbiosis, neutralism, commensalism, competition, antagonism, synergism, parasitism.

• Concept of Uncultivated microorganisms.

• Methods of identification of 'uncultivable' bacteria, Culture independent molecular methods for identification

• Importance of microbial diversity in environment, pharmaceuticals, human health and industry. Outlines of Metagenomics and biotechnological applications of extremophiles

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Department Of Microbiology

B.Sc. Microbiology

SEMESTER- III

Course title : Food, Dairy & Environmental Microbiology

Course Code : MIC 303

UNIT-3 Water & Air Microbiology 15

Microbes of water (E. coli ,Clostridium perfringens and Streptococcus faecalis as indicators of water pollution.) and their significance

- Microbiological testing of potable water - MPN index, membrane filtration
- Water purification in municipal water supply- Physical and Chemical treatment
- Waste water treatment (primary, secondary and tertiary).
- Microbes of air and air sampling methods

UNIT-4 Soil Microbiology

- Soil- definition, types, physical and chemical characters, soil profile
- Microbes of soil and their significance
- Microbial Interactions-Mutualism,Commensalism,Antagonism, Parasitism Biogeochemical Cycles (Carbon,Nitrogen,Sulphur,Phosphorus) & Role of microorganisms in nutrient cycling
- Biodegradation of cellulose, hemicellulose, lignin
- Microbial remediation of Xenobiotics–oil spills, organophosphorous pesticides
- Solid waste disposal-sanitary landfills, composting

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DEPARTMENT OF MICROBIOLOGY

SEMESTER-V

Course title : Environmental Microbiology & Sustainable Agriculture
Course Code : MIC 506A

Course Type: Discipline Specific Elective (DSE-A

UNIT – I Water & Air Microbiology

- Microbes of water (E. coli ,Clostridium perfringens and Streptococcus faecalis as indicators of water pollution.) and their significance
- Microbiological testing of potable water - MPN index, membrane filtration
- Water purification in municipal water supply- Physical and Chemical treatment Waste water treatment (primary, secondary and tertiary).
- Microbes of air and air sampling methods

UNIT - II Soil Microbiology

- Soil- definition, types, physical and chemical characters, soil profile
- Microbes of soil and their significance
- Microbial Interactions-Mutualism,Commensalism,Antagonism, Parasitism Biogeochemical Cycles(Carbon,Nitrogen,Sulphur,Phosphorus) & Role of microorganisms in nutrient cycling

UNIT-III Sustainable Agriculture

- Rhizosphere and phyllosphere
- Plant growth-promoting microorganisms -Mycorrhizae, Rhizobia, Azospirillum, Azotobacter, Cyanobacteria, Frankia and phosphate-solubilizing microorganisms. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic).
- Biofertilizers - Rhizobium & Cyanobacteria
- Biopesticides – Bacillus thuringiensis,Nuclear polyhedrosis virus (NPV)

UNIT-IV Biodegradation and Bioremediation

- Biodegradation of cellulose, hemicellulose, lignin

- Microbial remediation of Xenobiotics–oil spills, organophosphorous pesticides Solid waste disposal-sanitary landfills, composting Biogas-Biohydrogen, Biomethane

AECC. Pol. Science

Ability Enhancement Compulsory Course

Human Rights for Non- Arts students (Mandatory)

No of Classes: 02 per week

No of Credits: 01

Unit IV Environmental Rights

Environmental Movements in India, Environmental Rights &Rio Summit (Earth Summit)

2022 -2023 Semester IV Pol. Sci.

Paper - IV Constitution and Politics of India

Course Title: Constitution and Politics of India

Course Code: POL404

Unit- I: Constitutional Development in India

Article 48 A ; Fundamental Duties Article 51 A relates protect and improve the natural environment.

Unit- II: Institutional Framework

Mission Bhagirathi Providing a perennial solution for drinking water

B.Sc. BIOTECHNOLOGY III YEAR

SEMESTER-VI

BIT 608: ENVIRONMENTAL BIOTECHNOLOGY

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No. of Hrs. per week -4 **Total no. of teaching hours: 60**

Code: BIT 608

CREDIT I: Environmental Pollution

1.1 Introduction to environmental and pollution

1.2 Types of pollution – air, water and soil pollutions

1.3 Types of pollutions - inorganic, organic and biotic

1.4 Sources of pollution - domestic waste, agricultural waste, industrial effluents and municipal waste.

1.5 Greenhouse gases, global warming and climate change

1.6 Measurement methods of environmental pollution - BOD & COD

CREDIT II: Biomass and Biofuels

2.1 Renewable and non-renewable energy resources

2.2 Fossil fuels as energy source and their impact on environment

2.3 Biomass as source of energy (bioenergy)

2.4 Types of biomass - plant, animal and microbial biomass

2.5 Production of biofuels: bioethanol and biodiesel

2.6 Production of biohydrogen and biomethane

CREDIT III: Biofertilizers and Biopesticides

3.1 Chemical fertilizers and their impact on environment (Eutrophication)

3.2 Concepts of Biofertilizers

3.3 Types of Biofertilizers - bacterial, fungal and algal Biofertilizers

3.4 Pesticides and their impact on environment

3.5 Concepts of biopesticides, types of biopesticides

3.6 Uses of Biofertilizers and biopesticides

CREDIT IV: Bioremediation of Environmental Pollutants

4.1 Waste water treatment - sewage and industrial effluents (aerobic and anaerobic

methods)

4.2 Bioremediation - concepts and types (in-situ and ex-situ bioremediation)

4.3 Bioremediation of toxic metal ions - biosorption and bioaccumulation

4.4 Composting of organic wastes

4.5 Microbial remediation of pesticides and xenobiotic compounds

4.6 Phytoremediation - concepts and applications

PRACTICALS

No. of Hrs. per week -3 **Total no. of teaching hours: 45**

Credits: 1 **Code: BIT 618**

1. Estimation of BOD in polluted water samples
2. Estimation of COD in polluted water samples
3. Estimation of total dissolved solid in waste water samples
4. Determination of quality of water sample (Coli form test)
5. Isolation of microorganisms from polluted soil/industrial effluents
6. Production of hydrogen or biogas
7. Identification and characterization of bioremediation micro organisms
8. Production of microbial Biofertilizers

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B.SC (CBCS) BOTANY- III YEAR

Semester -V Paper – VI

Ecology & Biodiversity

Elective-I Course Code: BOT 506A

UNIT – I (15 hrs)

1. Concept and components of Ecosystem. Energy flow, food chains, food webs, ecological pyramids, biogeochemical cycles - Carbon Cycle.(4h)
2. Definition of Environment: Atmosphere (Troposphere, Stratosphere, Mesosphere, Ionosphere), Hydrosphere, Lithosphere & Biosphere. (3h)
3. Plants and environment: Ecological factors - Climatic (Light and Temperature) and biotic. Ecological adaptations of plants. (5h)
4. Edaphic Factors: Soil- Formation- Weathering, mode of formation residual; Transported: Colluvial, Alluvial, Glacial & Eolian. Soil erosion & Conservation.(3h)

UNIT – II (15hrs)

5. Population ecology: Natality, Mortality, Growth curves, Ecotypes & Ecads. (4h)
6. Community ecology: Frequency, density cover, Life forms & Biological spectrum.(4h)
7. Community Dynamics: Succession - Serial stages, Modification of physical environment, Climax formation with reference to Hydrosere and Xerosere.(4h)
8. Production ecology: Concepts of productivity - Primary and Secondary Productivity.(3h)

UNIT- III (15hrs)

9. Biodiversity: Concepts, Convention of Biodiversity - Earth Summit (Copenhagen). (4h)
10. Biodiversity- Levels, threats and values. (3h)

11. Hot spots of India - North Eastern Himalayas, Western Ghats; Endemism.
12. IUCN categories, RED data book, Remote sensing and ecosystem management(5h)
13. Principles of conservation – *Insitu* and *Exsitu*. Role of organizations in the conservation of Biodiversity - WWF and NBPGR. (3h)

B.Sc Biochemistry III Year

Subject	Theory
Course Code	**BCH606B**
Course Title	**r-DNA Technology and Biotechnology**
Course Objectives	If Any

IV	**Microbial and Environmental Biotechnology** 4.1 Microbes as biocontrol agents 4.2 Bioremediation, Biodegradation ofcellulose and lignocellulose, biosurfactants and bio emulsifiers 4.3 Microbial ore leaching and production of microbial fuels (hydrogen, methane) 4.4 Renewable and Non-renewableenergy sources

	4.5 Strategies involved in Municipal solid waste treatment Treatment of industrial and domestic effluent (aerobic and anaerobic) **4.6 Biomaterials as an alternative to non- degradable materials, Microorganisms for Heavy Metal Accumulation** **Biosorption** **4.7 Heavy metal tolerance (including mechanism) and its impact on environment**