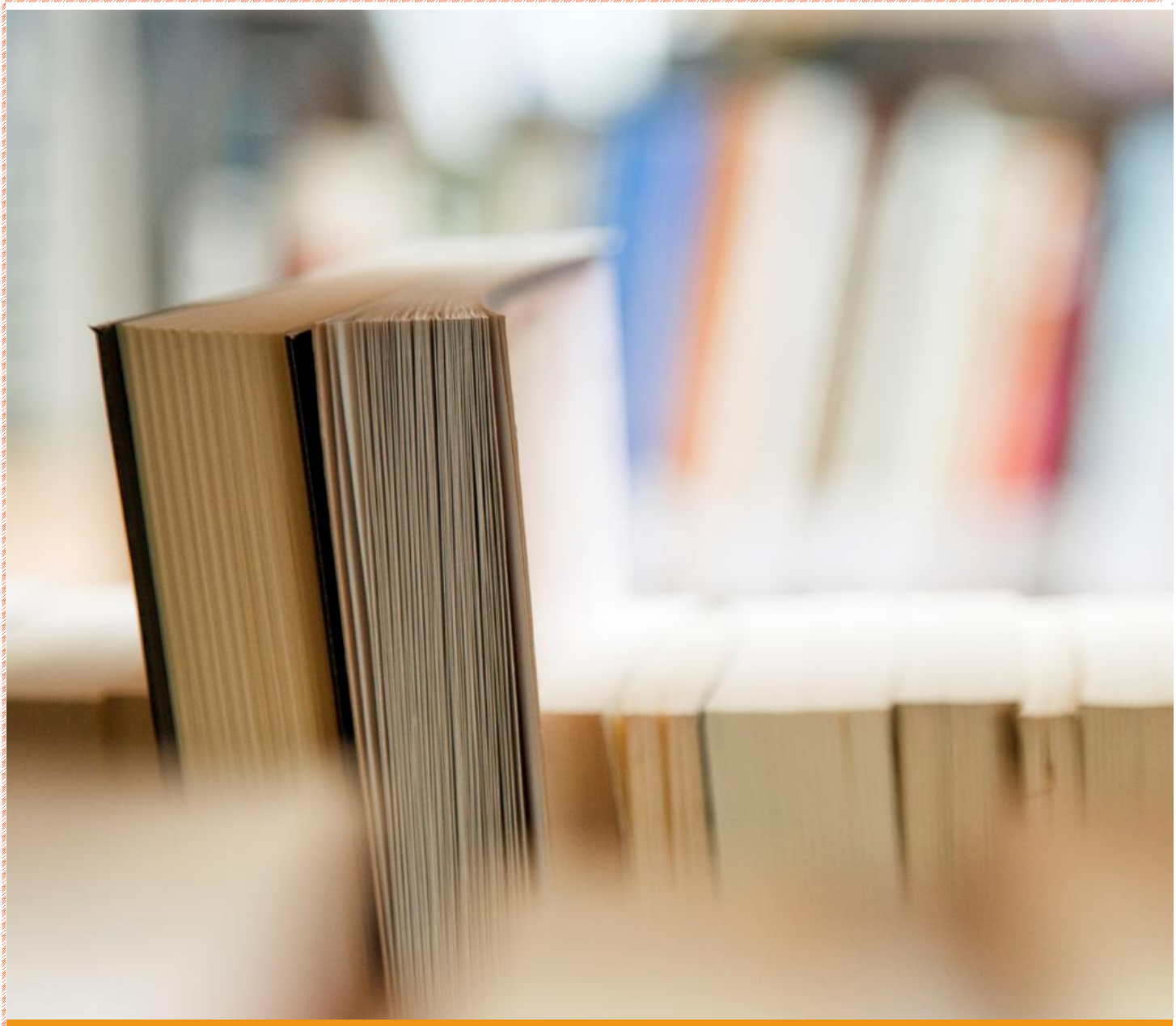

SGRR UNIVERSITY

Brochure of Value-Added Courses
School of Basic & Applied Sciences
2022-2023

ABOUT THE UNIVERSITY

Shri Guru Ram Rai University was established by a religious and philanthropic leader, Shri Mahant Devendra Dass Ji Maharaj in the year 2017. It is situated in the heart of city, Uttarakhand. We are extremely privileged to extend the values and ethos of the Shri Guru Ram Rai Education mission through SGRR University to impart quality education and in successfully placing more than 80% students in various companies across the globe. SGRR University has humongous campus spread over 80 acres of land. Its state-of-art facilities give opportunities to develop leadership skills and to achieve professional excellence. It has 8500+ students from different countries, 29 states and Union Territories and providing cultural melange and global exposure to our students. One of the biggest boosts from University is its unmatched experience of 67 years of in delivering quality education that helps to develop confidence and will give you more knowledge, industry exposure, building good networking and high self-esteem. This will change your overall personality and develop you into a complete professional to face any challenge.

Vision

"To establish Sri Guru Ram Rai University to be a Center of Excellence in higher education, innovation and social transformation by nurturing inquisitive and creative minds and by enabling the stakeholders to become committed professionals and educators of national and global relevance."

Mission

- To provide a comprehensive and sustainable educational experience that fosters the spirit of enquiry, scientific thinking and professional competence along with ethical and spiritual values
- To deliver a classic, well rounded learning experience that is distinctive and impactful on the young generation preparing them for a successful career
- To engage, inspire and challenge the stakeholders to become leaders with ethics and positive contributors to their chosen field and humane citizens
- To attract, train and retrain qualified staff to work efficiently to bring forth the maximum resource potential

- To develop committed and responsible professionals who work for the welfare of the society by providing innovative and efficient solutions and creating long term relationship with the stakeholders

- To create a sustainable career, by collaborating with stakeholders and participating in community partnership for life and livelihood in the local society in a responsive and dynamic way

- To make our students globally competent by introducing specialized training leading to professional capabilities and developing diverse skills in them for competitive advantage.

- To establish quality standards for generations by epitomising professionalism and integrity while raising the achievements of students.

- To ceaselessly pursue excellence by strengthening a learning environment that makes the institution the most preferred destination in the country.

Index

INTRODUCTION

The ever-changing global scenario makes the world more modest and needs high levels of lateral thinking and the spirit of entrepreneurship to cope up with the emergent challenges. Many a times, the defined skill sets that are being imparted to students today with Programme Specific Objectives in educational institutions become redundant sooner or later due to rapid technological advancements. No university curriculum can adequately cover all areas of importance or relevance. It is important for higher education institutions to supplement the curriculum to make students better prepared to meet industry demands as well as develop their own interests and aptitudes.

Objectives The main objectives of the Value-Added Course are:

- ✓ To provide students an understanding of the expectations of industry.
- ✓ To improve employability skills of students.
- ✓ To bridge the skill gaps and make students industry ready.
- ✓ To provide an opportunity to students to develop inter-disciplinary skills.
- ✓ To mould students as job providers rather than job seekers.

Course Designing The department interested in designing a Value Added Course should undertake Training Need Analysis, discuss with the generic employers, alumni and industrial experts to identify the gaps and emerging trends before designing the syllabus.

Conduction of value added courses :

Value Added Course is not mandatory to qualify for any programme and the credits earned through the Value-Added Courses shall be over and above the total credit requirement prescribed in the curriculum for the award of the degree. It is a teacher assisted learning course open to all students without any additional fee.

Classes for a VAC are conducted during the RESERVED Time Slot in a week or beyond the regular class hours The value-added courses may be also conducted during weekends / vacation period. A student will be permitted to register only one Value Added Course in a Semester.

student will be encouraged to opt for the VAC offered by his/her parent Department/Faculty. Industry Experts / Eminent Academicians from other Institutes are eligible to offer the value-added course. The course can be offered only if there are at least 5 students opting for it. The students may be allowed to take value added courses offered by other departments after obtaining permission from Dean offering the course. The duration of value added course is 30 hours with a combination 18 hours (60%) of theory and 12 hours (40%) of practical. However,

the combination of theory and practical shall be decided by the course teacher with the approval of the Dean

GUIDELINES FOR CONDUCTING VALUE ADDED COURSES

- Value Added Course is not mandatory to qualify for any program.
- It is a instructor supported learning course open to all students without any added fee.
- Classes for VAC will be conducted during the **RESERVED** Time Slot in a week or beyond the regular class hours.
- The value-added courses may be also conducted during weekends / vacation period.
- A student will be permitted to register only one Value Added Course in a Semester.
- Students may be permitted to enrol in value-added courses offered by other departments/ Schools after obtaining permission from the Department's Head offering the course.

DURATION AND VENUE

- The duration of value-added course should not be less than 30 hours.
- The Dean of the respective School shall provide class room/s based on the number of students/batches.
- VAC shall be conducted in the respective School itself.

REGISTRATION PROCEDURE

The list of Value-Added Courses, along with the syllabus, will be available on the University Website. A student must register for a Value-Added Course offered during the semester by completing and submitting the registration form. The Department Head shall segregate according to the option chosen and send it to the Dean of the school offering the specific Value-Added Courses.

- Each faculty member in charge of a course is responsible for maintaining Attendance and Assessment Records for candidates who have registered for the course.
- The Record must include information about the students' attendance and Assignments, seminars, and other activities that were carried out.

- The record shall be signed by the Course Instructor and the Head of the Department at the end of the semester and kept in safe custody for future verification.

- Each student must have a minimum of 75% attendance in all courses for the semester in order to be eligible to take certificate.

- Attendance requirements may be relaxed by up to 10% for valid reasons such as illness, representing the University in extracurricular activities, and participation in NCC.

- The students who have successfully completed the Value Added Course shall be issued with a Certificate duly signed by the Authorized signatories.

Sustainable Ecotourism

Course Code: VCSBAS003

Course Objectives:

- To give the students a way to evaluate and understand ecotourism in their context.
- To increase the benefits and to reduce the negative impacts caused by tourism for destinations. This can be achieved by: Protecting natural environments, wildlife and natural resources when developing and managing tourism.

Course Outcomes:

- Know about diverse nature of tourism, including culture and place, global/local perspectives, and experience design and provision.
- Understand the contextualize tourism within broader cultural, environmental, political and economic dimensions of society.
- Apply marketing strategies for tourism destinations and organizations
- Propose and conduct a research project to inform tourism practice
- Work collaboratively in groups, both as a leader and a team member, in diverse environments, learning from and contributing to the learning of others.

Course Content:

Module I: Introduction to Ecotourism

History and scope of ecotourism; Components of ecotourism; Principles and characteristics of ecotourism; Ecotourism planning: Site diagnostics, Target groups; Ecotourism industry and its stake holders; Resources and products of ecotourism; Commercialization of ecotourism.

Module II: Types of Ecotourism

Tourism vs. Ecotourism; Types: Agro-ecotourism, Geo- ecotourism, Cultural-ecotourism – tangible and intangible heritages and tourism, Sensitive areas of ecotourism; Ecotourism management plans.

Module III: Ecotourism resources in India and Uttarakhand

Eco-regions; Vegetation types; Protected areas; Endemism and biodiversity hotspots; Historical monuments and historical sites; Adventure ecotourism destinations; Ecotourism potential of Uttarakhand

Module IV: Community participation in ecotourism

Present scenario, Future prospects (year-round ecotourism); Sustainability of ecotourism; Ecotourism in developed countries; Community based ecotourism: case studies; Joint forest management, Role of NGOs ;Ethical and legal aspects; Eco-travel and environmental awareness; Impacts of ecotourism, Green report card, Eco-labelling; Environmental sustainability practices.

References:

- Governing the Wild: Ecotours of Power Stephanie Rutherford *University of* Minnesota Press, 2011
- Heritage and Tourism: Places, Imageries and the Digital Age Edited by Linde
- Egberts and Maria D. Alvarez *Amsterdam University Press, 2018*
- Overtourism: Lessons for a Better Future Edited by Martha Honey and Kelsey
- Frenkel *Island Press, 2021*
- Ecotourism and Sustainable Development: Who Owns Paradise? Martha Honey Island Press, 999

Bio-fertilizer Production Technology

Course Code: VCSBAS004

Course Objective:

- To demonstrate the low-cost media preparation and impart training of eco-friendly agricultural inputs in biofertilizer production.

Course outcomes:

- Understand the role of microorganism in improving the fertility of soil and also in control the pest and other pathogens.
- Will know the techniques involved in mass production, quality control and application of Bioinoculants in organic farming.
- Students will have an opportunity to work in research laboratory, biofertilizer industry and can also be an bio-entrepreneur.
- Ability to distinguish the types of biofertilizers and methods of application in farmers field. Development of integrated management for best results using nitrogenous and phosphate biofertilizers.

Course Content:

Module I:

Introduction, History and concept of Bio fertilizers, status scope and importance of Bio fertilizers, Classification of Bio fertilizers. Nitrogen fixation.

Module II:

Structure and characteristic features of bacterial Bio fertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cyanobacterial biofertilizers- Anabaena, Nostoc, Haplodiplontic and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza.

Module III:

Production technology: Strain selection, sterilization, growth and fermentation, equipment, mass production of carrier based and liquid bio fertilizers. FCO specifications and quality control of bio fertilizers.

Module IV:

Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of bio fertilizers.

References:

- B. Giri et al. (eds.), Biofertilizers for Sustainable Agriculture and Environment, Soil Biology 55.
- **Dinesh Biofertilizers (Skill Enhancement Course) For B.Sc. Botany Classes**, by Dr. Anil K. Thakur, Dr. Susheel K.
- Spaink HP, Kondorosi A, Hooykaas PJJ (eds) (1998) The Rhizobiaceae. Kluwer Academic Publishers, Dordrecht
- **Biofertilizers and Biopesticides**, by Krishnendu Acharya,
- **Handbook of Microbial Biofertilizers**, by M. K. Rai

Application of Plant Tissue Techniques

Course Code: VCSBAS005

Course objectives:

This course presents an overview of the techniques and underlying theory of plant tissue culture, and plant genetic engineering, and their applications. The specific objectives of the course are as follows:

- To enable students acquire knowledge of the fundamental principles of plant tissue culture.
- To learn about different kinds of plant culture techniques.
- To make students understand the principles of Agrobacterium tumefaciens biology and Ti-plasmid.
- To impart knowledge about the diverse applications of plant biotechnology and genetically- modified crops.

Course Content:

Module I:

Introduction. Micropopagation Axillary bud proliferation, Meristem and shoot tip culture, cud culture, organogenesis, embryogenesis, advantages and disadvantages of micropropagation.

Module II:

In vitro haploid production: Androgenic methods: Anther culture, Microspore culture andogenesis. Gynogenic haploids, factors effecting gynogenesis.

Module III:

Protoplast Isolation and fusion: Methods of protoplast isolation, Protoplast development, Somatic hybridization, identifiation and selection of hybrid cells.

Module IV:

Cybrids, Potential of somatic hybridization limitations. Somaclonal variation Nomenclautre, methods, applications basis and disadvantages.

References:

- Bhojwani, S.S. and Razdan 2004 Plant Tissue Culture and Practice.
- Brown, T. A. Gene cloning and DNA analysis: An Introduction. Blackwell Publication.
- Raven, P.H., Johnson, GB., Losos, J.B. and Singer, S.R. 2005 Biology. Tata MC Graw Hill.

- Reinert, J. and Bajaj, Y.P.S. 1997 Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture. Narosa Publishing House.
- Russell, P.J. 2009 Genetics – A Molecular Approach. 3rdedition. Benjamin Co.

Introduction to Animal Tissue Culture

Course Code: VCSBAS006

Course objectives:

The course aims to make students gain knowledge in the current trends and techniques in animal biotechnology. The specific objectives of the course are as follows:

- To develop an understanding about animal cell culture and gene delivery methods in animals.
- To provide an overview of in-vitro fertilization, embryo transfer methods and other related techniques.
- To gain knowledge about the stem cells and their various applications
- To learn about the production of transgenic animal and gene therapy and their applications.

Course Content:

Module I:

Gene transfer methods in Animals – Microinjection, Embryonic Stem cell, gene transfer,

Module II:

Introduction to transgenesis. Transgenic Animals – Mice, Cow, Pig, Sheep, Goat, Bird, Insect.

Module III:

Animal propagation – Artificial insemination, Animal Clones. Conservation Biology – Embryo transfer techniques. Introduction to Stem Cell Technology and its applications.

Module IV:

Genetic modification in Medicine- gene therapy, types of gene therapy.

References:

- Brown, T.A. (1998). Molecular biology Labfax II: Gene analysis. II Edition. Academic Press, California, USA.
- Butler, M. (2004). Animal cell culture and technology: The basics. II Edition. Bios scientific publishers.

- Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). Recombinant DNAgenes and genomes- A short course. III Edition. Freeman and Co., N.Y., USA.

Basic Molecular Techniques

Course Code: VCSBAS007

Course Objectives:

- This course will challenge students to apply critical thinking skills to their readings, class activities, laboratory exercises, and classroom discussions.
- This course is designed to provide bioscience research, writing, and publication opportunities while exploring advanced topics in molecular biotechnology techniques.
- This is a research and project-based course which will require active learning and collaborative participation on the part of the student.

Course Outcomes:

- The student would be able to learn practical skill related to Plant biotechnology and understand significance with respect to plant tissue culture industry.
- Students will be able to do projects which help them to get better understanding on topics and gain interest towards research.
- Active involvement of students in planning and execution of the project.
- The student would be able to utilize practical skill related to all kind of Molecular techniques with respect to plant tissue culture industry.
- The student would apply this course reflect skills necessary in the Science workforce which emphasize communication skills, punctuality, and teamwork in addition to molecular biotechnology skills.

Course content:

Module I: Origin of life, Cell and cell organelles

Structure and functions of nucleus, Endoplasmic Reticulum, Mitochondria, Lysosomes, Ribosome, Central dogma, Nucleic Acid.

Module II: Plant Tissue Culture

Brief history of plant tissue culture, Scope of plant tissue culture, Sterilization Techniques, Preparation of culture media, Totipotency, Micropropagation. Protoplast isolation and fusion. Somatic Embryogenesis, Haploid Production through Anther and ovule culture; Embryo culture.

Module III: In-vitro mutagenesis and germplasm Conservation

Somaclonal variation; In vitro mutation methods; Germplasm conservation, production of secondary metabolites, GM crops- current status concerns about GM crops-regulations on GM crops and products.

Module IV: Biotechnology

Isolation of DNA from plant, animal and microbial sources, Isolation of plasmid DNA, purification and estimation of isolated DNA, agarose gel Electrophoresis. Introduction to PCR technique, Western, southern and northern blotting, Finger Printing DNA Sequencing.

References:

- Bhojwani, Sant Saran, Dantu, Prem Kumar, Plant tissue culture: An introductory text, Springer publication,3rd Edition.
- B. D. Singh, Kalayani Publishers, 2006 - Plant biotechnology .
- Slater.A., Nigel W.S, Flower. R.Mark, Plant Biotechnology: The Genetic Manipulation of Plants, 2009, Oxford University Press.
- S Chawla, Introduction to Plant Biotechnology oxford and IBH publishing, third edition.
- Robert H. Smith, Plant tissue culture techniques and experiments, third edition, Academic Press.

Environmental Pollution and Chemistry

Course Code: VCSBAS008

Course Objectives:

To give the students a broad idea about environmental chemistry and pollution with emphasize on air, water and soil pollution and its sources.

Course Outcomes:

- Remembering the concepts of environmental pollution and chemistry.
- Understanding the major sources of air, water and soil pollution.
- Applying the concepts of environmental chemistry in understanding the mechanism by which pollutants can influence the quality of air, water and soil.
- Analyzing the various factors affecting the quality of air, water and soil.

Course Content:

Module I:

Concept and scope of environmental chemistry, composition and structure of atmosphere. Air pollution, effects of air pollutants on physic-chemical and biological properties of atmosphere.

Module II:

Water pollution, types and major sources of water pollutants, water quality parameters (physical, chemical and biological), significance of DO, BOD, COD. Waste Water Treatment.

Module III:

Composition of lithosphere/soil, organic and inorganic components in soil, acid-base and ion exchange reaction in soil, NPK in soil. Toxic chemicals in the environment, biochemical effects of pesticides.

Module IV:

Sources and effects of noise pollution on health. Radioactive and thermal pollution sources and their effects, solid waste disposal and its effects on environment.

Module V:

Practical: To Determine biochemical oxygen demand (BOD) and DO of given water/Waste water sample, To determine the pH and TDS of given water sample, To determine hardness of water

References:

- Environmental Chemistry: De A.K.; New Age International Publication.
- Environmental Pollution, Sharma B.K.; Goel Publishing House Meerut.

Fundamentals of Soft Skill and Microbiology

Course Code: VCSBAS009

Course Objectives:

This integrated course aims to provide students with a holistic skill set, combining technical proficiency in microbiology with essential soft skills that are crucial for success in scientific research and professional environments.

Course Outcomes:

- To Develop and demonstrate effective written and oral communication skills, particularly in conveying scientific information to diverse audiences.
- To collaborate effectively in laboratory settings and group projects, fostering teamwork and interpersonal skills.
- To Apply critical thinking skills to analyze complex scientific problems and develop effective solutions.
- To demonstrate awareness of ethical considerations in scientific research, emphasizing integrity and responsible conduct in microbiological studies.
- To demonstrate the technique of Microbial Identification.

Course Content:

Module I:

Definition and importance of soft skills Key soft skills for success in academic and professional life. Verbal and non-verbal communication, Effective listening and feedback, and written communication skills. Teamwork and Collaboration Importance of teamwork Building effective teams Collaboration in scientific research and microbiology projects, Soft Skills in Professional Settings Job interview skills, resume writing and professional networking Workplace etiquette

Module II:

Time Management and Organization Prioritization and goal setting Time management techniques, organizing work in microbiology labs.

Module III:

Microbial Cell Structure and Function Prokaryotic and eukaryotic cell structures Cell growth and reproduction, Microbial Techniques Principles of microbial growth Introduction to microbial cultivation techniques Basic microbiology laboratory skills.

Module IV:

Microbial Identification Techniques Morphological and biochemical methods Introduction to molecular techniques in microbiology.

Module V:

Integration of soft skills with microbiology concepts Group project combining communication and microbiology skills Course review and assessment.

References:

- "Soft Skills: The Software Developer's Life Manual" by John Sonmez
- "Prescott's Microbiology" by Joanne Willey, Linda Sherwood, and Christopher J. Woolverton
- Additional handouts and online resources on soft skills and microbiology techniques.

Ecology and Waste Management

Course Code: VCSBAS010

Course Objectives:

- The course will provide knowledge about the ecosystem and environmental issues.
- The course will provide the knowledge about the role in protecting the environment and biodiversity.
- The students will understand concept of waste management and the methods of reducing the waste.
- The course will provide the knowledge about the disposal of waste and treatment of waste.

Course Outcomes:

After completion of the Course the student will:

- Get an overview of the ecosystem and significance of it, and need for public awareness.
- Understand the importance and programs related to environment protection
- Apply the knowledge for conserving the environment and waste management.

Content Course:

Module I: Introduction to environment

Eco system, balanced eco system, human activities, effects of human activities on environment, Need for public awareness-Health Risk & Vulnerability of humans due to environmental Degradation.

Module II: Ecology

Biodiversity, impact of economy on ecology, restoration-biodiversity threats and conservation

Module III: Introduction to waste management

Environmental issues, ways of environmental pollution, need of waste management, State of municipal waste generation in the world, ways of dealing with municipal solid waste, sanitary land fill, recycling of plastic.

Module IV: Disposal of waste and management

Waste management, hazardous and toxic waste, Municipal waste handling in Indian cities and towns, Bio medical and chemical waste, Nuclear and E waste, environmental consequences of ship breaking- polluting industries of India, hazardous waste from other countries to India, Climate change and adaptation.

References:

- Odum, E.P. (2005). Fundamentals of Ecology. New Delhi, India: Cengage Learning India Pvt. Ltd., 5th edition.
- Kormondy, E.J. (1996). Concepts of Ecology. New Delhi, India: PHI Learning Pvt. Ltd. 4th edition.
- Sharma, P.D. (2010). Ecology and Environment. Meerut, India: Rastogi Publications. 8th edition
- Singh, J.S., Singh, S.P., Gupta, S.R. (2014). Ecology, Environmental Science and Conservation. New Delhi, India: S. Chand.
- Ajith Sankar. 2015. Environmental Management. Oxford Univ. Press.

Corrosion Chemistry

Course Code: VCSBAS011

Course Objectives:

- Students will be able to identify issues. problem-solving strategies suitable for a particular circumstance.
- Students will gain new competencies, including the ability to recognise assumptions.

Course outcomes:

- Remembering the corrosion, EIS and polarization techniques and Corrosion Prevention Techniques
- Understanding the reason of corrosion and its inhibition by, AFM Spectroscopy, SEM analysis, SEM-EDX, SEM-EDS, XRD, EIS and polarization techniques with the help of inhibitor.
- Applying the concept of General method for corrosion prevention, mechanisms of corrosion inhibition and techniques for evaluation of inhibition efficiency.
- Analysing the Corrosion Prevention Techniques.

Content Course:

Module I:

Introduction of Corrosion Definition and scope of corrosion, Direct chemical corrosion, Electrochemical corrosion and different mechanisms, Types of electrochemical corrosion-Galvanic and concentration cells, Types of electrochemical corrosion-Differential aeration corrosion, Water-line corrosion and Pitting corrosion, Type of electrochemical corrosion- Intergranular and Soil corrosion and factors affecting corrosion.

Module II:

EIS and polarization techniques Electrode-electrolytes interfaces, double layer, electrode potential, reference electrode, three electrodes cell, supporting electrolyte, rate constant, EIS basics, electrical elements, differential impedance, differential impedance, time domains result, bode plane plots in EIS and polarization techniques.

Module III:

Corrosion and Material analysis Data analysis, electrical equivalent circuits, choice of circuits, confidence interval, initial value, distinguishability, zeros and poles

representation, charge transfer resistance and polarization resistance. Constant phase elements (CPE). XPS spectroscopy, SEM analysis, SEM-EDX, SEM-EDS, XRD, AFM spectroscopy. Quantum chemical calculation and Monte Carlo method for corrosion study.

Module IV:

Corrosion Prevention Techniques General method for corrosion prevention. Conditioning of environment to reduce corrosion. Basics and classification of corrosion Inhibitors. Mechanisms of corrosion inhibition. Techniques for evaluation of inhibition efficiency. Application of corrosion inhibitors for boiler corrosion, cooling water systems, reinforced concrete, chemical and petrochemical industries. Inhibitors for microbial corrosion. Organic paints and varnishes for corrosion prevention.

References:

- M.G. Fontana: Corrosion Engineering, McGraw Hill International Book Co.London.
- L.L. Shreir: Corrosion, Vol I and Vol II, Newness Butterworths, Edward Arnold
- Ltd, London. 3. J.C. Scully: Fundamental of Corrosion, Pargmon Press Inc. New York,
- V.S. Sastry: Corrosion Inhibitors, Principles & Applications, John Wiley & Sons.
- C.C. Nathan: Corrosion Inhibitors, NACE, Houstion, Texas.
- ntroduction to Corrosion Science by E. McCafferty

Analytical Chemistry and Instrumentation

Course Code: VCSBAS012

Course Objectives:

To give students insight about analytical chemistry and instrumental techniques

Course Outcome:

Students will be able to:

- Remember terms associated with analytical chemistry.
- Learn about the preparation and standardization of different solutions.
- Know about various instruments and their operations.
- Analyzing the problems based on concentrations and instrumentation.

Course Content:

Module I:

Normality, Molarity, Molality, percentage (v/v,w/v,w/w), parts per million etc., Preparation of solids and liquid compounds, standardization of solutions and dilutions. Accuracy and precision.

Module II:

Types of volumetric analysis, types of indicators, acid -base titrations, redox titrations, gravimetric analysis.

Module III:

Basic principle of conductometer, pH meter, colorimeter, spectroscopy, polarimeter. calibration and operation procedure and applications.

Module IV:

Classification and types of chromatography, Basic principle and applications of paper, thin layer and column chromatography.

Module V:

Practical based on above modules.

References:

- Vogel's Textbook of Quantitative analysis
- Vogel's Textbook of Quantitative analysis
- Instrumental Methods of Chemical Analysis by Chatwal Anand.

Climate Change and Human Health Techniques

Course Code: VCSBAS013

Course Objective:

- The objective of the course to study the major implications of climate change for human health.
- We will develop skills to understand climate predictions, estimate potential health impacts, identify vulnerable populations, and valuate interventions to help populations adapt to a changing climate.

Course Outcomes:

- To understand the climate change promises to affect many populations: outdoor workers and the home-bound, children and the elderly.
- The course hopes to build abilities to analyze causes and on sequences of climate change and suggest environmentally sustainable solutions

Course Content:

Module I:

Causes of climate change, Impacts of climate change.

Module II:

Adaptation and mitigation of climate change, Climate effects on human health.

Module III:

Climate-sensitive diseases, Public Health responses to climate change, Climate change policies Sustainable future.

References:

- Bourque, F. and Willox A.C., (2014). Climate change: The next challenge for public mental health. International Review of Psychiatry, 26, pp. 415-22.
- Hardy, J.T. (2003). Climate Change: Causes, Effects, and Solutions. West Sussex: John Wiley and Sons, Inc Intergovernmental Panel on Climate Changehttp://www.ipcc.ch Lancet Commissions on Climate Change and Healthhttp://www.thelancet.com/commissions/climate-change
- Luber and Lemery (eds.) 2015. Global Climate Change and Human Health, fromScience to Practice. Jossey-Bass. San Francisco.

Plants and Society

Course Code: VCSBAS014

Course Objectives:

- Students will recognize biological aspects and structure and functions of different plant parts.
- Students will learn concept of plant adaptation and mechanism of pollination.
- Student will acquire the knowledge the commercial application of products for human.

Course Outcomes:

- Remembering the botanical description of Plants and its values.
- Understanding the active mechanism of medicinal and aromatic plants and useful plants.
- Applying the concept of the uses and its value added products of medicinal plants and other non-wood forest products.
- Analysing the knowledge of products for household and industries commonly utilized for basic human needs as food, clothing, shelter, health etc**.**

Course Contents:

Module I: Plant Biology

Botanical aspects, Plant tissue types (structure and function), Structural organization of flower, Double fertilization, Transport of nutrients in plants (active and passive transport)

Module II: Plant adaptations, Pollination:

Seed structure and dispersal mechanism, Plant Ecology: Biomes, Tundra, Grasslands, Deciduous and Tropical forests, Scrub, Desert, Different approaches for conservation of the plant diversity and sustainable development.

Module III: Cultivated plants as a source of food

General description about cereals (wheat, Maize and Rice, Millets), Legumes (Pea, Gram and Soybean), Oils and Fats (Mustard, Groundnut), Spices (Black pepper and Cloves), Fibre Yielding Plant (Cotton, linseed), genetically modified plants (transgenic),Commercial/Medicinal aspects of plants: Stimulating Beverages (Tea and coffee), Paper, Cloth and Wood, Ornamental plants, Medicinal Plants, Psychoactive Plants, Toxic Plants.

Module IV:

Practical Related to above mentioned module will be conducted

References:

- Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
- Introductory Botany: Plants, People, and the Environment by Linda Berg, 2nd Edition, Cengage Learning Publisher, 2007
- Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
- Levetin, E., and McMahon, K. *Plants and Society*. 7th edition, New York, NY: McGraw- Hill, 2016

Plants and Society

Course Code: VCSBAS014

Course Objectives:

- Students will recognize biological aspects and structure and functions of different plant parts.
- Students will learn concept of plant adaptation and mechanism of pollination.
- Student will acquire the knowledge the commercial application of products for human.

Course Outcomes:

- Remembering the botanical description of Plants and its values.
- Understanding the active mechanism of medicinal and aromatic plants and useful plants.
- Applying the concept of the uses and its value added products of medicinal plants and other non-wood forest products.
- Analysing the knowledge of products for household and industries commonly utilized for basic human needs as food, clothing, shelter, health etc**.**

Course Contents:

Module I: Plant Biology

Botanical aspects, Plant tissue types (structure and function), Structural organization of flower, Double fertilization, Transport of nutrients in plants (active and passive transport)

Module II: Plant adaptations, Pollination:

Seed structure and dispersal mechanism, Plant Ecology: Biomes, Tundra, Grasslands, Deciduous and Tropical forests, Scrub, Desert, Different approaches for conservation of the plant diversity and sustainable development.

Module III: Cultivated plants as a source of food

General description about cereals (wheat, Maize and Rice, Millets), Legumes (Pea, Gram and Soybean), Oils and Fats (Mustard, Groundnut), Spices (Black pepper and Cloves), Fibre Yielding Plant (Cotton, linseed), genetically modified plants (transgenic),Commercial/Medicinal aspects of plants: Stimulating Beverages (Tea and coffee), Paper, Cloth and Wood, Ornamental plants, Medicinal Plants, Psychoactive Plants, Toxic Plants.

Module IV:

Practical Related to above mentioned module will be conducted

References:

- Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi
- Introductory Botany: Plants, People, and the Environment by Linda Berg, 2nd Edition, Cengage Learning Publisher, 2007
- Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
- Levetin, E., and McMahon, K. *Plants and Society*. 7th edition, New York, NY: McGraw- Hill, 2016