



Unveiling Excellence

# Prospectus

## VALUE ADDED COURSES 2021-22

### UNIVERSITY OF SCIENCE & TECHNOLOGY MEGHALAYA

Techno City, Khanapara, Kling Road, Baridua, 9th Mile, Ri-Bhoi, Meghalaya

- ▶ Applied Biology
- ▶ Botany
- ▶ Business
- ▶ Chemistry
- ▶ Commerce
- ▶ Computer Science
- ▶ Earth Science
- ▶ Economics
- ▶ Education
- ▶ English
- ▶ Library
- ▶ Mathematics
- ▶ Physics
- ▶ Political Science
- ▶ Rural Development
- ▶ Social Work
- ▶ Sociology
- ▶ Zoology
- ▶ Pharmaceutical Science
- ▶ Physiotherapy
- ▶ University School of Law & Research



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# PROSPECTUS

## Value Added Courses 2021-22



*Unveiling Excellence*

**University of Science & Technology Meghalaya**  
**Techno City, 9<sup>th</sup> Mile, Meghalaya**

## **Index**

<b>Sl. No.</b>	<b>Content</b>	<b>Page No.</b>
1	Introduction	3
2	Objective	3
3	List of courses to be offered during 2021-22	4
4	Course content of the VAC	-
5	Applied Biology	7
6	Botany	11
7	Business Administration	13
8	Chemistry	13
9	Commerce	15
10	Computer Science & Electronics	15
11	Earth Science	16
12	Economics	16
13	Education	19
14	English	-
15	Library & Information Science	20
16	Mathematics	21
17	Physics	22
18	Political Science	26
19	Rural Development	28
20	Social Work	28
21	Sociology	29
22	Zoology	30
23	Pharmaceutical Science	31
24	Physiotherapy	-
25	University School of Law & Research	-
26	Guidelines for conduction of VAC	32

## **Introduction**

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. USTM offers a wide variety of Value added courses which are conducted after class hours or during the semester breaks. These courses are conducted by the various professionals and industry experts in addition the faculty experts and help students by adding further value to their resume.

These courses will equip our students in current trends and technologies and will also reduce the gap between academic and industry.

### **Objective**

The Value Added Courses aim to provide additional learner centric graded skill oriented technical training with the primarily to improve the employability skills of the students. The university provides range of value added courses with the following objectives

1. To provide students an understanding of the expectations of industry.
2. To improve employability skills of students along with the global demand.
3. To bridge the skill gaps and make students industry ready.
4. To provide an opportunity to students to develop inter-disciplinary skills.
5. To update the knowledge of the students with the emerging trends of technology and their applications.



**VALUE ADDED COURSES TO BE OFFERED DURING  
THE ACADEMIC SESSION : 2021-22**

SL. NO.	NAME OF THE COURSE	COURSE CODE	DEPARTMENT
1	Applied Industrial Microbiology	VAC-1601	APPLIED BIOLOGY
2	Food Safety and Quality	VAC-2102	
3	Industrial Enzymology and Applications	VAC-1501	
4	Recent Trends in Clinical Microbiology and Biochemistry	VAC-1602	
5	Indigenous Dairy Products	VAC-1603	
6	Water Analysis (Physico-chemical characteristics)	VAC-1704	BOTANY
7	Conservation and Utilization of Medicinal Herbs	VAC-1804	
8	Horticultural nursery management	VAC-1604	
9	Social Media as a Promotional Tool	VAC-2157	BUSINESS ADMINISTRATION
10	Fundamental Applications and Functions of MS excel	VAC-2124	
11	Professional Grooming and Business Etiquettes	VAC-2111	
12	Tourism and Travel Management	VAC-2105	
13	Group theory application	VAC-2164	CHEMISTRY
14	Applications of software tools in chemistry	VAC-2159	
15	Introduction to computational chemistry	VAC-2160	
16	Computerized Accounting -Tally	VAC-2109	COMMERCE
17	Digital Marketing	VAC-1805	
18	Essential of Office Suits	VAC-2156	
19	Advanced Libraries for Data Science	VAC-2113	COMPUTER SC. & ELECTRONICS
20	Computer Components Assembling and Troubleshooting	VAC-2126	
21	Fundamental Theory and Application of Neural Network	VAC-2131	
22	Digital Steganography: Tools & Techniques	VAC-2137	
23	Cloud Computing platform in Industry	VAC-2143	
24	Sustainable Urban Development Using Geo-Spatial Technology	VAC-2116	EARTH SC.
25	Agriculture: Its Implications on Economy and Ecology	VAC-2136	
26	Management of Financial Services	VAC-1508	ECONOMICS
27	Consumer Decision and Financial Literacy	VAC-1713	
28	GST an Inclusive tax regime	VAC-1816	

**Prospectus: Value Added Courses-2021-2022**

29	Introduction to Data Analysis in Economics	VAC-2150	EDUCATION
30	Recent Development in Monetary Policy	VAC-1813	
31	Early Childhood Education	VAC-2101	
32	Education for Aesthetic Development	VAC-2161	ENGLISH
33	Research Methodology and Critical Tools in English Studies	VAC-2115	
34	English Language skill enhancement	VAC-2141	
35	Theater Theory & performance	VAC-2151	LIBRARY AND INFORMATION SC.
36	An Advanced Approach to web Designing	VAC-1611	
37	Effective Academic Writing and Presentation	VAC-1515	
38	Information Retrieval System from Academic and Scholarly Databases	VAC-1412	MATHEMATICS
39	R Programming Language for beginners	VAC-2125	
40	Mathematics for Competitive Examination	VAC-2149	
41	LATEX	VAC-1718	PHYSICS
42	Two-Dimensional Nanomaterials and Their Applications	VAC-2122	
43	Astronomy & Astronomical Instrumentations	VAC-2123	
44	Fiber Optic Sensing	VAC-2132	
45	Numerical Analysis using Python	VAC-2133	
46	Nuclear Radiation: Safety Measurement and Applications	VAC-2148	POLITICAL SC.
47	Changing Paradigm of citizenship in North East India	VAC-1722	
48	Why do people Migrate: Theories and Approaches	VAC-1820	RURAL DEVELOPMENT
49	Rural Technology	VAC-1413	
50	SHG & Micro-Finance in the Context of Rural Economy	VAC-2121	
51	Agro-forestry and Sustainable Agriculture	VAC-2128	
52	Rural Entrepreneurship Development	VAC-2135	
53	Application of Geospatial techniques in Rural Development	VAC-2146	SOCIAL WORK
54	Community Health and Social Medicine	VAC-2119	
55	Online Dangers for children in Cyber World	VAC-2147	SOCIOLOGY
56	Soft Skills and Personality Development	VAC-1519	
57	Environmental Management and Sustainable Development	VAC-2156	ZOOLOGY
58	Wildlife Research Techniques	VAC-1520	
59	Advances in Fish Farming for Entrepreneurship	VAC-2154	
60	Ecological Field Sampling and Analysis	VAC-2155	PHARMACEUTI
61	AYUSH	VAC-2110	

**Prospectus: Value Added Courses-2021-2022**

62	In-vivo methods for screening in experimental Pharmacology	VAC-2158	CAL SCIENCE
63	Scale up and pilot plant design in Pharmaceutical Industry	VAC-2139	
64	Pharmacovigillace and its current Perspectives	VAC-2152	
65	Emergency medicine and First Aid	VAC-2134	
66	Yoga for Wellness	VAC-2103	PHYSIOTHERAPY
67	Nutrition and health	VAC-2112	
68	Vestibular rehabilitation	VAC-2145	
69	Hospital infection control	VAC-2142	
70	Constitutional Pluralism in the context of Art.370 of the Constitution of India	VAC-2114	UNIVERSITY SCHOOL OF LAW & RESEARCH
71	Green Collar Crime	VAC-2127	
72	Criminal Litigation and Trial Advocacy	VAC-2144	
73	Contribution of Intellectual Property Rights in Research and Development Sector	VAC-2106	
74	Facilitating E-Commerce Trade Practices	VAC-2108	



**Department of Applied Biology**

**Title of the Course: Applied Industrial Microbiology**  
**Duration: 30hrs**

**Course Code: 1601**  
**Total Marks: 50**

**Background:**

Industrial Microbiology and its application helps to understand the mechanism of industrial production of alcoholic beverages, antibiotics, solvents, vitamins and industrial enzymes using microbial fermentation process with special reference to micro-organisms involved, media, fermentation conditions, downstream processing and their uses, it helps to have the concept on the sources, isolation, preservation and maintenance of industrially important microbial strains as well as their specific features and also to get an insight into the principle, types and components of a typical industrial fermenter; the basic requirement, process, measurement and control of fermentation parameters. The value added course on Applied Industrial Microbiology helps to enhance knowledge on the industrial use of microbes for the production of valued products. The practical process can enhance the idea of studying and handling such microbes as well as the production process using laboratory scale fermenter. Students will be acquainted to the applications Industrial Microbiology in the field of various industries and to make them aware of the current and possible future applications of Industrial Microbiology, This course also emphasizes on the development of attitude and capability of the students to work in a group and gather information on the related field for lifelong learning.

**Educational Qualification** : B. Sc. /M. Sc. Biotechnology and Microbiology  
**Venue of the Course** : Department of Applied Biology, USTM  
**Training Curriculum** : The course structure consists of both theoretical and hands on training on Bioreactor, approaches in obtaining industrial products and use of immobilized enzymes in industries concerned with detergents, leather etc and downstream processing.

**Course Content**

**Theory :**

**Module-I**

**Basic Concept on Industrial Microbiology**

**[4 lectures]**

- 1 Brief history and developments in industrial microbiology
- 2 Sources of industrially important microbes and methods for their isolation, preservation and maintenance of industrial strains, strain improvement

**Module-II**

**Basic Concept of Fermentation**

**[4 lectures]**

1. Types of fermentation processes - Solid-state and liquid-state (stationary and submerged) fermentations; batch, fed-batch (eg. baker's yeast) and continuous fermentations
2. Types of bioreactors-Laboratory, pilot- scale and production fermenters, constantly stirred tank and air-lift fermenters.

**Module-III**

**Production Process**

**[4 lectures]**

1. Microbial production of industrial products (micro-organisms involved, media, fermentation conditions, downstream processing and uses.
2. Citric acid, ethanol, penicillin, glutamic acid, Enzymes (amylase, protease, lipase), Wine, beer





**Module-IV**

**Downstream processing**

**[4 lectures]**

Introduction, types of downstream process, cell disruption, filtration, centrifugation, solvent extraction, precipitation, lyophilization and spray drying

**Module-V**

**Enzyme, Immobilized enzymes**

**[4 lectures]**

Methods of immobilization, advantages and applications of immobilization

**Practical:**

**Industrial Microbiology**

1. Study different parts of fermenter
2. Microbial fermentations for the production and estimation (qualitative and quantitative) of:
  - (a) Enzymes: Amylase and Protease
  - (b) Amino acid: Glutamic acid
  - (c) Organic acid: Citric acid
  - (d) Alcohol: Ethanol

**Title of the Course: Food Safety and Quality**

**Course Code: 2102**

**Duration: 30hrs**

**Total Marks: 50**

**Theory :**

**Module 1**

**Introduction to Food Safety-** who is this course for? Why is food hygiene important? Food hygiene law, understanding food safety, and health issues caused by contaminants.

**Food Safety Hazards** – microbiological hazards, allergenic hazards, physical hazards, and chemical hazards.

**Module 2**

**Food Safety Controls** – The conditions for bacterial growth, temperature control, controlling time, low and high risk foods, controlling microbiological hazards, allergenic contamination, controlling physical hazards, controlling chemical hazards, food deliveries, refrigeration and pests.

**Module 3**

**Personal Hygiene** – hand hygiene, hair hygiene, body hygiene and bad habits, protective clothing, and reporting illnesses. **Cleaning Activities** – why is cleaning important? Waste management, cleaning and disinfection, clean as you go, dishwashers, and scheduling cleaning. FSSAI Food Hygiene and Food Safety Guidelines for Food Businesses during Coronavirus Disease (COVID-19) Pandemic.

**Module 4**

**Introduction to Food Quality-** Concept, objectives and need for quality, difference between quality control and quality assurance.

**Food adulteration-** adulterants, health hazards, methods of detection.

**Food labelling-** Perspectives on nutrition labeling, food labeling logo.

**Module 5**

**Food laws-** Objectives, requirements and benefits of food standards (FSSAI, PFA, BIS, AGMARK, FPO and FDA), Food Safety Management Systems (FSMS) – ISO22000. Codex Alimentarius Commission (CAC) guidelines for food quality management

Virtual Industrial visit food industry /Food Testing Laboratory

**Title of the Course: Industrial Enzymology and Application**  
**Duration: 30hrs**

**Course Code: 1501**  
**Total Marks: 50**

**Background:**

Enzyme is one of the main mediators in industrial production process involving microbes. The enzymology principle including fundamental properties of enzymes, enzyme catalytic mechanisms and enzyme kinetics. In industrial sector these concepts are applied in obtaining valued products using microbes or their products. The value added course on “Enzyme Technology” provides the theory and knowledge relevant to the Techniques employed in enzymes purification and characterization. Students will be acquainted to the applications of enzyme technology in food, medical and household industries to make them aware of the current and possible future applications of enzyme technologies. This course also emphasizes on the development of attitude and capability of the students to work in a group and gather information on the related field for lifelong learning.

**Educational Qualification** : B. Sc. /M. Sc. Biotechnology and Microbiology  
**Venue of the Course** : Department of Applied Biology, USTM  
**Training Curriculum** : The course structure consists of both theoretical and hands on training on enzymatic approaches in obtaining industrial products and use of enzymes in industries concerned with detergents, leather etc.

**Course Content**

**Theory:**

**Module-I**

**Basic Concept of Enzyme** [4 hrs]

1. Definition, nomenclature and classification of Enzymes.
2. Concept of coenzymes and cofactors.

**Module-II**

**Enzyme Catalysis-Regulation and Inhibition** [8 hrs]

1. Enzyme substrate reaction; Michealis-Menten Equation, estimation of Km and Vmax value;
2. Regulation of Enzyme activity; Kinetics of Enzyme Inhibition.

**Module-III**

**Applied Enzymology (Industrial uses of Enzymes)** [8 hrs]

1. Industrial Enzymes- Proteolytic enzymes in meat and leather industry; Enzymes in fermentation processes. Clinical enzymes; Enzyme immobilization and Enzyme Engineering.
2. World Leather Industry at Crossroads: Can Biotechnology/Enzyme Technology Help?

**Practical:**

- 1) To learn the process of bacterial cellulose production (Demonstration).
- 2) To learn the application of enzymes in Leather Technology (Demonstration).
- 3) To learn bio-fuel production from yeast.
- 4) To study the production and optimization of enzymes.

**Title of the Course: Recent Trends in Clinical Microbiology and Biochemistry**  
**Duration: 30hrs**

**Course Code: 1602**  
**Total Marks: 50**

**Background:**

The course concerns microbiological aspects of human infection by pathogens like bacteria, fungi, protozoa and virus. Common topics of interest include nature of the etiologic agents, their interaction with the host and diagnosis and epidemiology of the infectious diseases. It correlates the biochemical approaches in the characterization and identification of the causative agents.

The value added course on “Recent Trends in Clinical Microbiology and Biochemistry” deals with the study on clinical aspect of microbiology that helps in generating skilled persons for diagnostic laboratories. The dearth of

proper and expert pathology and microbiology technicians within the arena of Medical Services coupled with the knowledge on clinical biochemistry. Such a course can provide excellent opportunities for the youth as well as bridge the gap in medical services which is a challenging job in the laboratories and hospitals.

**Theory:**

**Module I**

**Normal microflora of the human body and host pathogen interaction [8 hrs]**

Normal microflora of the human body: Microflora of skin, respiratory tract, gastrointestinal tract and urogenital tract and their importance.

Host pathogen interaction: Concept of infection, invasion, pathogenicity, virulence, toxigenicity; Opportunistic infections.

**Module II**

**Microbial diseases in man [6 hrs]**

Bacterial, fungal and viral diseases in man with special reference to causative agents, symptoms and pathogenicity.

**Module III**

**Diagnostic Methods [8 hrs]**

Collection, transport and culturing of clinical samples; Isolation and characterization of the pathogenic microbes. Principles of diagnostic tests like ELISA, Immunofluorescence and Agglutination based tests.

**Module IV**

**Antimicrobial agents and mode of action [6 hrs]**

Antibacterial agents: Types and Mechanism of action.

Antifungal agents: Types and Mechanism of action.

Antiviral agents: Types and Mechanism of action.

**Practical:**

**[10 hrs]**

1. To isolate and characterize microorganism from skin, throat and urine samples.
2. To perform antibiotic sensitivity test of the isolated microbes against known antibiotic materials through the determination of Minimal Inhibitory Concentration.
3. To perform serological tests like Widal Test, VRRRL Test and Slide Agglutination Test.

**Title of the Course: Indigenous Dairy Products**

**Course Code: 1603**

**Duration : 30hrs**

**Total Marks: 50**

**Background:**

Traditional Indian dairy products or indigenous milk products can be defined as the milk products which are native to India. The vigorous efforts towards such accomplishment including concentration, coagulation, desiccation, fermentation and use of certain others ingredients resulted into an array of products which led to a vast arena of products and approximately 150 types of sweetmeats are available in our country.

The traditional Indian dairy products and a great taxonomy of sweets are an integral part of vast Indian heritage. Depending upon various methods of processing, it possesses great social, cultural and economic importance. It is estimated that about fifty percent of milk produced in India is converted into a variety of products such as khoa, chhana, paneer,



## ***Prospectus: Value Added Courses-2021-2022***

dahi, ghee, shrikhandetc. It is having strong foothold not only in Indian market but also having a great export potential because of presence of Indian diaspora across the globe.

**Training Curriculum:** The course structure consists of theoretical and hands on training related to dairy and different processing and preservation techniques with quality assurance.

### **Course Outcome:**

**CO1.** To develop proficiency skill in producing different Indigenous dairy products.

**CO2.** To gain an understanding of storage and preservation methods of Indigenous dairy products.

**CO3.** Operating & maintenance of the modern Equipments & machineries

**CO4.** Make different Indigenous dairy products with quality assurance

### **Theory:**

#### **Module I**

##### **Indigenous Indian Dairy Products**

**[4 hrs]**

Definition, Status, Scope & Challenges of Indigenous Milk Products. Pattern of milk utilization in India.

#### **Module II**

##### **Ghee**

**[6 hrs]**

Definition of ghee, importance of ghee in India, Methods of manufacturing ghee, Grading of Ghee and factors influencing quality of ghee, Difference of ghee & butter oil, Utilization of ghee and residue.

#### **Module III**

##### **Khoa, Chhana, Paneer, Dahi & Indigenous Cheese**

**[6 hrs]**

Preparation & Packaging, yield and composition, Factor affecting quality, Packaging & Preservation, Marketing and grading, Legal standards.

#### **Module IV**

##### **MILK BASED SWEETS**

**[6 hrs]**

Place of milk based sweets in India and abroad. Method of manufacture, packaging, storage and transportation of Rasgulla, Gulab jamun, Kalakhand, Rabri, Keer, malai, Rasmalai, Barfi, Peda, Sandesh and lassi.

#### **Practicals**

**[10 hrs]**

Preparation of khoa. Preparation of Ghee from butter and cream. Preparation of Paneer. Preparation of chhana. Preparation of Dahi. Preparation of milk based sweets: Rasogulla, Gulab jamun, Kalakhand, Rabri, Rasmalai, Barfi, Peda, Sandesh and lassi.

#### **Industrial / Incubation centre visit related to Indigenous Dairy Products**

**[5 hrs]**

## **Department of Botany**

**Title of the Course: Conservation and Utilisation of Medicinal Herbs**  
**Duration-30 Hrs.**

**Course code: VAC-1804**  
**Total Marks: 50**

### **Course Objectives:**

**CO1:** To understand about the Biodiversity of medicinal plant and its importance.

**CO2:** The learner will understand about the conservation of crop genome and utilization of arable land.

**CO3:** To learn about the packaging and management of medicinal plants.

### **Course Contents:**

#### **Unit I**

##### **Biodiversity and its Conservation**

**10 hrs**

Definition, levels, measurement, threats, drivers of biodiversity loss, strategies for biodiversity conservation.

**Unit II**

**Conservation of Medicinal plants**

**10 hrs**

Conservation of agriculture and arable land; conservation tillage, conservation of crop genome; Strategies of conservation of crops.

**Unit III**

**Packages and practices**

**15 hrs**

Packages and practices of the following medicinal herbs – Eryngium foetida, Paederia Foetida, Mentha arvensis, Ocimum sanctum, Houttuynia cordata, Oxalis Corniculata, Aloe vera and Zingiber officinale,

**Title of the Course: Horticultural Nursery Management**

**Course code: VAC-1604**

**Duration-40 Hrs.**

**Total Marks: 50**

**Course Outcome:**

**CO1:** Students will understand about the Nursery and its perspectives.

**CO2:** Creates the practical techniques for plant propagation methods.

**CO3:** To learn about the packaging and preparation of plant root media.

**CO4:** Student will understand about the identification of valuable plants.

**CO5:** It will give an understanding of Marketing of valuable plant.

**CO6:** It will give a practical idea about the functions of Nursery.

**Course Contents:**

**Unit-I**

**Preparation of Nursery**

**3 hrs.**

Criteria for selection of site for nursery

**Unit-II**

**Plant Culture Techniques**

**6 hrs.**

Propagation structures

Propagation techniques

**Unit-III**

**Packaging of Plants**

**12 hrs.**

Containerization

Preparation of Rooting media/potting mixture

**Unit-IV**

**Identification and assessment of Plants**

**7 hrs.**

Importance of mother plants

Care of nursery plants

**Unit- Vv**

**Marketing & Management**

**6 hrs.**

**Marketing tips**

Market selection

**Unit-VI**

**Field Visits**

**6 hrs.**

Nursery visit



**Department of Business Administration**

**Title of the Course: Professional Grooming & Business Etiquettes**  
**Duration: 30 Hrs**

**Course code: VAC 2111**  
**Total Marks: 50**

Sl. no	Topic	Sub-topic	Lecture
1.	Art & Science of Creating First Impression	Building Positive Inner/Self Image & its impact	Lecture-1
		Creating high Self Esteem	Lecture-2
		4 elements of First Impression: Grooming, Clothing, Communication & Body Language	Lecture-3, 4
2.	Emotional Intelligence & Interpersonal Behaviour	Activity for Self Evaluation	Lecture-5
		Need & ways to use EI at workplace	Lecture-6
		Interpersonal Behaviour - Working with & against others	Lecture-7& 8
		Ways to develop Interpersonal Skills - Life Positions	Lecture-9 & 10
3.	Communication Skills & Business Etiquette	Communication Styles- Assertive, Passive, Aggressive, Passive Aggressive	Lecture-11 & 12
		Determinants of Communication - Emotions, Body Language, Self Esteem	Lecture-13
		Listening vs Hearing	Lecture-14
		Effective Communication Strategies	Lecture-15
		Business Etiquette - Self Introduction, Handshake, Meetings & Email Writing	Lecture-16 & 17
4.	Interview Skills	SWOT Analysis	Lecture-18
		CV vs Resume	Lecture-19
		Do's and Don't's in your Resume	Lecture-20
		Group Discussions	Lecture-21 & 22
		Resume Formats	Lecture-23
		Personal Branding (including Public Speaking & Presentation Skills)	Lecture-24
5.	Body Language & Power Dressing	Power of Body Language - Non verbal Communication	Lecture-25
		Different Body languages	Lecture-26
		Body Language Quiz	Lecture-27
		Effects of Clothing & Grooming	Lecture-28
		Clothing Cues/Communication	Lecture-29
		Professional Image Types	Lecture-30
		The 4 A's of Professional Dress Standards	Lecture-31
		Image Makers & Image Breakers	Lecture-32

**Department of Chemistry**

**Title of the Course: Group Theory Application**  
**Duration: 32 hours**

**Course Code: VAC-2201**  
**Total Marks: 50**

**Course Outcome:**

After successful completion of the course students will be able to CO1.

To recognize the symmetry elements and their associated operations CO2.

Understand point group concept and molecular symmetry CO3.

Assignment of point group to a molecule & Relate the symmetry with the spectroscopic properties of a molecule

**Contents**

**UNIT I:**

Groups and Matrices Definitions and elements of group theory and matrix algebra

**UNIT II:**

Molecular Shapes and the Symmetry Groups Symmetry elements and operations, classes of symmetry operations, symmetry and chirality, symmetry point groups, symmetry of the Platonic solids

**UNIT III:**

Chemical Applications of Group Theory Group Theory and Quantum Mechanics - wave functions as bases for irreducible representations, the direct product and its importance in predicting spectral transition probabilities. Molecular vibrations - symmetry of normal vibrations, selection rules for fundamental vibrational transitions. Symmetry properties of atomic orbitals, molecular orbitals for  $\sigma$  and  $\pi$  bonding in AB<sub>4</sub> molecules, MO treatment of the bonding in ferrocene. Ligand field states, construction of the correlation diagram for the d<sup>2</sup> configuration in an octahedral environment.

**UNIT IV:**

Hands on training Sessions on model preparation Preparation of different molecules of different symmetry using paper (Ball and Stick model). Construction of tetrahedral model and octahedral model with chart paper. Demonstration of various rotational axis (C<sub>2</sub>, C<sub>4</sub>, C<sub>3</sub>), various plane of symmetry in all these high symmetry molecules. Demonstration of Improper rotation and inversion

**Title of the Course: Applications of software tools in chemistry**

**Course Code: VAC-2202**

**Duration: 32 hours**

**Total Marks: 50**

**Course Outcome:**

After successful completion of the course students will be able to CO 1:

Learn the calculation, data analysis and construction of different form of graphs from the raw data. CO 2: Write the chemical structures with appropriate geometry. CO 3: Use MestreNova software, which is used to analyze the NMR raw data obtained from the NMR instruments.

**APPLICATIONS OF SOFTWARE TOOLS IN CHEMISTRY**

**UNIT 1**

Application of Excel Excel Basics; calculations and formatting in excel; data processing with excel; use of different mathematical operations; Graphing: Column & Bar Graphs, Line & Symbol Graphs, Pie Charts, Multi-Axis & Multi-Panel Graphs, 3D Graphs; data analysis; Hand on practice

**UNIT 2**

Application of Origin software Origin basics; Graphing; Column & Bar Graphs, Line & Symbol Graphs, Pie Charts, Multi-Axis & Multi-Panel Graphs, 3D Graphs, Waterfall Graphs; data analysis and statistics, curve and surface fitting, peak analysis, Signal Processing, Applications in TG study, XRD study, FTIR study. Hand on practice

**UNIT 3**

Application of ChemDraw (for drawing chemical structures) Introduction to basic features of Chemdraw; Chemical structure to name conversion; Chemical name to structure conversion; NMR spectrum simulation (both proton NMR & Carbon-13 NMR); Mass spectrum simulation; structure clean up; export to SVG, PDF, PDB, GIF, CDX etc.; Create and modifying images of chemical structures; write and perform chemical equations and diagrams;

**UNIT 4**

Use of Mestrelab (Mestrenova) Basics of NMR processing, spectral data analysis

**Department of Commerce**

**Title of the Course: : Digital Marketing**  
**Duration : 30 Hours**

**Course Code: VAC- 1805**  
**Total Marks: 50**

**UNIT I**

**Introduction to Digital Marketing-** Evolution of digital marketing, digital marketing vs traditional marketing, importance and scope of digital marketing, challenges of digital marketing, digital marketing models.

**UNIT II**

**Website Planning Process–** introduction of internet, use and role of internet, introduction to world wide web, types and functions of websites, planning and processing of a website.

**UNIT III**

**Social Media Marketing–**Introduction to social media platforms, importance and characteristics, social media marketing strategies.

**UNIT IV**

**Introduction to SEO,SEM, Mobile Marketing-** Introduction to SEO,SEM, working pattern of SEO, tactics of SEO,SEM, concept of mobile marketing.

**UNIT V**

**Trends in digital marketing** – Current trends in digital marketing, infographics, digital marketing plan and strategies.

**Suggested Readings**

1. Gupta Seema- Digital Marketing , 2<sup>nd</sup> Edition , Mc Graw Hill,2020
2. Upadhyay Chandra Kailash- Digital Marketing ,2021 Edition
3. Digital Marketing for Dummies, By Ryan Deiss and Russ Hennesberry, 2017
4. Social Media Marketing All-In-One for Dummies by Jan Zimmerman and Deborah Ng, 2017

**Department of Computer Science & Electronics**

**Title of the Course: Advanced Libraries for Data Science**  
**Total Hours : 36 Hours**

**Course Code: VAC- 2113**  
**Total Marks: 50**

**UNIT I**

Python Basics, Python Environment Setup and Essentials, Python Data Structures, Python Programming Fundamentals, Working with Data in Python. 8 Hours

**UNIT II**

Working with NumPy Arrays, Data Science Overview, Data Analytics Overview, Statistical Analysis and Business Applications, Most common libraries used in the Data Science. 8 Hours

**UNIT III**

Mathematical Computing with Python (NumPy), Data Manipulation with Pandas, Data Visualization in Python using Matplotlib, Scientific Computing with Python (Scipy), Natural Language Processing with Scikit Learn. 10 Hours

**UNIT IV** Developing and training deep learning models with python Keras, making statistical graphics in Python with Seaborn, Developing, training, and designing deep learning models with Python TensorFlow, Web Scraping with Beautiful Soup.



**Department of Earth Science**

**Title of the Course :** Agriculture: Its Implications on Economy and Ecology  
**Time: 30 hours**

**Course Code: VAC 2136**  
**Total Marks: 50**

**Objectives:**

- 1) To impart knowledge on the impact of agriculture in ecological and economic basis.
- 2) To understand the importance of various sectors of agricultural practices and the process influencing the agriculture.
- 3) To inculcate and promote entrepreneurship in agriculture

**UNIT I**

Agriculture: Its economic and ecological impact (12 Hours)

Importance of agriculture in national economy, Major diseases and pest of crops, Pesticides and Fertilizers, Ecotoxicology, Impact of agricultural practices on the environment, Biopesticides and biofertilizers

**UNIT II**

Various sectors of agricultural practices and the process influencing the agriculture (15 Hours) Shifting cultivation, Dry land farming, Agroforestry, Major soils of India, Soil erosion, Water resource management, Livestock management, Weed management, Importance of fisheries in agriculture and environment, Application of GIS in agriculture

**UNIT III**

Agricultural entrepreneurship (6 Hours) Agricultural statistics, Vermiculture, Agricultural entrepreneurship

**Essential books:**

1. ICAR, 1996. Hand book of Agriculture. Indian Council of Agriculture Research, New Delhi.
2. Balasubramaniyan, P and Palaniappan, S.P.2002. Principles and practices of Agronomy. Agro bios(India), Jodhpur
3. Dahama, A.K. 1996. Organic farming for Sustainable Agriculture. Agro botanical publishers (India), Bikaner.
4. Brady, N.C. 1995. The Nature and Properties of Soils. Prentice Hall of India Pvt. Ltd., New Delhi.
5. Pedigo, L.P. 1999. Entomology and Pest Management. III Edition. Prentice Hall, New Jersey, USA, 691 p.
6. Bimal Chandra Mal. 1995. Introduction to Soil and Water Conservation Engineering, Kalyani Publishers, Calcutta.
7. Nair, PKR (2008). An Introduction to Agro forestry, Sprinage (P) Ltd. New Delhi.
8. Sivasudevaro, B and Rajannikanthu, G. 2007. Rural Development and Entrepreneurship Development, The Associated Publications, Ambala



**Department of Economics**

**Title of the Course: Management of Financial Services**  
**Duration: 30 Hrs**

**Course Code: VAC 1511**  
**Total Marks: 50**

**Course Outcome:**

- CO1:** The course will enable to gain knowledge on the emerging scenarios and changes in the banking industry.  
**CO2:** The Course will enable to learn how a bank operates and functions.  
**CO3:** The course will help to understand the credit policies of NPA management system.

**CO4:** The course will introduce the whole range of products currently being offered by the banks.

**CO5:** It will develop the skill of computer based accounting for employability of learners.

**CO6:** The course will expose the students to various career prospects and future growth with the banking industry.

**Course Content:**

**Unit 1**

**Banking Scenario in India-An overview**

**5 Hrs**

Origin and growth of commercial banks in India, Financial Services offered by banks, changing role of commercial banks, Role of banks in economic growth of the nation, Bank mergers and its implication.

**Unit 2**

**Banking System: Operations and Functions**

**5 Hrs**

BASEL Committee norms, liquidity management, RBI guidelines, credit policy, prudential norms, IRAC, CAR, SARFAESI Act, Insolvency and Bankruptcy code.

**Unit 3**

**Credit and NPA Management**

**5 Hrs**

Credit management, principles of good lending, priority sector lending, credit appraisal techniques, credit rating agencies, CIBIL procedures, classification of sub-standard, doubtful or loss assets NPA trends.

**Unit 4**

**Banking products and Services**

**5 Hrs**

Various types of Deposit/Loans/credit product/ facilities and different types of securities available to bank & FI and modes of charging. Banking products, concept of CASA, KYC guidelines, demat account, electronic facilities, investment options with banks, ancillary services of banks, merchant banking, modes of charging for financial services.

**Unit 5**

**Use of Technology in Banking**

**5 Hrs**

Delivery channels, ATM, mobile banking, internet banking, USSD, UPI, BHIM, Payment Gateways, /card technologies, Electronic Fund Transfer, RTGS, NEFT, IMPS, Issues in banking technology.

**Unit 6**

**Career Prospects in Banking and Financial Sector**

**5 Hrs**

Career opportunities in banking and financial sector in India, Financial analysts, loan officers, teller, investment banking, credit risk manager, value added courses, factors in improving employability.

**Title of the Course: Recent Developments in Monetary Policy in India**

**Course Code : VAC 1813**

**Duration: 30 Hrs**

**Total Marks: 50**

**Course Outcome (CO):**

**CO1:** To impart a complete and detailed insight of monetary policy in India.

**CO2:** To educate the students about the contemporary policy reforms taken in to design current monetary policy.

**CO3:** To inform and aware the students about the use of various instruments of monetary policy.

**CO4:** To decipher the knowledge among students about the design, implementation and policy assessment of monetary policy practiced by Reserve Bank of India.

**CO5:** The course will help students to understand how monetary policy affects Indian Economy.

**Course Content:**

**Unit 1**

**Overview of Monetary Policy**

**6 Hrs**

Overview: Basic concepts, objectives, advantages and disadvantages, design, instruments and implementation of monetary policy in India

**Unit 2**

**Policy Implication of Monetary policy**

**6 Hrs**

Policy implications of monetary policy: Expansionary and Contractionary monetary policy in the context of India; Working of monetary policy with fiscal policy

**Unit 3**

**Reforms in monetary Policy**

**6 Hrs**

Major policy reforms in monetary policy in India after 21<sup>st</sup> century and their impacts on Indian economy-1: CRR, SLR, Bank Rate, Base Rate, Repo and Reverse Rate.

**Unit 4**

**Monetary policy and Indian Economy**

**6 Hrs**

Impacts on various instruments on monetary policy on Indian economy; other instruments, Liquidity Adjustment Facility (LAF), Marginal Standing Facility (MSF) and Market Stabilisation Scheme (MSS)

**Unit 5**

**Assessment and Evaluation of monetary**

**6 Hrs**

Assessment and Evaluation of monetary policy and the role of monetary policy in economic growth in the context of India economy and problems of monetary policy in India

**Title of the Course : GST: an Inclusive Tax Regime**

**Course Code: VAC- 1816**

**Duration : 30 Hrs**

**Total Marks: 50**

**Course Outcome:**

**CO1:** The course is intended to decipher the understanding of role of GST in designing an inclusive and robust tax regime for India.

**CO2:** The course will help the students to understand how far the GST has helped to achieve inclusive tax regime in India.

**CO3:** The course will help candidate's to gain the knowledge of various concepts and historical outlook of GST.

**CO4:** The course will enable the students to understand the structure in framing a new tax regime and the idea of One nation one tax structure" both in theoretical& practical way.

**CO5:** Most importantly, the course will enable students to understand how GST affects the India Economy to Grow.

**Course content:**

**Unit 1**

**History of Indirect Tax reforms in India**

**6 Hrs**

History of indirect taxes in India, Govt. of India Act, 1935, Introduction of Sales Tax in India, introduction of value added tax (VAT) in India, Modified value added tax (MODVAT) 1986, Central value added tax (CENVAT) 2002, VAT ACT, Reduction in Custom duties 1990, services tax 1994, GST 2017.

**Unit 2**

**Introduction of GST**

**6 Hrs**

GST, History of GST, GST in other countries, Genesis of GST in India, Constitutional Amendment for GST, Legislative Framework.

**Unit 3**

**Structure of GST**

**6 Hrs**

Structure of GST, Benefits of GST, GST rates, rationality of GST rates, Extent of CGST Act/ SGST Act/ UTGST Act/ IGST Act, Applicability of GST in India

**Unit 4**

**Levy and collection**

**6 Hrs**

Levy and collection as per CGST Act, 2017, Levy and collection as per IGST Act, 2017, GST on Alcohol for human consumption, GST on Petroleum, Liability to pay CGST.

**Unit 5**

**Economics of GST**

**6 Hrs**

Revenue and Economic growth, Impact of GST on Indian Economy, Implication on central, state and local governments, GST and Microeconomic Indicators, Tax revenue and GST.

**Department of Education**

**Title of the Course: Education for Aesthetic Development**

**Course Code: VAC- 2161**

**Duration : 1 Month**

**Total Marks: 50**

**INTRODUCTION:**

Aesthetic education is considered as the core of all education. The sense of understanding and appreciating beauty helps in developing some other qualities like imagination, creativity etc. which is very essential to live a life happily. Education for aesthetic development has great contribution in developing interest in art and literature also.

This course provides a platform for the learner of postgraduates, undergraduates, researchers, teacher educators as well student teachers to learn about 'EDUCATION FOR AESTHETIC DEVELOPMENT'. The course will provide an opportunity to learners to understand and appreciate beauty, to develop interest in creativity, to understand the value of truth, beauty and goodness as ideals and sources of happy life etc.

**AIMS :Its aim is to develop the sense of understanding and appreciating beauty.**

**OBJECTIVES OF THE COURSE:**

- To develop sense of beauty of objects and works
- To develop interest in Art and literature
- To develop interest in acquiring pleasant experience
- To establish relationship between nature and Human life
- To acquaint with the Ideals of Life

**COURSE LAYOUT:**

**Unit 1**

- Meaning, concept and nature of Aesthetic Development
- Aesthetic as a source of Education

**Unit 2**

- Aesthetic philosophy of Art and Education
- Theatre, Drama, Art, Literature and Aesthetic Development

**Unit 3**

- Philosophy and Aesthetic Experience
- Truth, Beauty and Goodness as Ideals and sources of happy life

**Unit 4**

- Theories of Aesthetic Development
- Principles of Aesthetic Education

**Unit 5**

- Materials and methods of teaching for Aesthetic Development
- Role of teacher in fostering Education for Aesthetic Development

**Books and References :**

1. Indian Aesthetic and the Philosophy of Art, By: Arindam & Chakravarti, Bloomsbury Publication
2. A History of Aesthetic, By: Bernard Bosanquet, Publisher: Forgotten Books, 2019
3. Indian Aesthetic An Introduction, By: V. S. Seturaman Publisher: Laxmi publication.
4. Indian theory of Aesthetic, By: P. S. Sastri Publication: Bharatiya vidya Prakashan
5. An introduction to Indian Aesthetic History, Theory & Theoretician  
By: Mini Chandran & Sreenath V. S, Publisher: Bloomsbury Academic India

**Department of Library and Information Science**

**Title of the Course: Information Retrieval Techniques from Academic and Scholarly Databases**

**Course Duration: 30 hrs**

**Course Code: VAC-1412**

**Total Marks: 50**

**Course Outcomes (CO)**

**CO1** To give students an understanding and knowledge of different academic databases

**CO2** To provide them the skills to search form different search engines and digital libraries by using various search strategies

**CO3** To enable the students to Identify and retrieve Primary and Secondary data for research purpose

**CO4** To familiarise the students with latest trends of information retrieval in context of Digital and Virtual libraries

**Unit-I**

**Search Techniques**

**(6hrs)**

-Search Strategies- Introduction, definition, meaning, function

-Types of Search Strategies- Boolean search, Phrase searching, Truncation search and Proximity search

**Unit-II**

**Databases and Networks**

**(12hrs)**

-Academic Databases- Introduction, needs and Importance

-Type of Academic Databases- Subscription based, Open access,

Bielefeld Academic Search Engine (BASE) & Reference works, Google Scholar etc.

-Academic databases and Networks in India-

INFLIBNET, Shodhganga, Shodhgangotri, Vidyanidhi, E-Gyankosh, Indian Citation Index

-Publishing and Media Houses- Online publications, E-Publishing

**Unit-III**

**Searching Tools**

**(10hrs)**

-Search tools- Web search engines, Meta search engines, Web directories

-Web search software- Web crawler

**Unit-IV**

**Recent Trends in Repository and Library**

**(6hrs)**

-Virtual Library- Google Books, Internet Archive, LibriVox, ProQuest etc.

-Digital Library- World Digital Library, National Digital Library (India), China Digital Library etc

-Internet Archive

**An Advanced Approached to Web Designing**

**Course Code : VAC 1613**

**Duration : 30 hrs**

**Total Marks: 50**

**Course Outcomes (CO)**

**CO1** To make the students to understand the principles of creating an effective web page, including an in-depth consideration of information architecture

**CO2** To familiarise the students with graphic design principles that relate to web design and learn how to implement theories into practice

**CO3** To develop their skills in analysing the usability of a web site

**CO4** To make the students to understand how to plan and conduct user research related to web usability

**Unit-I**

**Web Technology Tools**

**(9 hrs)**

-Introduction to Web Technology- Definition, meaning, importance

-Tools- HTML: The Foundation of any Web Site, DHTML (JavaScript ,CSS and CSS-P,DOM), The Backend:

PHP and Perl, The Future: SVG and XML

**Unit-II**

**Content Management Software: Drupal** (9 hrs)

- Basic Concepts of Drupal- Getting Started with the Drupal 8 UI, Creating Basic Content,
- Drupal 8 Structure and Site Organization- Working with Advanced Content
- System and Site Configuration- User and Access Control, Extending Drupal, Drupal 8 and Themes

**Unit-III**

**Content Management Software: JOOMLA** (8 hrs)

- Introduction and Installing Joomla- 3.x
- Joomla 3.x Backend Control Panels,
- Building Site Basics,
- Content Organization,
- Setting General Preferences for Articles,
- The Joomla 3.x Frontend Site,
- Working with Templates,
- SEO Tips and Tricks in Joomla 3.x

**Unit-IV WORDPRESS**

(8 hrs)

- Introducing Wordpress
- Creating Blog Content,
- Importing/Exporting Content

**Title of the Course: Effective Academic Writing and Preservation**

**Course Code: VAC 1516**

**Course Duration: 30 hrs**

**Total Marks: 50**

**Course Outcomes (CO)**

**CO1.** communicate effectively in specific writing situations, which may include various academic, professional, or civic situations;

**CO2.** understand and respond appropriately to the critical elements that shape communication situations, such as audience, purpose, and genre;

**CO3.** critique their own writing and provide effective and useful feedback to enable other students to improve their writing;

**CO4.** demonstrate critical and evaluative thinking skills in locating, analyzing, synthesizing, and using information in writing activities.

**UNIT-I**

**Introduction of effective academic writing and presentation**

(6 hrs)

- Need and purpose of academic writing
- History of academic writing
- Genre
- Audience and purpose in texts

**UNIT-II**

**Paragraph Writing**

(8 hrs)

- Paragraph structure
- Basic rhetorical modes (narration, description, exposition)
- Writing process (pre-writing, writing, re-writing)
- Stylistics (vocabulary, conciseness)

**UNIT-III**

**Summary writing**

(8hrs)

- Analyzing text structure
- Topic,
- Main points
- Thesis formulation

**UNIT-IV**

**APA requirements**

**(8 hrs)**

- Quoting and paraphrasing,
- Summarizing.
- Plagiarism.
- In text referencing and reference lists
- Citation of sources.

**UNIT-V**

**Synthesis writing**

**(8 hrs)**

- Topics for writing.
- Finding and evaluating relevant sources

**Department of Mathematics**

**Title of the course : LaTeX**

**Course Code : VAC 0301**

**Course Duration : 33hrs.**

**Total Marks: 50**

**Course Outcomes:**

**CO 1** : It will help the students to comprehend the successfully install Latex.

**CO 2** : It will give an understanding on how its related components on a home/personal computer.

**CO 3** : Students use LATEX and various templates acquired from the course to compose mathematical documents, presentations and report.

**CO 4** : It will help to access CTAN and other resources to obtain additional packages.

**CO 5** : It offers techniques for writing documents, mathematical formulas, preparing beamer presentation, import graphics as well as building diagrams and enhancing figures etc.

**Course Details:**

**Unit 1**

Introduction to LaTeX, history, Its merits and demerits. Installation of the software LaTeX.

**10 Hrs**

**Unit 2**

Understanding LaTeX compilation Basic Syntex, Writing equations, Matrix, Tables etc. Page Layout – Titles, Abstract, Chapters, Sections and subsections, References, citation. List making environments, Table of contents, Generating new commands, Figure handling numbering, List of figures, List of Tables, Generating index.

**10 Hrs**

**Unit 3**

Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing. Classes: Article, book, report, beamer, slides, IEEtran  
Writing Resume, question paper, article and research papers.

**10 Hrs**

**Unit 4**

Presentation using beamer. Reference writing using bibTex. Practical based on the above concept

**4 Hrs**

**Department of Physics**

**Title of the course : Two-Dimensional Nanomaterials and Their Applications**

**Course Duration: 32 hours**

**Total Marks: 50**

**About the course:**

This course has been designed to supplement the knowledge of students in ‘Condensed Matter Physics’. Nanotechnology is an integral part of this area now and understanding the physical properties of materials at the nanoscale is crucial to their applications. Two-dimensional nanomaterials like graphene and transition metal di-

## **Prospectus: Value Added Courses-2021-2022**

chalcogenides are being explored for their distinctive electronic, catalytic and optical properties. Tremendous amount of opportunities exists in exploiting their application potentials in present-day needs in areas such as energy, environment, healthcare etc.

### **Intended Audience:**

Students pursuing B.Sc. and M.Sc. in the field of Applied Sciences are eligible to participate in the course.

**Mode: Blended (Both Online and Offline)**

**Starting from: 3rd January 2022 onwards**

### **Course Contents**

#### **Module 1**

Brief review on Solid State Physics

#### **Module 2**

Two-dimensional nanomaterials (Carbon-based)

#### **Module 3**

Transition metal dichalcogenides

#### **Module 4**

Applications of carbon-based nanomaterials

**Title of the course : Astronomy & Astronomical Instrumentations**

**Course duration : 32 Hrs**

**Total Marks: 50**

### **About the Course:**

This Value Added Course is focused on the intensive interactive classes on Astronomy & Astronomical Instrumentations. The course is designed to help students to understand Astronomy, Astrophysics and different instruments used for Astronomical observations. It will encourage the participants to indulge in further research on the particular field. Moreover, the course will help to impart skill for solving research problems in the field of Astrophysics and Astronomy.

### **Course Content:**

#### **Module-I**

Introduction to naked eye Astronomy

#### **Module-II**

Celestial sphere and the coordinate systems

#### **Module-III**

Optical techniques for observing the stars

#### **Module-IV**

Radio Techniques

#### **Module-V**

Stellar Evolution and Milky Way galaxy

#### **Module-VI**

Hands on training on Astronomical Instrumentation

### **Who can apply?**

Students pursuing M.Sc. in the field of Applied Sciences are eligible to participate in the course.

Mode: Blended

Time: 3:00 –4:00 pm (offline) and 7:00 pm-8:00 pm (online)



**Title of the course : Fiber Optic Sensing**  
**Course duration : 32 Hrs**

**Total Marks: 50**

**About the Course:**

This Value Added Course is focused on helping the students extend their existing knowledge in Optics, Basic Instrumentation Skills and Practical Physics, into the paradigm of sensing with Fiber Optic Sensors. The course is designed to help students to understand one of the newest and most prominent branches of Optics, in which they can pursue further studies or research. Moreover, the course will help to impart design and development skills for solving practical implementation and research problems in the field of Fiber Optics. An assignment would be held on which, the students will be graded.

**Course Content:**

**Unit I**

Review of Fiber Optics & Introduction to FO Sensing 4 L  
Review of Fiber Optics; Introduction to Fiber Optic Sensing; Nomenclature of Fiber Optic Sensors; Types of Fiber  
Optic Sensing paradigms – Quasi, Fully & Hybrid Distributed Sensing paradigms.

**Unit II**

Optical Signal Measurement Devices 10 L  
Introduction to Optical Measurement instruments –Sources – Monochromatic and Broadband; Photodetectors;  
Spectrometer Principle; Optical Spectrum Analyzer; Optical Time Domain Reflectometer.

**Unit III**

Types of Fiber Optic Sensors 12 L  
Intensity Modulated FO Sensors – Microbend and extrinsic; Phase Modulated FO Sensors – Different  
Interferometer  
types and Low Coherence Interferometry; Wavelength Modulating FO Sensors – Bragg Gratings; Polarization  
Modulated FO Sensors – Birefringent Fibers – Different types and operational principle.

**Unit IV**

Special Types of Fiber Optic Sensing 6 L  
Optical Time Domain Reflectometry; Brillouin Scattering & Rayleigh Scattering in Fiber Optics  
Pre-requisites (Preferable):  
Waves & Optics – B.Sc.(H), Physics;  
Basic Instrumentation Skills - B.Sc.(H), Physics;  
Electronics – B.Sc.(H) & M.Sc., Physics

**Who can apply?**

Students pursuing B.Sc.,M.Sc., B.Tech. and M.Tech. in the field of Applied Sciences and Electronics are eligible to participate in the course.

Mode: Offline

Registration Process: Students are to contact Course Coordinators for registration

**Title of the course : Numerical Analysis using Python**  
**Course duration : 32 Hrs**

**Total Marks: 50**

**Course Objective**

This value-added course is focused on the intensive interactive classes on Numerical technique through Python. The course is designed to get the basics of python programming. A few simultaneous non-linear equations will be solved by Numerical regression method. It will encourage the students to indulge in further research in various fields.

**Course Outcome**

Upon successful completion of the course students will be able to

**CO1:** Create scripts in python.

**CO2:** Understand the purpose and the process of code review.

**CO3:** Design and develop application using python.

**CO4:** Demonstrate the ability to solve problems.

**Module 1**

**Basic Python Programming:**

Feature of Python, History, Python constant, Python Strings, variables and identifiers, data types and expressions.

**Module 2**

**Decision Control Statement:**

Selection/ conditional branching, if, if-else statement, loops in Python

**Module 3**

**Functions, Module, File Handling:**

Function definition, function call, variable scope and lifetime, return statement, arguments of Python, name of modules, making own modules, python modules, modules and namespaces, standard library modules, Introduction to file handling, types of files, opening and closing of file, reading and writing of files.

**Module 4**

**Numerical regression method**

Newton-Raphson Method, Euler Method, Runge-Kutta Method

**Module 5**

**Solution of Differential equation**

Solution of 1<sup>st</sup> and 2<sup>nd</sup> order differential equation

**Title of the course : Nuclear Radiation: Safety Measurement and Applications**

**Course duration : 32 Hrs**

**Total Marks: 50**

**About the course:**

This Value Added Course is designed to help the students to learn how to survey, monitor and control radiation exposure for a career in the nuclear industry. It focuses on the applications of nuclear radiations in various fields such as, medicine, academics, industry, agriculture, archaeology, space exploration, law enforcement, geology including mining and many others.

**Contents**

**Module 1**

Basics of Nuclear Radiation

**Module 2**

Radiation Monitoring and Safety

**Module 3**

Applications of Nuclear Radiation Compulsory for all students of BSc Physics 6th semester students  
MSc Physics 4th semester students

**Department of Political Science**

**Title of the course : Changing Paradigm of Citizenship in North-East India**  
**Duration: 30 hrs**

**Course Code: VAC 1722**  
**Total Marks: 50**

**Introduction**

Political Science is a part of Social Sciences which is concerned with the theory and practice of politics, political systems and political behavior. The Department of Political Science, University of Science and Technology, Meghalaya as a part of greater Political Science family will organize a value added course on *Changing Paradigm of Citizenship in Northeast India*. The issue of citizenship has become very relevant as people of the region revolted against the continuous migration to the region. As an outcome of such



movement Government of India initiated ideas to look into the issues of citizenship and Assam is the first place where it is implemented. The National Register of Citizen (NRC) is the first initiative to define citizenship and on the other hand Citizenship Amendment Bill (CAB) 2016 is also under consideration. The conflict over the issue of citizenship is very relevant in the present context and it a burning problem.

**Course Outcomes (COs):**

The following are the broad outcomes of this course:

**CO1:** To impart proper knowledge of citizenship and the contemporary debate on citizenship.

**CO2:** To understand the constitutional provisions for citizenship and the classification of present problems and issues on citizenship.

**CO3:** To explore merits and demerits National Register of Citizen and Citizenship Amendment Bill 2016.

**CO4:** Critical and creative thinking on the issue and emerging ideas of citizenship.

**CO5:** To provide exposure about the ongoing conflicts of NRC and CAB in Northeast India.

**Course Contents:**

- ❖ Citizenship: Approaches and Theories (2 hrs)
- ❖ Different Facets of Citizenship in North-East (3 hrs)
- ❖ Customary Laws and the Citizenship in North-East (3 hrs)
- ❖ Impact of Regional Differences over the Concept of Citizenship (4 hrs)
- ❖ Local Administration: Provisions, Challenges and Citizenship (4 hrs)
- ❖ Issues of NRC in North-East (4 hrs)
- ❖ Party Politics and Citizenship in North- East (4 hrs)
- ❖ Issues of Human Rights and the Concept of Citizenship (4 hrs)
- ❖ Citizenship Amendment Bill (2016): How Relevant in North-East (4 hrs)
- ❖ Citizenship: Way ahead in North-East (2 hrs)

**Title of the course : Why Do People Migrate: Theories and Approaches”**  
**Duration: 30 hrs**

**Course Code: VAC 1820**  
**Total Marks: 50**

**Introduction**

This course attempts to explore the theories about migration in greater depth and try to highlight how migration is a constant phenomenon throughout human history. In this course, the student will learn about different theoretical models that seek to explain why migration starts and why it continues. Student will explore migration

as a structural feature of our societies and will examine individual's choices to migrate. They will consider the role networks and institutions play in the movement of people. The student will also hear from experts about how migration theories can help us understand cases of labour migration in different regions.

**Course Outcomes (COs):**

The following are the broad outcomes of this course:

**CO1:** To identify the fundamental terminology used in theoretical debates on migration

**CO2:** To explore the main theoretical approaches and to understand migration as a global phenomenon

**CO3:** To explain the motivation for people to move and settle outside their home countries

**CO4:** To apply the main theories to the interpretation of real case-studies and theoretical approaches in practice

**Course Contents:**

- ❖ Crisis and Migration: A Humanitarian Perspective (2 hrs)
- ❖ Political Crisis: Impact of Migration in North East India (3 hrs)
- ❖ Migration problem in Urban Areas of India: A Special Reference to Assam (3 hrs)
- ❖ Issue of Migration from Myanmar to India: A Critical Analysis (4 hrs)
- ❖ Theoretical Understanding of Migration: An Indian Perspective (4 hrs)
- ❖ Migration problem from the USA Standpoint: Issues and Challenges (4 hrs)
- ❖ A Case Study on the Living Condition of Migrant: Special Reference to North East India (4 hrs)
  
- ❖ Migration and Human Rights: An Analysis from Global Perspective (4 hrs)
- ❖ Impact of Migration and Identity Crisis in India: A historical perspective (3 hrs)
- ❖ Impact of Migration, Threat on Culture and Tradition of the Indigenous People in India (4 hrs)
- ❖ Migration to Refugee: A global perspective (4 hrs)

**Title of the course : How to Write Research Project Proposals**

**Duration: 34 hrs**

**Course Code : VAC 1821**

**Total Marks : 50**

**Introduction**

Research is the fundamental basis of higher learning and innovation. The society develops through the strength of science and technology in various socioeconomic and political fields. It is a cumulative part of curriculum to train the students in research and innovation that provides ample opportunities for early career. Around the world, various agencies work with those research projects having abundant possibility to contribute for the promotion of modern approaches in the socio-political life. Institutions of higher studies are having specialised units to guide the young minds with lots of ready-to-use resources upto the maximum productive aspirations. This course will enable the young mind to explore their world of early career through funding agencies around the world.



**Course Outcomes (COs):**

The following are the broad outcomes of this course:

**CO1:** To encourage the students toward research oriented studies and orient them towards taking up research as a Career.

**CO2:** To promote early career ethics and equip them with the skill to prepare project proposals for funding from Government and Non-government organizations.

## ***Prospectus: Value Added Courses-2021-2022***

**CO3:** To improve the career prospects of the curriculum and providing wider scope beyond the curriculum for the enhanced employability.

**CO4:** Exploring national and international funding agencies in the domain of Social Sciences

### **Course Contents:**

- ❖ Equipping One-self to Face the Academic Challenges of 21st Century (2 hrs)
- ❖ Research Projects as an Alternate to Early Job Seekers (3 hrs)
- ❖ Positioning Research in Higher Studies (3 hrs)
- ❖ How to Find External Funding Agencies for Research Projects (4 hrs)
- ❖ Tips to write Good Research Proposal (4 hrs)
- ❖ Developing Standard Research Methodology for Study Area (3 hrs)
- ❖ Tips to Effectively Communicate the Funding Agencies to Provide Fund for Research Study (4 hrs)
  
- ❖ Agencies Providing Funds for the Young Scholars of Social Sciences (4 hrs)
- ❖ How to enhance the Research Prospect of the Proposal at the Initial Stage (3 hrs)
- ❖ Thinking beyond the Paradigm to Develop the Research Interest (4 hrs)

## **Department of Rural Development**

**Title of the Course: Rural Technology**

**Course Code: VAC 1413**

**Course Duration: 33 hrs.**

**Total Marks: 50**

### **Course Outcomes**

**CO1.** This course will give an opportunity to the students to learn about different aspects of Dairy Farming

**CO2.** Students of this course will have the chance to learn about the scientific process of Pig Farming and its Scientific Management.

**CO3.** Students of this course will also have the chance to learn about different aspects of Organic Farming after the completion of this course.

### **Unit 1**

#### **Management of Dairy Farming**

**(10 hrs.)**

Management of Dairy Farming- Scientific Settlement Pattern of Dairy, Health and Hygiene, Sanitation in Dairy

### **Unit 2**

#### **Pig Farming and its Scientific Management**

**(10 hrs.)**

Pig Farming and its Scientific Management- Scientific Settlement Pattern of Dairy, Health and Hygiene, Sanitation in Piggery

### **Unit 3**

#### **Organic Farming**

**(8 hrs.)**

Organic Farming- Concept, Principles and Methodology, Preparation and use of Low Cost Input- Vermicompost

### **Unit 4**

#### **Food Processing and Preservation**

**(5 hrs.)**

Food Processing and Preservation- Food Preservation, Food Processing: Packaging, Labeling, Grading

## **Department of Social Work**

**Title of the Course: Social Medicine And Community Health**

**Course Code: VAC 08**

**Course Duration: 30 hrs.**

**Total Marks: 50**

### **Program Outcome**

1. The course intends to provide knowledge on the applications of concept of social medicine and community health in profession as well as in various settings and also equip students in applying their knowledge in their respective focus areas while working with communities and organizations.

2. The students will be enabled to critically analyze, monitor and evaluate interventions in the field.
3. It aims to develop skills among the students for working with people in need. The programme enables the students to be facilitators of change by working with individuals, groups and communities.
4. Through the programme, the students would acquire skills in the field as well as use in research.

#### **Unit-I**

##### **Evolution and Basic Concepts of Public Health/ Social Medicine and Community Health**

- History of Social Medicine and Community Health in South Asia
- Comprehensive Health Care
- Social Development and Health
- Dimensions and Determinants of Health
- Mental health and its components: Characteristics of mentally health persons
- Mental illnesses, identification, assessment and intervention
- Concepts and Indicators of Health and Wellbeing
- Natural History of Disease
- Levels of Prevention

#### **Unit-II**

##### **International Health**

- Health problems of developed and developing countries
- Globalization and Its Impact on Health
- Health problems of South East Asia region
- International agencies in Health
- Health for All approaches- Primary Health Care (1978) to Universal Health Coverage
- Health and Sustainable Development Goals (SDG)

##### **Suggested references:**

1. Textbook of preventive and social medicine: Author Piyush Gupta
2. Social Medicine: Polarization and perspective Author Danny Dorling

### **Department of Sociology**

**Title of the Course: Soft Skills and Personality Development**

**Course Duration: 36 hrs**

**Course Code: VAC 1518**

**Total Marks: 50**

#### **Course Outcomes (CO)**

CO1 To train students in soft skills

CO2 To enable them to be professionally competent

CO3 To create interpersonal skills

#### **Unit 1**

##### **Fundamentals of Soft Skills and Personality Development (8 hrs)**

Soft Skills and Personality Development- Soft Skills: Meaning and Importance - Hard Skills versus Soft Skills - Self Concept: Self Awareness, Self Development and Self Realisation – Power of Positive Attitude – Etiquette and Manners. Listening: Types of Listening, Effective Listening and Barriers to Listening – Assertive Communication.



#### **Unit 2**

##### **Communication Skills**

**(6 hrs)**

Communication Skills- Oral Communication: Forms, Types of Speeches and Public Speaking – Presentation: Elements of Effective Presentation and Use of Visual Aids in Presentation. Written Communication: Strategies

## **Prospectus: Value Added Courses-2021-2022**

of Writing – Business Letters: Form, Structure and Formats – Types of Business Letters – Memos – Agenda and Minutes. Non-verbal Communication: Body Language and Proxemics.

### **Unit 3**

#### **Interpersonal Skills**

**(6 hrs)**

Interpersonal Skills: Relationship Development and Maintenance and Transactional Analysis. Conflict Resolution Skills: Levels of Conflict and Handling Conflict - Persuasion – Empathy – Managing Emotions – Negotiation: Types, Stages and Skills – Counselling Skills.

### **Unit 4**

#### **Employability Skills**

**(10 hrs)**

Employability Skills- Goal Setting – Career Planning – Corporate Skills – Group Discussion – Interview Skills – Types of Interview - Email Writing – Job Application – Cover Letter - Resume Preparation.

### **Unit 5**

#### **Professional Skills**

**(6 hrs)**

Professional Skills: Decision Making Skills – Problem Solving – Emotional Intelligence – Team Building Skills – Team Spirit – Time Management – Stress Management: Resolving Techniques.

## **Department of Zoology**

**Title of the Course: Wildlife Research Techniques**

**Course code: VAC-1521**

**Duration-30 Hrs**

**Total Marks: 50**

### **Course Objectives:**

**CO1:** Students become well understand of the wildlife conservation and methodologies.

**CO2:** Students will understand the uses of GIS and remote sensing in a landscape.

**CO3:** The course will provide knowledge about the using of instruments for observation of wildlife fauna.

**CO4:** Course provides a best option for students to gain knowledge about the Wildlife conservation and for research.

**CO5:** Students will be benefitted for joining tourism industry and earn livelihood.

### **Course Contents:**

#### **Unit-I**

##### **Modern concept of Wildlife Conservation**

**(5 hrs.)**

1. Integrated approaches in wildlife conservation
2. Protected area network – National Park, Wildlife Sanctuary, Conservation Reserve and Community Reserve; Other non-protected areas – Biosphere Reserve, Tiger Reserve, Elephant Reserve etc.
- 3.

#### **Unit-II**

##### **GIS and Remote Sensing**

**(5 hrs.)**

1. Basic concept on GPS
2. Application of GIS and Remote Sensing

#### **Unit-III**

##### **Wildlife rescue and rehabilitation**

**(5 hrs.)**

1. Wildlife rescue and its importance, Capture and handling of animals, Restraint techniques.
2. Translocation techniques and IUCN *Guidelines*, Handling of Radio collar and preparation of Carnivore plaster cast

#### **Unit-IV**

##### **Eco-development and Community conservation**

**(5 hrs.)**

1. Integrating wildlife conservation with tourism and alternative community livelihood.

2. Interactive approaches on wildlife conservation: citizen debate, street play, conservation games etc. and case studies

**Unit-V**

**Wildlife crime and Trade**

**(5 hrs.)**

1. Identification of original and fake wildlife articles

**Unit -VI**

**Census and research techniques**

**(5 hrs.)**

1. Wildlife census and Sampling methods  
2. Modern technological method in wildlife research  
3. Ethology: a tool of research- Focal, Scan and Ad. Libitum methods

**Unit –VII**

**Nature photography and documentation**

**(5 hrs.)**

1. Principle and ethics of nature photography.

**Unit –VIII**

**Scientific communication**

**(5 hrs.)**

1. Research grant sources, proposal and paper writing

**School of Pharmaceutical Sciences**

**Title of the Course: SYLLABUS ON AYUSH**

**Code: VAC 2110**

**Course Duration : 31 hours**

**Total Marks: 50**

**About the Course and topics**

▶ **AYURVEDA [CREDIT HOURS: 7 HOURS]:** Ayurveda means “the science of life” (ayur means “life” and veda means “science” in Sanskrit). Ayurveda is a discipline of the upaveda or “auxiliary knowledge” in Vedic tradition. Ayurveda has its prime origin from Atharva-Veda and apart as a supplement of the Rig-Veda. Dhanvantari is worshipped as the God of Ayurveda. The aim of this system is to prevent illness, heal the sick and preserve life. The Ayurveda has its origins from India and extended its wings in various parts of the world. It's the most famous course in Ayush courses. The topics include the following:

- a. Ayurveda Nirupana.  
b. Gunavigyaniam.  
c. Karma Vigyaniam.

▶ **YOGA [CREDIT HOURS: 6 HOURS]:** Yoga Science is an AYUSH course in the area of holistic health care. It is essentially about body's self-cleaning and repair without the use of allopathic medicines, body's immune, hormonal, nervous, and excretory systems, the body's adjustment and alignment with these systems and naturally healing diseases pertaining to these systems in the body. The topics include the following:

- a. Definition and Meaning of Yoga, Historical Development of Yoga, Relevance of yoga in modern age and scope.  
b. Brief Introduction of Hatha yoga, Raja yoga, Karma yoga, Gyana Yoga, Bhakti yoga.  
c. Essentials of yoga practices –Prayer, Disciplines in Yogic Practices, Place & Timing, Diet & Schedule for Yoga Practitioner, obstacles and difference between yogic and non yogic system of exercise.

▶ **UNANI [CREDIT HOURS: 6 HOURS]:** Unani medicine system is one of the ancient medication system adopted by the South-Asia and Middle-East countries of the world. This system has originated from the Greek by the great physician “Hippocrates”. It is also known as the “Hikmat” or Unani Tibb Medicine. It has the 6000 years back history. The topics include the following:

- a. Kulliyat Umoore Tabiya (Basic Principles of Unani Medicine) Brief Introduction of Hatha yoga, Raja yoga, Karma yoga, Gyana Yoga, Bhakti yoga.  
b. Falsafa (Philosophy).  
c. Ibtada-i-Ilm-un-Nafs (Elementary Psychology).



- ▶ **SIDDHA [CREDIT HOURS: 6 HOURS]:** Siddha System of Medicine is the most ancient among the AYUSH (Ayurvedha, Yoga and Naturopathy, Unani, Siddha and Homeopathy) systems. According to Siddha philosophy, the psychological and physiological functions of human body are controlled by SEVEN elements – saram (plasma), cheneer (blood), ooun (muscle), kozhuppu (fat), elumbu (bone), moolai (nerve) and inthiriyam (semen). These seven elements are activated by three Mukkuttram – vatha (air), pitha (fire or heat or energy) and kapha (water). The imbalance of any of these Mukkuttram results in disease and Siddha System of Medicine corrects the vitiated Mukkuttram for healthy life. The topics include the following:
  - a. Fundamental Principles of Siddha Medicine Falsafa (Philosophy).
  - b. Epistemology (Alavai) and Clinical Application.
  - c. Five element theory (Iymbootha Kolgai).
  
- ▶ **HOMEOPATHY [CREDIT HOURS: 6 HOURS]:** Homeopathy is the system of alternative medicines. The patients are taken care by enhancing the natural healing power of the human body. The concept of homeopathy is that the body rejuvenates itself because of its self-healing power. We just need to help it by enhancing the natural healing power. The topics include the following:
  - a. Homeopathic Pharmacy Epistemology (Alavai) and Clinical Application.
  - b. Organon of Medicine and Principles of Homeopathic Philosophy.
  - c. Homeopathic Materia Medica and Repertory.

## **GUIDELINES FOR CONDUCTING VALUE ADDED COURSES**

### **Course Structure**

1. The approval of syllabus along with the schedule for the value added course should be communicated to the office of the Academic Registrar at least 15 days before the date of commencement of the course. The Syllabus with at least 30 hrs (thirty classes) should be designed and the details of Faculty handling the course approved by the Department Council and forwarded by the Dean of respective schools should be enclosed.

The course offered should not be the same as any course listed in the curriculum of the respective programme / or any other programme offered in University Departments.

  - a. The value added courses should be outside the daily class hours. The courses may be also conducted during weekends / vacation period. As the university has
  - b.
  - c. The course can be offered only for the students studying semester V and above of UG Programmes and any semester in the PG Programmes.
  - d. Industry experts / eminent academicians from other Institutes are eligible to offer the value added course.
  - e. The course can be offered only if there are atleast 5 students opting for it.
  - f. The students may be allowed to take value added courses offered by other departments after obtaining permission from Head of the Department offering the course.

### **Duration**

2. The duration of value added courses should be at least 30hrs of theory or a maximum of theory and Laboratory courses and the course can have a maximum of three hours per day. For the one (two) credit courses either 15 (30) periods of theory or a combination of theory and Laboratory may be offered. Where, **2 periods** of laboratory = **1 period** of theory

### **Evaluation**

3. The value added courses shall carry 100 marks and shall be evaluated through **internal assessments only**.
  - a. Two Assessments shall be conducted preferably one in the middle and the other at the end of the course by the Department concerned.
  - b. The duration of assessment is one hour each.
  - c. The total marks obtained in the tests shall be reduced to 100 marks and rounded to the nearest integer.

- d. The Head of the Department may identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, staff handling the course (if available), coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the evaluation process. The grades shall be assigned to the students by the above committee based on their relative performance.
- e. The coordinator for the course is responsible for maintaining and processing the records with regard to assessment marks and results.

**Passing Requirement And Grading**

- 4. The passing requirement for value added courses shall be 50% of the marks prescribed for the course ( **Internal assessment only** )
  - a. The grades O, A+, A, B+, B obtained for the one/two credit shall figure in the Mark sheet under the title '**Value Added Courses**'.
  - b. The credits earned through value added courses shall not be considered for calculating GPA and CGPA.
  - c. The credits earned through value added courses shall not be considered for classification of degree.

**Annexure – II**  
**Application for Conducting Value Added Courses**

- 1. Name of the Department :
- 2. UG Programme :
- 3. **Details of the Value Added Courses** :
  - a. Name of the Value Added Courses :
  - b. Type of Value Added Courses : (Theory/ Lab/ Lab integrated Theory/others)
  - c. Short Description : Enclosure 1 enclosed - YES / NO
  - d. Syllabus including Reference : Enclosure 2 enclosed - YES / NO
- 4. **Target audience:**  
Semester (indicate if more than one) Others :
- 5. **Details of Faculty handling the course** :
  - a. Name of the Faculty handling the Value Added course
  - b. Details including designation and expertise Enclosure 3 enclosed - YES / NO
  - c. Contact details
- Email ID :
- Phone No :
- 6. **Tentative Time Table** including dates of internal assessments : Enclosure 4  
Enclosed - YES / NO
- 7. Number of students opting for the course :
- 8. Name and Designation of the Coordinator :

**Head of the Department**  
(with date & seal )

Dean  
School.....

*Dy Controller of Examinations and Admissions*

**Annexure III**  
**Details of Completion of Value Added Course**

Name of the Department & Division :  
Name of the Value Added course offered :  
Name of the Faculty offered the course : Academic / Industry  
Name of the coordinator :  
E- mail :  
Contact :  
Details of students attended the course :

Sl. No	Name of the Students	Reg. No	Programme	Semester	Marks	Grade

*(Faculty handing the Course)*

**(Coordinator)**

**(Head of the Department)**

**(With date & seal)**

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