VUCS13001 : ADVANCED R

Hours: 30

Course Objectives:

- To acquaint students with advanced concepts in Statistics using R.
- To introduce elementary and advanced statistical methods of data analysis using R.

Course Outcomes:

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

- construct various diagram using qualitative and quantitative data.
- calibrate correlation and regression statistical analysis.
- Perform one-way and two-way ANOVA table.
- Integrating data mining techniques.

Unit I: Descriptive and Bivariate Statistical Analysis **10 hrs**

Introduction; Graphics with R-Diagrammatic representation of data; Graphical representation of data; Histograms, Barplots, Boxplots; Measures of central tendency- frequency distribution for a discrete variable, frequency distribution for a continuous variable; Measures of skewness- Karl Pearson's measure, Bowley's measure; Correlation; Scatterplots; Regression-Linear regression models.

Unit II: Probability and Inference in R **10 hrs**

Probability in R – Distributions, Maximum Likelihood Estimation, Hypothesis Tests in R, Proportion Test, Testing a Mean, Test for the Median, Two Sample t-Test, Paired Differnces, Distribution of a Sample Mean, Sampling Distributions, Simulating Sampling Distributions, Confidence Intervals, Hypothesis Testsing.

Unit III: Analysis of variance & Data Mining **10 hrs**

One-Way ANOVA, Two-Way ANOVA, Decision Trees, Dendogram, Logistic Regression, Clustering- The K-Means Clustering, The k-Medoids Clustering, Outlier Deduction, Time Series Analysis – Forecasting.

Reference:

Yanchang Zhao, (2012). *R and Data Mining: Examples and Case Studies.* Published by Elsevier.

Jay Kerns. G, (2010). *Introduction to Probability and Statistics using R.*

Hothorn, Torsten and Brian Everitt. S. (2014). *Handbook of Statistical Analyses Using R*, (3rd ed.), CRC Press.

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VUCS13002: eSketch PRO

Hours: 30

Course Objective:

- To make the students to understand and learn to design the frequency-shaping analog circuits.
- To introduce various skills needed to changes in layout, component values, component tolerances and op amp Gain Bandwidth.

Course Outcomes:

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

- Understand the various aspects of file merging and conduction of analog simulation circuits.

Unit 1: Schematica capture: **10hrs**

File merging - importing of (registered) Filter Wiz PRO files-rapid component (device) placement Fast editing of component values - op amp device database provides Gain Bandwidth values for over 600 op amps - full circuit editing capabilities such as copy, cut and paste - annotation with text boxes and markers

Unit 2: Analog circuit simulation: **10hrs**

Automatic indication of when circuit is ready to simulate - view two graphs simultaneously -two voltage probes - view both, either, or difference - save previous traces to view up to 13 voltages or currents at once - amplitude response (real, imaginary, dB, volts) - phase and group delay responses - input impedance - component current, impedance and power dissipation - Sensitivity of output voltage to changes in component values - Transient response to impulse, step and "staircase" inputs - "ideal" and "real" op amp models - Monte Carlo analysis - Parameter Sweep analysis - Pole-zero placement

Unit 3: Analog Circuit simulation Experiments **10hrs**

Inverting and Non inverting Amplifier - Low pass and High pass filter - Band pass filter - RC Phase shift Oscillator.

References:

Sketchbook PRO 2015: perspective sketching tools Microelectronic Circuits (6th Edition) - Adel S Sedra & Kenneth Carless Smith: Oxford University Press

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VUCS15003 : QUANTITATIVE APTITUDE

Hours: 30

Course Objective:

- To develop and strengthen the foundation of basic mathematics.

Course Outcomes:

On successful completion of the course, the students should be able to

- solve problems in mathematics by using Number series, divisibility test, HCF & LCM, problems on numbers, decimal fractions, simplifications, problems on ages, speed and distances
- formulate ratios and proportions, profit/loss, simple and compound interest

Unit 1: Number System I **6 hrs**

Number series and divisibility test, HCF & LCM, problems on numbers.

Unit 2: Number System I **6 hrs**

Simplifications, decimal fractions, problems on ages.

Unit 3: Speed and Distance **6 hrs**

Speed, distance and time, problems on train, time and work.

Unit 4: Ratios and Proportions **6 hrs**

Ratio, proportion, chain rule.

Unit 5: Interest **6 hrs**

Profit and loss, simple Interest, compound Interest.

References:

Praveen, R. V, (2013), *Quantitative Aptitude and Reasoning*, PHI Learning Pvt. Ltd.

Sharma, Arun, (2011), *Verbal Ability and Rc for Cat,* Tata McGraw-Hill Education.

Sinha, Nishit K, (2016), *Quantitative Aptitude for the CAT*, Pearson Education India.

Khattar, Dinesh, (2016), *The Pearson Guide to Quantitative Aptitude for Competitive Examinations*, (3e), Pearson Education India.

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VUCS18001 : ADVANCED EXCEL

Hours: 30

Course Objectives:

- To acquaint students with basic concepts in Excel.
- To introduce opening excel, cell basics, formula and functions, working with data and working with charts.

Course Outcomes:

After the completion of the VAC course the student will be able to

- building basic worksheets by entering text, numbers, and formulas.
- developing skills in formatting, saving, and printing accurate, readable worksheets.
- creating formulas using absolute and relative references, if and average functions, autoSum, and grand total. Developing skills in managing multiple-sheet worksheets.
- generating pie and column charts by using the chart wizard.

Unit 1: Introduction **06 hrs**

MS Excel- Excel Basics; Introduction: opening Excel, Getting Started, The Excel Interface, The Excel Interface, The Quick Access Toolbar, Menus, Commands, Toolbars and their Icons; customizing excel: The Ribbon, customizing the Ribbon, Using and customizing Autocorrect, changing Excel's default options

Unit 2: Basic Operation in a Worksheet **06 hrs**

Spreadsheet applications (elementary level), The Workbook Window: Basics concepts of spreadsheet and other features such as, The Formula Bar, The Name Box, The Backstage View, The Worksheet Views, entering text, menus, commands, To rename a worksheet, To insert a new worksheet, To delete a worksheet, To copy a worksheet, To move a worksheet, To change the worksheet color, column width, copy, paste, to insert rows/columns, formatting, formula, print, sort, filter and other basic operations

Unit-3: Formatting Attributes **06 hrs**

Compatibility mode, To convert a workbook, Saving and Sharing Workbooks, Save and Save As, To save a workbook, Using Save As to make a copy, Exporting workbooks, Cell Basics: Understanding Cells, Cell Content, Formatting Attributes, Formulas and Functions, To drag and drop cells, To use the fill handle, To continue a series with the fill handle

Unit-4: Writing Formula **06 hrs**

Formatting Cells, Wrapping text and merging cells, Formulas and Functions, Simple Formulas, To create a formula using the point-and-click method, Complex Formulas, Relative and Absolute Cell References, Functions, Creating a function, The Function Library, SUM, COUNT, COUNTA, LEN, VLOOKUP, IF Statements, Working with Data, Freezing Panes and View Options, To split a worksheet.

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Unit-5 Functions **06 hrs**

Mathematical functions: sum, sumif, sumifs countif, countifs, Averageif, Avergeifs: protecting excel- File level protection, workbook, worksheet protection: Text functions: Upper, lower, proper, left, mid, right, Trim, concatenate, find and substitute. Working with Charts, Chart layout and style, other chart options.

References:

M.L. Humphrey. Excel for Beginners, Amazon Asia-Pacific Holdings Private Limited.

Professional Excel Development: The Definitive Guide to Developing Applications Using Microsoft Excel, VBA, and .NET.

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VPCS13002: LIFE SKILLS FOR COMPUTER PROFESSIONALS

Hours: 30

Course Objectives:

- To explore the vital resources of life.
- To get focused with a definite purpose in life and create a compelling future with clearly defined goals.
- To break limiting patterns of thoughts, beliefs, behaviour and habits.
- To develop personal and interpersonal effectiveness.

Course Outcomes:

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

- apply a techniques of problem solving to overcome life's challenges.
- recognise life values to integrate professional and personal life.
- create a compelling future with clarity defined goals .

Unit 1: Mastering Emotions: **6 hrs**

Significance of mastering emotions, reactive and proactive people, ways to deal with emotions, avoiding inner conflicts, analysis of inner traits and negative traits, creating long- term changes.

Unit 2: Life Values **6 hrs**

Types of life values- personal values, social values, professional values, spiritual values; Life Vision, beliefs and values, Life goals - personal development goals, family goals, educational goals, career goals, financial, material goals and social goals.

Unit 3: Effective Communication **6 hrs**

Types of Communications - Verbal communication, Non- verbal communication, activities related to communications Presentation skills, listening skills. Activities based on Types of talk to get action, to inform, to convince

Unit 4: Problem solving **6 hrs**

Defining problems, potential cause of problems, identification of possible solutions, finding the best solution and decision-making.

Unit 5: Successful Relationship **6 hrs**

Principles of successful relationship: Ways to make impressive relationship, Methods to make people to like us, think in our way, bringing people to around you, ways to overcome worry and find peace and happiness.

References:

Covey, S. R., & Covey, S. (2020). *The 7 habits of highly effective people*. Simon & Schuster.

Covey, S. R., Merrill, A. R., & Merrill, R. R. (1995). *First things first*. Simon and Schuster.

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VPCS16001 : NLP USING PYTHON PROGRAMMING

Hours: 30

Course Objective:

- To understand the fundamental approach to solve the real world problems and to introduce the basic Python programming language and Python tools to work productively with data.

Course Outcomes:

After completing this course, the student will be able to:

- identify the right data analytics structure to solve a problem using Python.
- formulating to choose the right packages to suit the client/customer requirement and generate an effective solution.

Unit 1: Introduction to Python **5 hrs**

Basics of Python – Introducing the python interpreter; Using the Interactive Prompt; Running Files with command lines; IDLE Basics; Using IDLE; Other IDEs. Python's Core Data types; Numbers; Strings; Lists; Dictionaries; Tuples; Numeric type basics; Numeric literals; Built-in Numeric tools; Python Expression operators; Variables and Basic expressions; Taking input and displaying output; Adding comments.

Unit 2: Data structures in Python **5 hrs**

Strings – Basic operations; Indexing and Slicing; String Methods; Lists in Action – Basic List operations; List Iteration and Comprehensions; Indexing, Slicing and Matrixes; Dictionaries – Basic Dictionary operations; Changing Dictionary in-place; More Dictionary methods; Tuples – Tuples in Action.

Unit 3: Decision making and Functions **5 hrs**

Control flow statements; if statement; General format; Basic examples; if else statement; while loops; for loops; break, continue, pass and the Loop else; use of compound expression in conditional and looping construct. **Functions** – Grouping code under a name, Coding functions, def statements. Python Scope Basics-Scope rules; Name resolution: The LEGB rule; Scope example. Argument-passing basics-Arguments and Shared references.

Unit 4: Object Oriented Programming using Python **5 hrs**

Creating a class, the class statement; General form, Example; Methods; Inheritance; Operator overloading; Static and Class Methods; Exception Handling: Errors in a python program, Default Exception Handler, Catching Exceptions; Raising Exceptions; User-Defined Exceptions. The try/except/else statement, the assert statement.Modules and packages: Creating modules and packages, Module Usage; The import statement; the from statement; the from * statement; Package import basics; Package import example.

Unit 5: Natural language processing **10 hrs**

What is Natural Language Processing, NLTK, Python 3 and the Jupyter Notebook ,Introduction to HPC, Sources 2: APIs, Social Media, Web Scraping, Building your Corpus, Tokenization, N-grams and Scriptio continua, Stemming and Lemmatization, Tokenizing your Corpus, POS Tagging and Stopwords, Named Entity Recognition (NER), Text "Features" and TF-IDF Classification.

References:

B. Muthukumaran (2010). *Information Technology for Management*, Oxford Higher Education.

Dr. Michael Arock, (2014). *Fundaments of programming with C*. Yes Dee publishing. ITL

Balagurusamy. E, (2016). *Introduction to computing and problem solving using Python*. McGraw Hill Education Private Ltd.

Wes McKineey. (2013). *Python for Data Analysis*.(1st Edition). O'Reilly

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VPCS17002 : J2EE

Hours: 30

Course Objectives:

- To understand the advanced concepts of J2EE.
- To build an Independent Web Application.
- To gain knowledge on Servlet, JSP and EJB.

Course Outcomes:

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

- develop distributed web application using RMI, Servlets and JSP.
- apply the concepts of Session, EJB and JAR files to develop server side applications.

Unit 1: Integrated Application Development **5 hrs**

Introduction to Integrated Application Development – Introduction IDE Tools and use – Eclipse tool installation – working with Eclipse – Client /Server Program – Web Server Versus Application Server

Unit 2: J2EE Understanding Servlets **8 hrs**

MVC Architecture – what is HTTP – Introduction to Servlet – Servlet Life Cycle – Web Application Structure – Writing A Simple Hello World Servlet – Understanding web.xml – Distinguish GET and POST – Retrieving parameters from request – Sending a response – Re-directing a request – Using Request Dispatcher – Session Management – Handling Cookies

Unit 3: Understanding JSP Pages **7 hrs**

Introduction to JSP – JSP Life Cycle – Page Directive attributes – using conditional and iterative statements – Implicit variables and Objects – JSTL – Expression Language – Iteration Tags – Database access tags – Miscellaneous tags – writing custom tag library

Unit 4: Struts **5 hrs**

Introduction to Struts – architecture – struts classes – action classes – understanding struts config.xml – understanding action mappings – struts flow with an example – tile – combining struts and tiles – tiles file structure – building the layout file and creating a tiles template – creating a definition in XML file and deploying – creating small application using tiles

Unit 5: EJB and Hibernate **5 hrs**

Enterprise JavaBeans Communication – EJB details – Session Beans – Entity Beans – Message Driven Bean – Java Messaging Service (JMS) – writing a message driven bean – message driven bean clients – Introduction to Hibernate - Hibernate with example

References:

Jim Keogh (2002). *J2EE- The Complete Reference*. Tata McGraw-Hill.

Alur Deepak, Malks Dan and Crupi John (2001). *Core J2EE Patterns: Best Practices and Design Strategies*, Prentice Hall India.

Austin and Pawlan (2004). *Advanced Programming for JAVA 2 Platform*, Pearson Education.

Geary M. David (2007). *Core JSTL Mastering the JSP standard Tag Library*, Pearson Education.

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VPCS15001: ASP.NET

Hours: 30

Course Objective

- To provide basic knowledge in ASP.NET framework and MVC.

Course Outcomes:

- explain .NET framework, ASP.NET programming structure
- illustrate ASP.NET objects and Components
- connect web forms, events in VS.NET using MVC controller

Unit 1: ASP.NET: Introduction **5 hrs**

.NET Framework –ASP Operating Systems –Servers –ASP Objects –ADO and ADO.NET objects – ASP Components – RDBMS and other data sources – Developing the Distributed online applications –Client Server or Tiered Applications.

Unit 2: Programming ASP.NET **5 hrs**

Programming Language Structures – Built in ASP.NET objects and interactivity – Using the Response Object – ASP Server Object.

Unit 3: Web Forms and ASP.Net **8 hrs**

Programming web forms –Web forms capabilities – Web forms processing – Web forms and Events – Creating Web Forms Event Handlers – Building interactive application with VS.Net –Solutions and project in VS.NET – Solutions Explorer – Creating a Web Form.

Unit 4: MVC **7 hrs**

Developing MVC Models and Controllers - Exploring ways to create MVC Models - Implementing MVC Controllers - Creating Action Methods - Implementing MVC View

Unit 5: ASP.Net Objects and Components **5 hrs**

The Scripting Object Model – Active Server Components and Controls – More Active Server Components.

References:

Mathew Macdonald, (2002), *ASP.NET: The Complete Reference,* McGraw Hill Education.
John Ciliberti, (2017), *ASP.NET Core Recipes: A Problem – Solution Approach,* Apress.
Kogent Learning Solutions, *.NET 3.5 Programming,* Wiley India Pvt Ltd.
Mugilan T.S Ragupathi, *Learning ASP.NET Core MVC Programming,* Packt.

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VLSC13001: ANIMAL TISSUE CULTURE

Hours: 30

Course Objectives:

- To provide knowledge on history and techniques in animal cell culture.
- To understand the study of biochemical and physiological processes of the cell using various cell lines.
- To comprehend the basic information about the conditions of cell culture, cell line maintenance, passage and using of cell culture and tissues

Course outcomes:

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

- Learn the essential laboratory technique on animal cell culture.
- Understand the knowledge on conditions of cell culture, cell passaging and cell viability assay and cryopreservation.

Unit 1: Introduction of Animal tissue Culture and Media preparation **8 hrs**

Introduction, history and scope of Animal Biotechnology; terminologies in animal cell culture; Media constituents, physiochemical properties of a media, types of animal cell culture media: natural–plasma clot, biological fluids, tissue & embryo extracts. Importance of serum in media, artificial–chemically defined media, choice of medium and serum.

Unit 2: Cell lines and Culturing techniques **8 hrs**

Isolation of tissue, Primary culture: disaggregation of tissue–enzymatic, mechanical, and primary explant technique; Secondary cultures– transformed cells and continuous cell lines; Cell lines and cloning.

Unit 3: Applications of Animal Cell Culture **8 hrs**

Cancer Research, vaccine manufacture, gene and stem cell therapy, production of recombinant proteins, IVF Technology, toxicology studies.

Unit 4: Translational Research Applications **6 hrs**

Rodent and murine models in scientific research associated with cancer and neurodegenerative diseases. Animal cells as the applicable products (recombinants, hybridomas, stem cells and transplants).

References:

Freshney, R.I. (2010). *Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications*. Wiley-Blackwell, 2010. 6th Edition.

Davis, J. M. (2008). *Basic Cell Culture*. Oxford University Press, New Delhi.

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VLSC13002 : LIFE SKILL EDUCATION FOR LIFE SCIENCE PROFESSIONALS

Hours: 30

Course Objectives:

- To develop communication competence in students and to enable them in conveying thoughts and ideas with clarity and focus with good writing skills.
- To equip them to face interview & Group Discussion.
- To inculcate critical thinking process and to prepare them on problem solving skills.

Course Outcomes:

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

- Provide symbolic, verbal, and graphical interpretations of statements in a problem description.
- Understand team dynamics & effectiveness.
- Instill Moral and Social Values, Loyalty and also to learn to appreciate the rights of others.
- Learn leadership qualities and practice them.

Unit 1: Writing and Reporting Skills **6 hrs**

Technical Writing: Differences between technical and literary style, Elements of style; Common Errors, Letter Writing: Formal, informal and demi-official letters; business letters, Job Application: Cover letter, Differences between bio-data, CV and Resume, Report Writing: Basics of Report Writing; Structure of a report; Types of reports.

Unit 2: Communication and Presentation Skills **8 hrs**

Interview Skills: Types of Interviews; Ensuring success in job interviews; Appropriate use of non-verbal communication, Group Discussion: Differences between group discussion and debate; Ensuring success in group discussions, Presentation Skills: Oral presentation and public speaking skills; business presentations, Technology-based Communication: Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software.

Unit 3: Group Problem Solving, Achieving Group Consensus **8 hrs**

Steps in problem solving, Problem Solving Techniques, Problem Solving through Six Thinking Hats, Mind Mapping, Forced Connections. Problem Solving strategies. Group Dynamics techniques, Group vs Team, Team Dynamics, Teams for enhancing productivity, Building & Managing Successful Virtual Teams. Managing Team Performance & Managing Conflict in Teams. Working Together in Teams, Team Decision-Making, Team Culture & Power, Team Leader Development.

Unit 4: Morals, Values and Ethics **8hrs**

Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully. Caring, Sharing, Honesty, Courage, Valuing Time, Cooperation, Commitment, Empathy, Self-Confidence, Character Spirituality, Senses of 'Engineering Ethics', variety of moral issued, Types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, Consensus and controversy, Models of Professional Roles, Theories about right action, Self-interest, customs and religion, application of ethical theories.

References:

Life Skills for Engineers, Complied by ICT Academy of Kerala, McGraw Hill Education(India) Private Ltd., 2016.

Barun K. Mitra; (2011), "*Personality Development & Soft Skills*", First Edition; Oxford Publishers.

Larry James (2016); "*The First Book of Life Skills*"; 1st Edition; Embassy Books.

Shalini Verma (2014); "*Development of Life Skills and Professional Practice*"; 1st Edition;Sultan Chand (G/L) & Company.

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VLSC14002: RESEARCH METHODOLOGY

Hours: 30

Course Objective:

- To give knowledge and understanding of the essentials of research
- To comprehend on interpretation and research writing

Course Outcomes:

After completing the course students will be able to:

- learn about designing of experiments for research
- get to know the systematic way of interpreting results
- acquire knowledge on report writing and paper publication

Unit 1: Research Methodology **10 hrs**

Meaning, Basic and applied research, Essential steps in research, Defining the research problem, Research/Experimental design, Research and Scientific Methods; Literature collection, Significance of research.

Unit 2: Interpretation and Report Writing **10 hrs**

Meaning of interpretation; Techniques of interpretation; Precautions in Interpretation; Synopsis/ Dissertation/Thesis/Report/Abstract/Manuscript/Review/Project/writing: Meaning, concept, objectives and scope, components, format, types, layout, different steps involved, Significance and Bibliography

Unit 3: Publications and Statistical Analysis **10 hrs**

Publishing research articles in Journals, Books, Proceedings. Citation Index, Impact factor, Abstract Index, Oral and Poster presentation. Statistical Methods: Collection and presentation of Data (Tables, Graphs, Diagrams). Standard deviation and standard error.

References:

Kumar K. L.' (1997), *Educational Technology*, New Age International (P) Ltd., New Delhi.

Kothari, C.R; II ed. (2004), *Research Methodology*, Methods and techniques; New Age Internartional (p) Ltd., Publishers, New Delhi.

Jerrald H. Zar (1999), *Biostatistical analysis of Prentice Hall International*, Inc. Press, London

Tony Bates A.W. Technology, (2005), *e-Learning and Distance Education*, New York, Routledge.

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VLSC16001: ESSENTIALS OF FOOD MICROBIOLOGY

Hours: 30

Course Objectives:

- To understand the mechanism of processing of milk and milk products.
- To understand the different types of packaging and distribution of food products.
- To familiarize food spoilage, preservation and regulations in food industry.

Course Outcomes:

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

- Learn the importance of food and nutritive value of milk.
- Understand the processing of various dairy and meat products.
- Acquire an elementary knowledge and understand the relevance of microscopy and its applications in everyday life.
- Develop an understanding of the role of microorganisms in food industry and in the maintenance of health.

Unit 1: Milk and Milk Products **08 hrs**

Processing – Pasteurization, cryogenic cooling, instantization of milk; Factors affecting milk selection – Physiological factors, nutritional factors, sensory factors; Functional – denaturation, coagulation, gelation, foaming and browning; Nutrition – nutrition in milk as a significant factor; Preservation; Quality assessment. Processing - cream, butter, condensed milk, evaporated milk, whole and skimmed milk powder; Fermented milk products-Instantization of milk products.

Unit 2: Food Product and Processing **08 hrs**

Mechanical separation – filtration, membrane concentration, sieving, centrifugation, sedimentation; Mechanical handling – conveying, elevation, size reduction, classification-mixing, kneading, blending; Processing of chocolate, cocoa, cocoa butter, vegetables, fruits, raw and refined sugar, fish, meat, fats and oils, fat substitutes and low-calorie foods.

Unit3:Microorganisms in Foods and Preservation methods **08 hrs**

Microorganisms in Foods and methods for detection-Culture, Microscopic and Sampling Method for detecting microbes, Food Preservation & Principles of Quality Control: Chemicals antibiotics, Radiation, Low and high temperature, High-Pressure Processing Pulsed Electric Fields. Aseptic Packaging, thermosonication, Microbiological quality standards of food, FDA, HACCP, ISI. Microbial Food Spoilage and Food borne diseases.

Unit 4: Food Adulteration and Regulation **06 hrs**

Food adulteration and food safety, HACCP; Sensory evaluation – introduction, panel screening; Instrumental analysis in quality control; FSSAI; Optimum nutrition requirements (WHO), additives in food processing and preservation – functions, safety, colours, flavours, sweeteners, acidulants.

References:

M.R. Adams and M.O. Moss, *Food Microbiology*, New Age International (P) Ltd., New Delhi, 2005.
VijayaRamesh, K. *Food Microbiology*, MJP Publishers, Chennai, 2007

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VLSC16002: ESSENTIALS OF PLANT BIOTECHNOLOGY

Hours: 30

Course Objectives:

- To understand basic methodologies of plant tissue culture
- To familiarize on using biotechnological tools in creating transgenics and its application in crop improvement

Course outcomes:

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

- Learn about Plant tissue culture techniques and preservation methods
- Understand the different modes of gene transfer in Plant tissue culture
- Know the various applications in agriculture for crop0 improvement

Unit 1: Plant Cell and Tissue Culture **05 hrs**

Plant tissue culture media, Micropropogation; organogenesis, somatic embryogenesis; Protoplast isolation, somatic hybridization; Haploid production; Somoclonal variation; Cryopreservation

Unit 2: Gene Transfer in Plants **08 hrs**

Marker genes-reporter genes; selectable markers; Gene transfer methods – Vector or *Agrobacterium* mediated gene transfer - Plasmid vectors -Virus mediated gene transfer; Physical methods and Chemical methods.

Unit 3: Applications of technology in Agriculture **08 hrs**

Bio fertilizer - Cultivation and mass production of bio inoculants- *Azotobacter, Rhizobium, Azospirillum*, Cyanobacteria, phosphate solubilizing microorganisms, *Azolla;* Bio pesticides– types and applications-*Pseudomonas fluorescens, Bacillus thuringiensis, Trichoderma harzianum, Trichoderma viride.* Vermicomposting. Terminator Gene technology.

Unit 4: Crop Improvement using Transgenic Technology **09 hrs**

Role of biotechnology in crop improvement; Herbicide resistance in commercially important plants; Insect resistance by Bt genes (*cry* genes) and protease inhibitor genes; Male sterile plants, methods of inducing male sterility, its importance in breeding.

References:

Agrios A.G., (2006). *Plant Pathology*, Elsievier Academic Press, New Delhi.

Altman A. and Hasegawa, P.M., (2011). *Plant biotechnology and Agriculture – Prospects for the 21st Century,* Elsevier Science Publishers, Amsterdam.

Bhojwani, S.S. and Razdan, M.K. (1983), *Plant tissue culture: Theory and Practice*, Elsevier Science Publishers, Amsterdam.

Gamborg O.L. and Philips G.C., (1998). *Plant cell, tissue and organ culture,* Narosa Publishing House, New Delhi.

Kalyan Kumar De, (2001). *An introduction to plant tissue culture*. New Central Book Agency (P) Ltd., Kolkata.

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VLSC16003: FOOD AND NUTRITION

Hours: 30

Course Objectives:

- Understand the nutritive value of different foods
- Understand Food Spoilage and preservation
- Understand Food borne diseases and adulteration

Course Outcomes:

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

- Gain basic knowledge of the different nutrients.
- Get insight into the role of nutrients in maintaining health of the individual and community.
- Understand the interrelationship of the various nutrients.

Unit 1: Nutritive value of food **8 hrs**

Carbohydrates: types and sources, functions, digestion, absorption, metabolism, deficiency; Proteins: biological value, types of proteins, energy, regulatory functions, digestion, absorption, metabolism, dietary sources, effect of protein deficiency and excess; Fats - types, sources, Nutritive value, biological importance; Vitamins: –fat soluble vitamins and water soluble vitamins (B-Complex vitamins), Vitamin deficiencies and importance of minerals.

Unit 2: Food Contamination and Spoilage **6 hrs**

Introduction, types of contaminants in food: Biological– naturally occurring toxicants in plants, myco-toxins, sea food toxins, toxic metals. Chemicals- pesticide residue, presence of extraneous material, residue from processing and packing material; Reasons for food spoilage, food spoilage conditions, signs of spoilage.

Unit 3: Food Borne Diseases **6 hrs**

Types of food borne diseases, Mode of transmission of diseases: direct, indirect, cross contamination; Food poisoning, food infections leading to typhoid, cholera, dysentery, allergies, jaundice; Prevention and control of food borne illness.

Unit 4: Food Preservation **6 hrs**

Basic principles of preservation, methods of food preservation: Low temperature –refrigeration, Cook - chill, freezing, High temperature –wet heat, blanching and pasteurization, dry heat, removal of moisture; use of preservatives, controlled atmospheric storage, fermentative preservation, radiation and food additives (antioxidants, emulsifiers, food colours, flavouring agents, nutrient supplements, anti-caking agents, non - nutritive sweeteners, sequestrants, bleaching agents

Unit 5: Food adulteration **4 hrs**

Definition of food adulterants, types of adulterants, Common examples of food adulteration and the tests used for their detection.

References:

Deb, A. C. (1989), *Fundamentals of Biochemistry* (3rd Ed.), New Central Agency Publishers, Calcutta.

Jain, J. L. (2005), *Fundamentals of Biochemistry* (6th Ed.). S Chand Publication, New Delhi.

Ranganatha Rao, (2002), *Text Book of Biochemistry* (3rd Ed.). Prentice Hall publishers, New Delhi.

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