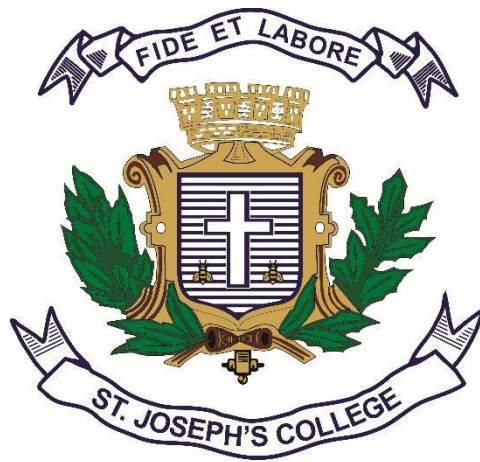


ST. JOSEPH'S COLLEGE (AUTONOMOUS)

BENGALURU-27



Re-accredited with 'A++' GRADE with 3.79/4 CGPA by NAAC
Recognized by UGC as College of Excellence

DEPARTMENT OF MICROBIOLOGY

SYLLABUS FOR CERTIFICATE COURSES OFFERED

Certificate Course	Principles of Genetic Engineering (UGC approved)
Offered by	Dept. of Microbiology, St. Joseph's College (Autonomous)
Course coordinator	Dr. Syed Wajeed, Associate Professor, Dept. of Microbiology, St. Joseph's College (Autonomous), Bengaluru.
Contact email ID	wajeed@sjc.ac.in
Course Duration	90 hours
Credits	3
Course Fee	Rs. 5000/- (Rupees Five thousand only)
Course Objective	<ul style="list-style-type: none"> Empowering students with the basic skills and knowledge required to clone genes, express them in unnatural hosts and purification of the expressed proteins product by chromatographic techniques.
Content	<p>The course consists of both theory and practical modules. Emphasis is laid more on the practical aspects. Theory and practical modules are dealt in a methodical way.</p> <p>The Theoretical component, protocols of the experiments and data interpretation will be dealt by virtual mode to begin with. Practical Classes will be carried out once the regular offline classes resumes.</p> <p style="text-align: center;">THEORY</p> <p>Module I Concepts and scope of genetic engineering</p> <p>Module II Purification and quantification of Genomic and Plasmid DNA from living cells.</p> <p>Module III Vectors in gene cloning</p> <p>Module IV DNA manipulative enzymes</p> <p>Module V PCR: Process, Primer designing, PCR types and its applications.</p> <p>Module VI DNA fingerprinting</p> <p>Module VI Transformation techniques</p> <p>Module VII Expression and purification of cloned genes by affinity chromatography</p>

PRACTICALS

- 1) Preparation and analysis of genomic DNA from bacteria.**
- 2) Preparation and analysis of plasmid DNA from bacteria.**
- 3) Estimation of purified DNA by UV-Spectrophotometry.**
- 4) Restriction digestion of purified plasmid DNA.**
- 5) Ligation of Vector DNA with gene of interest.**
- 6) Invitro amplification of DNA by polymerase chain reaction.**
- 7) Calcium chloride mediated gene transfer in bacteria.**
- 8) Blotting**
- 9) DNA fingerprinting**
- 10) Protein purification by affinity Chromatography**

**CERTIFICATE COURSE IN FOOD
TECHNOLOGY
2020-2021**

Name of the Co-ordinator: Dr. VANITHA NM

**DEPARTMENT OF MICROBIOLOGY/FOOD SCIENCE
AND TECHNOLOGY
ST. JOSEPH'S COLLEGE**

E mail ID: BANGALORE: 560 027
vanitha_nm@sjc.ac.in

Mobile No: +91 9845674313e

Name of the course: CERTIFICATE COURSE IN FOOD TECHNOLOGY

Duration: 90 Hours

Course timings: 1st & 3rd Saturday

Minimum eligibility for candidates: I & II B.Sc
(Natural Sciences students- CBZ, MCB/Z, CBBt, CEB/Z)

Course Fee: 4,000.00 (Rupees four thousand only)

No. of credits: 03

CERTIFICATE COURSE IN FOOD TECHNOLOGY

Total No. of Hours: 90 hours

Total credits: 03

Theory: 50 hours

Practical: 40 hours

Project/Assignment/Training:

SCOPE OF THE CERTIFICATE COURSE

Food has become a high-profit industry by reason of the scope it offers for value addition, particularly with the food processing industry getting recognized in India as a high-priority area.

In order to achieve the expected returns on investment through good quality and right value addition, application of technology has become imperative, leading to an unprecedented demand for scientists, technologists and other professionals who can manage the emerging challenges of the food processing industry effectively.

This role of professionals and trained personnel in the food industry as well as in the various R&D areas of food Science and technology is immense.

In simple words "There is huge requirement for Food Technology professionals in India and abroad".

The concept of processed foods has caught the imagination of consumers in recent years because of their enhanced convenience, variety, nutrition and taste. The challenge therefore lies in continuously developing new variations of food items, as well as new processes that will maximize its appeal and shelf-life, and minimize the use of chemicals and preservatives.

Food Science is the discipline in which biology, physical science, and engineering sciences are used to study the nature of foods, the causes of their deterioration, and the principles underlying food processing. Food Technology is the application of food science to the selection, preservation, processing, packaging, distribution and use of safe, wholesome and nutritious food.

The food processing industry covers a range of food products. These include the basic or primary foods such as wheat and rice products, sugar, oil and pulses and the processes for converting them into edible form and the processed foods such as biscuits and bakery products, confectionery, dairy products, breakfast foods, meat and fish products, fruit and vegetable products and all such items which are processed and packaged to enhance and prolong their edible life.

The swelling consumerism has seen the introduction of a range of new products like ready-to-eat snack foods, breakfast cereals, vegetable protein foods and so on. Different brands of the same item and attractive packaging vie for the consumers attention.

The Food technology is a branch of science in which the food science is applied in manufacturing and preservations of food products. The food technologists study the chemical, physical and microbiological makeup of the food.

OBJECTIVES OF THE CERTIFICATE COURSE

- ❖ To train students to actively participate in every facet of the country's growing food industry.
- ❖ To gain knowledge and understanding about food systems in the production, processing and consumption of food and an appreciation of their impact on society
- ❖ To have a knowledge and understanding about the nature of food and human nutrition and an appreciation of the importance of food to health
- ❖ To learn skills in researching, analyzing and communicating food issues, skills in experimenting with and preparing food by applying theoretical concepts and skills in designing, implementing and evaluating solutions to food situations.
- ❖ To develop entrepreneurial spirit among students for inspiring them to set up their own facilities.
- ❖ To spread awareness in the community about the Science of Technology of food processing for use in the household and cottage sector.
- ❖ To take up developmental works for new products and for improved formulations for traditional food products.
- ❖ To collaborate actively with industry for mutual benefits. To inculcate a spirit of social service in students by involving them in the activity.

SYLLABUS OF THE CERTIFICATE COURSE

(THEORY) 50 hours

UNIT-I INTRODUCTION TO FOOD TECHNOLOGY: 8 hours

1. History and development of food technology, evolution of cooking processes, fermentation processes and food preservation processes.
2. Physico-chemical properties of food- boiling point, evaporation, melting point, smoke point, surface tension, osmosis, humidity, freezing point and specific gravity and H-ion concentration.
3. Colloidal systems- Particle size and extent of dispersion, stability of colloids, properties of colloidal dispersion. Starch and protein colloids.

Type of colloidal system in food- sol, gel, emulsion, foam.

UNIT-II COMPOSITION AND NUTRITIVE VALUE OF PLANT FOODS: 8 hours

1. Cereals- production, structure, composition and storage.
Novel foods: breakfast cereals, instant mixed foods, infant foods
2. Legumes- beans and peas
3. Beverages- nutritious and refreshing drinks-alcoholic and non-alcoholic.
4. Nuts and oil seeds- coconut, groundnut, soybean (extrusion), sesame, sunflower.
5. Spices and condiments- garlic, onion, olive oil and vinegar.

UNIT-III COMPOSITION AND NUTRITIVE VALUE OF ANIMAL FOODS: 8 hours

1. Milk and milk products- preservation of milk and production of fermented milk products (yoghurt, cheese and cultured butter milk)
2. Meat and meat products- preservation and curing of meat.
3. Egg and egg products- nutritive value, composition and preservation of egg.
4. Sea foods- preservation and use of brine.

UNIT-IV PRINCIPLES OF COOKING:**6 hours**

1. Thermal heating, Barbecue, Grilling, Steaming and Microwave. Cooking utensils and covering for microwave.
2. Factors influencing-standing time, volume, density, defrosting. Standing time before serving and stirring.
3. Arrangement of food.

UNIT-V FOOD ADDITIVES AND ADULTERATION:**6 hours**

1. Food additives, antioxidants, sequestrants, preservatives, nutrient supplement, emulsifiers, stabilizers and thickening agents, bleaching and maturing agent, sweeteners, humectants and anti-caking agents, coloring and flavoring substance
2. Food adulteration: Types of adulterants- intentional and incidental adulterants, methods of detection. Health hazards and risks.

UNIT-VI PRODUCTION OF NOVEL FOOD:**2 hours**

1. Mushroom cultivation-SCP, leaf protein concentrates.
2. Irradiated and radiated foods and food analogues.

UNIT-VII FOOD PACKAGING:**2 hours**

1. Package evolution- Functions, types and safety measures of packaging materials.
2. Packaging materials- aseptic and biodegradable methods.
3. Packaging of meat, poultry, fish, sea food, fruits, vegetables and milk

UNIT-VIII FOOD SAFETY, QUALITY AND EVALUATION: 10 hours

1. Evaluation of foods-physical (taste, volume, texture, viscosity) and chemical methods (pH, acidity, alkalinity, sugar concentration).
2. Principles of food contamination- sources of microbial contamination of foods.
3. Spoilage of foods- spoilage of fruits and vegetables, grains, milk and milk products, meat, poultry and sea foods.
4. Preservation of foods
 - a. physical methods: cold and heat treatment, ultra sound and microwave.
 - b. chemical methods: organic acids, sodium chloride, sulfites, nitrites.
 - c. antimicrobial compounds: lactoperoxidase system, lactoferrin, spices and their essential oils.
5. Factors affecting the growth of microbes- intrinsic and extrinsic factors.
6. Development and impact of rapid methods for the detection of food borne pathogens
 - a. AOAC
 - b. HACCP
 - c. FPO
 - d. FDA
 - e. ISO 9000 Certification

**SYLLABUS OF THE CERTIFICATE COURSE
(PRACTICAL) 40 hours**

1. Study of instruments- pH meter, Refractometer, Viscometer, Lactometer, Alcoholometer, Microwave	2 Units
2. Identification of different foods	1 Unit
3. Microscopic observation of fungi from spoilt fruits and vegetables	2 Units
4. Measurement of foam in egg white	1 Unit
5. Antimicrobial activity of spices	3 Units
6. Microbial analysis of foods	3 Units
7. Production of milk-based beverages	1 Unit
8. Determination of quality of milk	3Units
9. Measurement of acidity in different foods-pH, TSS, Volatile acidity, Degre's brix.	3 Units
10. Preparation of fruit squash	1 Unit
11. Estimation of ascorbic acid in fruit juices	1 Unit
12. Alcohol production from jaggery	1 Unit
13. Preparation of mayonnaise as a stable emulsion	1 Unit
14. Preparation of peanut butter	1 Unit
15. Meal making- Preparation of chikki from oil seeds	2 Units
16. Preparation of wheat bran, popcorn. Germination and malt making	3 Units
17. Preparation of pickles	1 Unit
18. Mushroom cultivation	1 Unit
19. Food adulteration: Substance adulteration test for coffee, chicory, edible oils, ghee, soji, cumin, cinnamon, milk	2 Units
20. Role of yeast	2 Units
21. Food packaging- nutrition labeling and different types of packaging materials	1 Unit
22. Butter making	1 Unit
23. Importance and formation of Gluten	1 Unit
24. Sensory evaluation tests-taste identification test, taste intensity tests	1 Unit
25. Jelly making	1 Unit
26. Blanching	1 Unit
27. Simple fudge making	1 Unit
28. Preparation of vegetable stock	1 Unit
29. Practical based Assignment	

REFERENCES:

1. Jay J.M. 1986. Modern Food Microbiology. 3rd Edn. VNR, New York.
2. Ranganna, S. 1986. Handbook of Analysis and Quality Control for Fruits and Vegetable Products. Tata McGraw Hill, New Delhi.
3. Painy, F.A. and Painy, H.Y. 1983. A Handbook of Food Packaging. Leonard Hill, Glasgow, UK.
4. Shakuntala Manay N and Shadaksharaswamy M. Foods-facts and principles. 3rd edition New age International.
5. William C Frazier and Dennis C Westhoff. Food microbiology, 4th edition Tata McGraw Hill, New Delhi.
6. Srilakshmi B. Food Science 4th edition. New age International.
7. Srivastava, R. P. and Kumar, S. 1998, Fruit and vegetable preservation: principles and practice. 2nd edition. International book distributing co., Lucknow.
8. Mohini Sethi and Eram S Rao. Food science experiments and applications. CBS publishers.
9. Raghuramulu, N., Madhavan Nair, K., and Kalyanasundaram, S. Ed. 1983. A Manual of Laboratory Techniques. National Institute of Nutrition, ICMR, Hyderabad.
10. Warner, J.M. 1976. Principles of Dairy Processing. Wiley Eastern Ltd. New Delhi



ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
DEPARTMENT OF MICROBIOLOGY
CERTIFICATE COURSE

Ethics in Life Sciences and Health care Sector

Duration: 30 hrs

Credit: 1

Course Objectives

- ◆ The focus of the course will be the exploration of various moral values, legal and policy issues related to human life and medical challenges.
- ◆ It also focuses on the influence of biotechnology and bioethics in each of them.
- ◆ The course will give the sense of responsibility in the use of newer technologies with at most care.
- ◆ Case studies in this course focus on real issues in real life and real time.

Course Content

Module – 1

(1 Hr)

Introduction and History of Bioethics. Scope of Bioethics in life sciences and Health care sector

Module - 2

Reproductive Ethics

(5 Hrs)

Introduction to Assistive reproductive technologies (ART). Ethical issues related to ART, Surrogacy, Preimplantation genetic diagnosis and Sex selection of embryos or fetus. Ethical issues related to abortion. Case studies.

Module - 3

Human Enhancement Ethics

(6 Hrs)

Use of Medical technologies for enhancement (Happy pills, Cosmetic surgical procedures, Doping in sports, Anti-aging medicine, Cognitive enhancement). Pros and cons of enhancement techniques. Case studies.

Module - 4

Ethics of Euthanasia

(5 Hrs)

Basics of Euthanasia and Death with Dignity. Forms of euthanasia. Ethical analysis of euthanasia. Movie screening and critical review.

Module - 5

Transplantation Ethics

(5 Hrs)

Over view of organ transplantation. Types of organ donors. General view on transplant laws in India. Brain death and organ transplantation. Organ trafficking- causes and consequences. Forced organ harvesting. Case studies.

Module 6

Ethical issues in Cloning

(5 Hrs)

Overview of cloning. Purpose of cloning. Effect of reproductive cloning on the child/parent relationship. Pros and cons of cloning humans. Overview of cloning in animals and plants and its applications. Movie screening and critical review.

Module 7

Ethics and Biological Warfare

(4 Hrs)

History and overview of Biological warfare, Bioterrorism and Biocrime. Biowarfare as an emerging threat to mankind. Biodefense. Ethical challenges in biodefense and bioterrorism. Case studies.

Course Outcome:

After completing the course, the students will have,

CO1	Knowledge and understanding of the key concepts and the problems associated with the advancements in existing technologies in life sciences.
CO2	Skills to analyze and argue on different ethical issues pertaining to human life.
CO3	Ability to express their knowledge and understanding acquired through this course.