University of Mumbai

No. UG/ 118 of 2019-20

CIRCULAR:-

Attention of the Principals of the Affiliated Colleges, and Directors of the recognized Institutions in Science & Technology Faculty is invited to the syllabus uploaded by Academic Authority Unit which was accepted by the Academic Council at its meeting held on 27th February, 2013 **vide** item No. 4.16 relating to the revised syllabus as per (CBSGS) for the T.Y.B. Sc. Applied Component Course in Food Production and Processing (USACFP).

They are hereby informed that the recommendations made by the Board of Studies in Microbiology at its meeting held on 22nd May, 2019 have been accepted by the Academic Council at its meeting held on 26th July, 2019 **vide** item No. 4.9 and that in accordance therewith, the revised syllabus as per the (CBCS) for the T.Y.B.Sc. (Sem. V & VI) Food Production & Processing (USACFP) (Applied Component) has been brought into force with effect from the academic year 2019-20, accordingly. (The same is available on the University's website www.mu.ac.in).

MUMBAI – 400 032
18th September, 2019

(Dr. Vinod P. Patil)
I/c REGISTRAR

To

The Principals of the affiliated Colleges, and Directors of the recognized Institutions in Science & Technology Faculty. (Circular No. UG/334 of 2017-18 dated 9th January, 2018.)

A.C/4.9/26/07/2019

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No. UG/ 118 -A of 2019-20 MUMBAI-400 032 18th September, 2019

Copy forwarded with Compliments for information to:-

1) The I/c Dean, Faculty of Science & Technology,
2) The Chairman, Board of Studies in Microbiology,
3) The Director, Board of Examinations and Evaluation,
4) The Professor-cum-Director, Institute of Distance and Open Learning (IDOL),
5) The Director, Board of Students Development,
6) The Co-ordinator, University Computerization Centre,

(Dr. Vinod P. Patil)
I/c REGISTRAR

Ordinances and applicable Regulations for Eligibility and Evaluations need to be clearly mentioned
Revised
15/7/19

Cover Page

AC 26/7/19
Item No. 4.9

UNIVERSITY OF MUMBAI

Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of the Course	TYBSc Applied Component for Microbiology : Food Production & Processing
2	Eligibility for Admission	XII (Sc) Second Year BSc ~~with Microbiology~~ 17/7/19
3	Passing Marks	40/100
4	Ordinances / Regulations (if any)	Ord: 0.2145. Circular No UG/394 of 2004 dt Sept 2004.
5	No. of Years / Semesters	2 Semesters
6	Level	~~P.G.~~ / U.G./ ~~Diploma / Certificate~~ **(Strike out which is not applicable)**
7	Pattern	~~Yearly~~ / Semester **(Strike out which is not applicable)**
8	Status	~~New~~ / Revised **(Strike out which is not applicable)**
9	To be implemented from Academic Year	From Academic Year 2019-20

Date:

Signature : Bhathena

Name of BOS Chairperson / ~~Dean~~ : Prof (Dr) Z P Bhathena

Revised

UNIVERSITY OF MUMBAI

Revised Syllabus for T.Y.B.Sc.
(APPLIED COMPONENT)
Program: B.Sc.(Microbiology)
Course: Food Production and Processing (USACFP)

Choice Based Credit System with effect from the academic year **2019–2020**

T. Y. B.Sc.
Food Production &Processing (Applied Component) for B.Sc degree in Microbiology
Course code – USACFP

SEMESTER V

Course Code	Unit	Topic	Credits	Lectures per week
USACFP501		**FOOD PRODUCTION AND PROCESSING (General Principles)**	**2**	**4**
	I	Food Science and Nutrition		1
	II	Production of Traditional foods		1
	III	Principles of Food processing		1
	IV	Principles of Food spoilage and Preservation		1
USACFPP-1	**Practical based on above course in theory**		**2**	**4**

N.B.

I. Each theory period shall be of 48 minutes duration.Theory component shall have 60 instructional periods plus 60 notional periods per semester which is equal to 96 learning hours. For theory component the value of one credit is equal to 48 learning hours.

II. Each practical period shall be of 48 minutes duration. Practical component shall have 60 instructional periods plus 15 notional periods per semester which is equal to 60 learning hours. For Practical component the value of one credit is equal to 30 learning hours.

LEARNING OBJECTIVES:

Topics included in this semester aim

- to revise and impart to the students, knowledge on various aspects of food with respect to their nutritional value and their impact on human health.
- to give the students an overview of various coloring and flavoring agents used in foods.
- to acquaint students with traditional foods and their role in nutrition.
- to give an insight into processing of basic foods.
- to familiarize them with basic principles of food spoilage and also to equip them with various methods of preservation.

LEARNING OUTCOME:

- Students will become competent for various post graduate courses in food technology, which will enhance their chances to be employed in food industry.
- The students will acquire knowledge with respect to nutritional requirements, basic principles of balanced diet.
- They will also be able to plan a balanced meal.
- Students will understand the disorders due to nutritional deficiencies.
- They will gain comprehensive account of production of traditional foods.
- Students will be acquainted with various techniques of processing of cereals, pulses and animal foods.
- It will help students to identify food spoilage and devise methods to prevent the same.

To be implemented from the academic year 2019-2020

SEMESTER V

UNIT	TOPICS	Lec/topic	Lec / Sem	Credit
	Course Code: USACFP-501 **FOOD PRODUCTION AND PROCESSING** **(General Principles)**		**60**	**02**
I	**1. Food Science and Nutrition** **1.1** Sources and Functions of Nutrients-- Proteins, Carbohydrates, Fats, Minerals, Vitamins, Fibre, Antioxidants and Phytochemicals **1.2**Energy Value of Foods. Methods of measurement of energy value of nutrients – direct and indirect, basal metabolic rate – measurement and factors affecting BMR **1.3** Disorders due to deficiency of nutrients --. Vitamin deficiency, Protein deficiency, Mineral deficiency -- Iron, Iodine, Calcium, Sodium, Potassium, Phosphorous, Magnesium **1.4** Food guide for a balanced diet **1.5** Food Additives – Intentional / Unintentional, general. Examples: Antioxidants, chelating agents, colouring agents, emulsions, flavours and flavour enhancers, flavour improvers, humectants and anti-caking agents, leavening agents, nutrient supplements, non-nutritive sweeteners, pH controlling agents	**5** **2** **4** **2** **2**	**15**	
II	**Production of Traditional Foods** **2.1.** Fermented foods- Idli, Bread, Yogurt, Butter, Cottage Cheese, Sausage, Soya sauce, Pickles **2.2.** Beverages – Coffee, tea **2.3.** Aquaculture – General Principles, Prawn and Oyster farming **2.4.** Foods of Microbial Origin- SCP – Yeast and algal	**7** **3** **3** **2**	**15**	
III	**Principles of Food Processing** **3.1** Processing of rice- milling, parboiling, parched, puffed, starch extraction **3.2**Processing of Cereal Protein- Gluten, Pasta, Macaroni, Semolina **3.3** Processed Soybean products- soya oil, meal, flour, infant formula, curd, milk **3.4** Processing of Oilseeds (extraction of oil) **3.5** Processing of Meat, Fish- Aging, tenderizing, curing. Fish processing, Eggs- egg protein and foam **3.6** Processing of fruits and Vegetables – jam, jelly, squash, ketchup	**4** **2** **2** **1** **4** **2**	**15**	

IV	**Principles of Food Spoilage and Food Preservation** **4.1** Principles of Food Spoilage- Physical, Chemical and Microbial **4.2** Principles of Food Preservation- **A. Physical Methods-** **i.** Methods using High temperature -Blanching, Pasteurization, Canning. **ii.** Methods using Low temperature- Chilling, Freezing. **iii.** Dehydration **iv.** Irradiation **B. Chemical Methods** Salt, Sugar, Na-benzoate, Meta bisulfite, Citrate, Acetate **4.3. Newer Preservation & Processing Methods**- Natural antimicrobials, Hydrostatic pressure, Electric pulse, Light pulse, High magnetic pulse, Microwave, minimally processed foods, Bio-preservation, hurdle technology	**3** **2** **1** **1** **2** **2** **4**	**15**	

PRACTICALS BASED ON SEMESTER V (USACFPP-501):

1. Estimation of carbohydrates from rice products like puffed and parched rice.
2. Estimation of proteins from soya flour, wheat flour (direct Biuret method).
3. Estimation of protein content of Spirulina (indirect Biuret method).
4. Estimation of Vitamin C content. (from amla /lime)
5. Study of idli batter - Count of lactic acid bacteria, SPC, Titrable acidity
6. Determination of Iodine number of oil/ ghee/ butter.
7. Determination of saponification value of fats.
8. Preparation of ketchup / pickles.
9. Preparation of jam.
10. MIC of salt, sugar, benzoate, potassium meta-bisulphite.
11. Isolation of spoilage causing microorganisms from bread, butter, cheese, pickles.
12. Assignment: Preparation of a day's menu plan for different individuals.
13. Visit to aquaculture/ oil extraction unit/ rice mill.

SEMESTER VI

Course Code	Unit	Topic	Credits	Lectures per week
USACFP601		**FOOD PRODUCTION AND PROCESSING (Newer methods and Quality Assurance)**	2	
	I	Food Production using Genetic Engineering		1
	II	Contemporary foods		1
	III	Food Safety and Quality Assurance		1
	IV	Food Packaging and Marketing		1
USACFPP-2	**Practicals based on above course in theory**		**2**	**4**

LEARNING OBJECTIVES:

The course designed for Semester VI

- Aims at imparting knowledge on recent trends in food production and food safety.
- Aims to familiarize learners with the use of genetic engineering techniques in plant and animal-based food production.
- Aims at highlighting the significance of modern foods and supplements.
- Create awareness about food hazards and the laws and standards related to food safety and quality assurance.
- Indicate the importance of food packaging to extend shelf life of foods.

LEARNING OUTCOME:

- Students will be trained to be food analysts.
- They will be skilled to respond to issues related to food safety emergencies.
- They will become competent to use FSSAI guidelines.
- The learner will be able to comprehend details mentioned on food packages.

Semester VI

UNIT	TOPICS	Lec/topic	Lec /Sem	Credit
	Course Code: USACFP-601 **FOOD PRODUCTION AND PROCESSING** **(Newer methods and Quality Assurance)**		**(60 Lectures)**	**02**
I	**Food Production using Genetic Engineering.** **1.1** Genetic Engineering-General Methodology **1.2** Applications of Genetic Engineering – Modification of plant nutritional content, taste and appearance, fruit ripening, edible vaccines. **1.3** GM Foods- Brinjals, Tomatoes, Golden rice **1.4** Transgenesis in Cows, Buffaloes and Fish	**1** **6** **4** **4**	**15 Lectures**	
II	**Contemporary Foods** **2.1** Beverages: Fruit based, vegetable juices, soups **2.2**- Confectionaries as source of energy -Chocolate, Sugar boiled caramels, Energy Bars. **2.3** Convenience foods **2.4** Probiotics and prebiotics **2.5** Nutraceuticals	**4** **3** **2** **3** **3**	**15 Lectures**	
III	**Food Safety and Quality Assurance** **3.1** Food Hazards: Microbial – bacterial, fungal, protozoan, and viral. Food hazards: Non microbial-adulteration, natural/artificial colouring agents, metals.. **3.2** Food analysis – Sensory, chemical, microbiological, rapid detection methods as per FSSAI **3.3.** Safe Process Design and Operation – GMP, HACCP, Food Hygiene and sanitation, risk assessment, flow sheets **3.4** Food Standards and Laws- National, International legislation and agencies governing food and its quality	**3** **3** **3** **4** **2**	**15 Lectures**	
IV	**Food Packaging and marketing** **4.1** Role of Packaging **4.2**. Types of Packages **4.3** Types of Packaging materials **4.4** Labelling and Printing **4.5** Food and food packaging interaction **4.6** Nanotechnology in packaging **4.7** Shelf life testing **4.8** Transportation and Storage	**2** **2** **2** **2** **2** **1** **2** **2**	**15 Lectures**	

PRACTICALS BASED ON SEMESTER VI (USACFPP-601):

1. Sample preparation for microbiological (SPC and Coliforms) analysis:
   a. Jam
   b. Pickles
2. Determination of titrable acidity of fruit juices
3. Extraction and detection of lycopene from tomatoes.
4. Study of probiotic and prebiotics in food samples.
5. Analysis of food- butter and cheese using FSSAI manuals.
6. Food adulteration.
7. Study of types of packaging materials.
8. Testing of packaging materials.
9. Assignment on GM (genetically modified) foods.

Text books

Course: USACFP-501 and USACFP- 601

1. Joshi Shubhangini, Nutrition and Dietetics, Second Edition, Reprint 2007 Tata McGraw Hill Publishing
2. Mudambi R and Rajagopal M. V. 2001. Fundamentals of food and nutrition. 4t Edi. New Age International Ltd. Publ
3. Manay N. S. and Shadasaraswamy. Foods –facts and principles. New Age International Pvt Ltd. 3rdEdi.
4. Shrilaxmi B., Food Science, Fourth Edition, New Age International Publishers
5. Shivshankar B., 2005, Food Processing and Preservation, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd
6. Swaminathan Handbook of Food and Nutrition. Fifth edition , Reprint 2006.

References

1. Glick and Pasternak, 3rd Edi. ASM Press. Molecular Biotechnology- Principles and Applications of Recombinant DNA.
2. Mudambi S., Rao Shalini and Rajgopal M.V., 2006, Food Science, Revised second Edition, New Age Publishers.
3. Swaminathan M. Principles of Nutrition and Dietetics. 2nd Edi
4. Vijaya Ramesh K., 2007, Food Microbiology, MJP Publishers, Chennai
5. Adams M.R.and Moss M.O., 2008, Food Microbiology, Third Edition, RSC Publishing
6. FSSAI Manuals.
7. Ceirwyn S. James Analytical Chemistry of Foods. Blackie Academic and Professional Publication.
8. R.C. Dubey. A textbook of Biotechnology. Chand publication Fourth edition.
9. Bibek Ray & Arun Bhunia. Fundamental Food Microbiology. Fourth edition. CRC press
10. James Jay Modern Food Microbiology Seventh edition. Springer International edn.