

OPEN ELECTIVE-10 Chemistry of food production, health and nutrition

Semester	II
Paper Code	CHOE-X
Paper title	Chemistry of food production, health and nutrition
Number of teaching hours per week	3
Total number of teaching hours per semester	42
Number of credits	3

1. CHEMISTRY OF FOOD PRODUCTION**7+6 h**

Chemicals composition of soil. Factors affecting the productivity of soil. Plant nutrients -non-mineral, primary, secondary and micronutrients and their natural sources. Nitrogen fixation. Chemicals fertilizers: manufacture, advantages and disadvantages of ammonium sulphate, calcium ammonium nitrate, urea and calcium superphosphate. Micronutrient deficiencies and their remedies.

Case study – Zn micronutrient deficiency in plants.

Plant growth enhancers. Pesticides and their classification. Insecticides -harmful effects of DDT and parathion. Herbicides: selective and non-selective herbicides with examples. Impact of excess usage of chemical fertilizers and pesticides.

Case study – effect of pesticides on human health.

The urgent need for new approaches in agriculture. Organic farming – a sustainable approach towards agriculture.

2. CHEMISTRY OF NUTRITION**11+5 h**

Nutrition and nutrients, classes of nutrients, general nutritional needs of human beings, ways of assessing the nutritional status of a human being.

Case study - importance of nutrients and nutrient metabolism on human health.

Malnutrition, nutrient requirements-recommendations – dietary allowance per day (RDA), caloric data of nutrients and calculation of calorific value of food. Basal metabolic rate (BMR). Factors affecting BMR.

Case study – BMR studies in young adults.

Function, daily needs, food sources of carbohydrates, proteins and fats; problems associated with excess and deficiency of carbohydrates, proteins and fats. Minerals – functions of nutrient minerals, health issues associated with deficiency of Ca, I, Fe, K and Na in human body.

Case study - mineral deficiencies: a root cause for reduced longevity in mammals.

Vitamins – sources and deficiency effects of vitamins A, D, E, F, K, B complex and C.

Case study – Vitamin deficiency and its consequences.

3. FOOD ADDITIVES**4+3 h**

Definition and classification, preservatives, antimicrobial and antioxidant preservatives, food colour, pH control in food, sequestrates, flavour enhancers, sweeteners.

Case study – application and economic prospective of Xanthan.

Anticaking agents, stabilizers, thickeners and surface active agents (emulsifiers), role of polyhydric alcohols as food additives.

Case study: food additives and their side effects.

4. FOOD ADULTERATION

3+1 h

Adulterants-definition, examples of adulterants in food and beverages, harmful effects of food adulteration.

Case study - effect of food adulteration on human health.

Detection of adulteration in edible oil, milk, beverages, spices and pulses.

5. CHEMISTRY OF COOKING

2 h

Leavening of bread, fermentation

References:

1. Chemistry: Impact of Society, M.D. Joesten. D.O. Johnston, J.T. Netterville and J. L. Woo. Saunders College Publishing, 1998.
2. Chemistry of food and nutrition. H.C. Sharma, Agrobios (India) 2009.
3. Pesticides in the modern world: Risks and benefits, Margarita Stoitcheva, IntechOpen, 2011.
4. E Source: Chemgeneration. Com/milestones/food-and-agriculture.html
5. S. T. Khan, A. Malik, A. Alwarthan, M. R. Shaik, Arabian Journal of Chemistry, 2022, 15, 103668.
6. P. Nicolopoulou-Stamati, S. Maipas, C. Kotampasi, P. Stamatis and L. Hens, Frontiers in Public Health, 2016, DOI: 10.3389/fpubh.2016.00148.
7. I. Tsvetkov et. al. Agriculture and Environmental Biotechnology, 2018, 32, 241-260.
8. Y. Chen, M. Michalak, and Luis B. Agellona, Yale J. Biol Med. 2018, 91(2): 95–103.
9. Mineral Deficiencies: A Root Cause for Reduced Longevity in Mammals, N. S.N. Chaitanya, S. Sahu, IntechOpen, 2020, DOI: 10.5772/intechopen.94276.
10. G. F. Combs Jr, J. P. McClung, The Vitamins, 2017, 59-78, DOI: 10.1016/B978-0-12-802965-7.00004-6.
11. B. de M. Lopes, B. L. Lessa, B. M. Silva, M. A. da S. C. Filho, E. Schnitzler, L. G. Lacerda, Journal of Food and Nutrition Research, 2015, 54, 184-194.
12. C. J. K. Henry, Public Health Nutrition, 2005, 8, 1133-1152 DOI: 10.1079/PHN2005801.
13. A. Badora, K. Bawolska, J. K. Strawska, J. Domanska, Nutrition in Health and Disease, IntechOpen, 2019, DOI: 10.5772/intechopen.85723.
14. C. Vethirajan, K. Banupriya, Consumers in Digital Era: Issues and Concerns, 2017, 157-166.

15. Food Marketing and Technology, 2021, <https://fmtmagazine.in/food-adulteration/>
16. <https://www.indiastudychannel.com/resources/172754-Adulteration-and-Harmful-effects-of-Food-Adulteration.aspx>.

Formative Assessment (Internal assessment) Theory	
Assessment Occasion/ type	Weightage in Marks
Continuous evaluation and class test	20
Seminars/Class work	10
Assignments/Discussions	10
Total	40

