

COLLEGE OF FISHERIES, KISHANGANJ
BIHAR ANIMAL SCIENCES UNIVERSITY, PATNA

Class Schedule for M.F.Sc. 1st Semester
FNT-503: Feeds and Feed Technology 3(2+1)

Theory

Sl. No.	Topic	No. of Classes
1.	Unit I Feed formulation: General principles and criterions, Different methods of feed formulation; Pearson's square method and least cost formulation (quadratic equation, solver function, Graphic solution, Linear programming and software assisted formulations), Limitations of formulation methods	6
2.	Unit II Types of feed: Wet, Moist and Dry (pellets – steam compressed, extruded and crumbled, flakes, powdered/ mash, micro-encapsulated, micro-bound and micro-coated diets). Farm made feeds, Experimental diets; Reference diet, purified and semi-purified diet, Compact pellet, Floating and slow sinking pellet feeds; Starter, grower, Finisher and brood stock feeds, High energy eco-friendly and medicated feed	6
3.	Unit III Feed processing technology: Receiving of raw materials, Equipments used in feed manufacture and processing; Grinder/pulverizer, Mixer, Pelletizer/extruder, Crumbler, Drier, Vacuum coater/ fat sprayer, automatic bagging and sealing, Role of pre-conditioning in feed preparation, Effects of processing on the nutritional value and availability of nutrients.	6
4.	Unit IV Feed storage: Hydro-stability of feed and their storage; Prevention of spoilage from rancidity, Fungus and associated toxins; Vectors of fish disease in feed and quality control; Nutritional value in relation to feed storage.	4
5.	Unit V Feed additives and supplements: Binders, carotenoids, Attractants, Antioxidants, Probiotics, Prebiotics, Synbiotics, Immunostimulants, Nutraceuticals, Acidifiers and Preservatives, Bile acids, Herbal additives and Vitamins, minerals, Limiting amino acids, Essential fatty acids, Phospholipids, and Cholesterol.	5
6.	Unit VI Quality control in fish feed manufacturing: Quality control procedures, Raw materials, Finished products; Safety of farm fish products, Harmful residues (pesticides, antibiotics, and pollutants).; Geometrical, and physical feature; Mechanical characteristics in air, Behavioural characteristics in water, Feed economics and evaluation	5
	Total numbers of classes	32

Practical

Sl. No.	Topic	No. of Classes
1.	Feed formulation, Preparation of mineral and vitamin premix,	4
2.	Feed additives, binders.	2
3.	Water stability test. and available lysine	2
4.	Determination of feed particle size	2
5.	Development of feed dispensers both for laboratory and pond feeding as part of project assignment	5
6.	Visit to feed processing industries.	1
	Total numbers of classes	16

Rajesh Kumar
Assistant Professor
Department of FNPB
CoF, BASU, Patna

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FNT-504: Nutritional Energetics 3(2+1)

Theory

Sl. No.	Topic	No. of Classes
1.	Unit I Concepts of nutritional energetics: Energy budget equation; Energetic efficiencies and energy flow/partitioning in biological systems; Gross energy, Digestible energy, Metabolizable energy, Net energy, Heat increment of feeding (specific dynamic action, SDA); Factors influencing energy metabolism	6
2.	Unit II Energy requirement: Energy requirement of fish and shellfish, Factors influencing energy requirements; Energetics of maintenance and methodology of estimating the maintenance requirement.	6
3.	Unit III Energy estimation: Direct and indirect methods of estimation of energy of feed and feed components based on chemical compositions.	5
4.	Unit IV Energetics of growth: Relationship between feeding and growth; Energy exchange in biological systems; Growth and maturation	5
5.	Unit V Energetics of reproduction: Gonadal maturation and reproduction in relation to feeding	4
6.	Unit VI Energetics of intermediary metabolic pathways: Aerobic and anaerobic glycolysis, TCA cycle, Glycogenolysis, Beta oxidation, Electron transport chain, Effect of biotic and Abiotic factors on energy metabolism	6
	Total numbers of classes	32

Practical

Sl. No.	Topic	No. of Classes
1.	Estimation of gross and digestive energy of feed and feed ingredients	3
2.	Estimation of digestibility of nutrients, Bomb- calorimetry	3
3.	Energy budget equation based on experimental data;	4
4.	Determination of standard metabolism in fish	3
5.	Assay of metabolic enzymes	4
	Total numbers of classes	17

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Class Schedule for M.F.Sc. 2nd Semester

FNT-506, Feed Ingredients & Additives 3(2+1)

Theory

Sl. No.	Topic	No. of Classes
1.	Unit I Introduction: National and international scenario; present production trend and future requirements of feed ingredients	4
2.	Unit II Ingredient classification: Conventional feed ingredients - protein sources, energy sources; Unconventional feed ingredients - by-products of agro-industry, slaughter house, fruit processing units, seafood industry and forest; Single cell proteins; leaf protein concentrates, gluten meal and grain by-products.	10
3.	Unit III Proximate composition; International coding of feed ingredients; Amino acid profile.	5
4.	Unit IV Anti-nutritional factors: Methods of detection and detoxification.	3
5.	Unit V Feed Processing: Methods; effect of processing on nutritional quality and utilization.	5
6.	Unit VI Storage and quality control: Storage methods; effect of storage on ingredient quality; Factors affecting quality of ingredients; toxins.	5
	Total numbers of classes	32

Practical

Sl. No.	Topic	No. of Classes
1.	Proximate composition, Estimation of Tannin, Protease inhibitors, HCN, Aflatoxin, Available lysine; Storage studies	18

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Class Schedule for M.F.Sc. 2nd Semester
FNT-510, Carbohydrate Nutrition 2 (1+1)

Theory

Sl. No.	Topic	No. of Classes
1.	Unit I Sources: Carbohydrate sources and digestible energy supply, Role of digestible and non-digestible carbohydrates; Dietary levels of carbohydrate for carps and catfishes	6
2.	Unit II Digestibility and interactions with other nutrients: Carbohydrate digestibility, Factors affecting starch utilization, Carbohydrate and Interaction with other nutrients and protein sparing effect	6
3.	Unit III Constraints and utilization: Constraints of carbohydrate utilization in fish, non-starch polysaccharides, Strategy to enhance carbohydrate utilization; Gelatinization, Exogenous amylases, Glucose Intolerance; Carbohydrates and immunity	6
4.	Unit IV Economic importance aquafeeds: Maximum and inclusion levels for different fish species, Uses of carbohydrates for low-cost feed formulations.	4
	Total numbers of classes	22

Practical

Sl. No.	Topic	No. of Classes
1.	Estimation of starch gelatinization in different feed processing methods; Blood glucose estimation; Estimation of crude fiber and non-starch polysaccharides	10

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FNT-511, Vitamin & Mineral Nutrition 2 (1+1)

Theory

Sl. No.	Topic	No. of Classes
1.	Unit I Vitamins: Classification and sources, properties and functions of water- and fat-soluble vitamins; Vitamin as co-enzymes and prosthetic groups of enzymes.	6
2.	Unit II Vitamin requirements and sources: Vitamin requirements of different species; dietary sources of vitamins; factors affecting vitamin requirements; Loss of vitamins during feed processing and storage.	6
3.	Unit III Vitamin deficiency: Manifestation of vitamin deficiency; Vitamin –mineral interactions. Hypo- and hyper- vitaminosis.	6
4.	Unit IV Minerals: Classification and sources, macro, micro minerals and heavy metals toxicity. Minerals requirements for different aquaculture species, dietary sources of minerals, factors affecting mineral requirement; nutrient-minerals interaction; Mineral-Mineral interactions; manifestation of mineral deficiency.	4
Total numbers of classes		22

Practical

Sl. No.	Topic	No. of Classes
1.	Estimation of zinc, phosphorus, magnesium, iron and vitamin A; preparation of vitamin and mineral premix; estimation of vitamin and mineral losses due to leaching.	11

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