

## SYLLABUS: DEPARTMENT OF ANIMAL SCIENCE

Courses offered by Department of Animal Science in the M. Sc. (Ag.) in Animal Science programme

Course No.	Course Title	Credits	Semester
PSC 501	Poultry breeding and genetics	2+1	I
PSC 502	Poultry nutrition and feeding	2 + 1	I
PSC 503	Commercial layer production	2 + 1	III
PSC 504	Commercial broiler production	2 + 1	III
PSC 505	Breeder stock and hatchery management	3 + 1	II
PSC 506	Management of poultry other than chicken	2 + 1	II
PSC 507	Poultry products technology and marketing	2 + 1	III
PSC 508	Poultry economics, projects and marketing	2 + 1	III
PSC 509	Physiology of poultry production	2 + 1	I
PSC 510	Diseases of poultry and flock health	2 + 1	II
PSC 511	Avian anatomy and physiology of different systems; related to poultry production	2 + 1	I
PSC 512	Applied pharmacology and therapeutics in poultry	1 + 1	I
PSC 513	Poultry diseases, pathological changes and diagnosis	2 + 1	II
PSC 514	Poultry medicine & preventive measures	1+1	II
PSC 515	Poultry wastes management, integrated fish farming with poultry production, bio-technological intervention and environment	2 + 1	III
PSC 591	Credit seminar	0+1	IV
PSC 599	Master's Research (Thesis)	0+20	I to IV

(Course Nos PSC 501-510 and PSC- 591, 599 are at per ICAR)

### PSC 501

### Poultry breeding and genetics

2+1

#### Objectives

To impart knowledge on different systems of breeding, selection methods, design and implementation of breeding programme in developing egg-type and meat type birds. Modern tools in poultry breeding.

#### Syllabus:

##### Theory

##### UNIT I

Genetic classification of Poultry -Origin and breed characteristics of poultry- Development of Poultry Industry in India - Mendel's laws of inheritance related to poultry -Qualitative and Quantitative traits in Poultry breeding -Additive, Non Additive, Epistatic and complementary gene action - Lethal and mutations in poultry - Sex linked, Sex limited and Sex influenced traits

- Economic traits - Heritability - Quantitative inheritance -- Phenotype, Genotype & environment interactions.

#### UNIT II

Systems of Breeding - Systems of Mating - Selection methods - Breeding programme for developing egg-type and Broiler type of birds - Developing hybrids - Other species of Poultry breeding and management - Formation and Management of inbred, pure lines, grand parent and parent stock.

#### UNIT III

Industrial breeding-Artificial insemination in chicken-Autosexing-Random Sample Test. Use of molecular genetics in poultry breeding-Quantitative trait loci and marker-assisted selection-Conservation of poultry genetic resources.

#### **Practical:**

Breeds of poultry - Factors affecting inheritance of qualitative and quantitative traits in poultry - Constructing index and Osborne index-Estimating heritability - Breeding program for developing commercial hybrid layers, broilers, Japanese quail, duck, turkey, fancy birds, Guinea Fowl and Pigeons - Semen collection, evaluation & insemination in chicken & turkey - Breeding records -Use of computers to maintain breeding records and for selection.

#### **Learning Outcome:**

Students will get exposure on different systems of breeding, selection methods, design and implementation of breeding programme in developing egg-type and meat type birds. Modern tools in poultry breeding.

**PSC 502**

**Poultry nutrition and feeding**

**2+1**

#### **Objectives**

Teaching about nutrients & their functions, nutrient requirements of poultry and factors influencing the same. Imparting knowledge of different types of feeds and feeding methods.

#### **Syllabus:**

#### **Theory**

##### UNIT I

Digestive system, digestion, metabolism and absorption of feed in poultry - Factors influencing the feed consumption in birds - Macro and micro-nutrients - Nutrient requirements for various species of poultry. Partitioning of energy - Calorie: protein ratio - Nutrient interrelationships - Factors influencing the nutrient requirements.

##### UNIT II

Feed ingredients composition, feed storage technique-milling and quality control Processing of feed - Types & forms of feeds and feeding methods - Commonly occurring anti nutrients and toxicants in poultry feed ingredients - Mycotoxins and their prevention - Feeding chicks, growers, layers, broilers and breeders - Principles of computing feed- - Balanced feeds -Least

cost feed formulation and programming – Feeding in different seasons and stress conditions – Nutritional and metabolic disorders in poultry.

#### UNIT III

Systems of feeding – restricted, forced, controlled and phase feeding -Use of Additives and Non additives- enzymes, probiotics, prebiotics antibiotics, herbs, performance enhancers – Utilization of non-conventional feedstuff - Feeding of ducks, turkeys, Japanese quails, Guinea fowls.

#### UNIT IV

Organic, functional, designer & SPF feed production - Production of drug residue, pesticide residue & toxin free feeds – regulations for Import and Export of feed and feed supplements.

#### **Practical:**

Physical and sensory evaluation of feed ingredients- sampling techniques for ingredients and compounded feed-Estimation of proximate principles of feed and feed ingredients – Computing various poultry feed formulae based on commonly available feed ingredients – Estimation of Aflatoxin, Calcium, Phosphorus, Sand, Silica and Salt – Mash, pellet & crumble feed preparation – Feeding procedures. Visit to feed mills – Preparation of Project report for a feed mill–Hands on Training in feed analytical lab- Preparation & quality control of organic and designer feeds.

#### **Learning Outcome:**

Students will learn about nutrients & their functions, nutrient requirements of poultry and factors influencing the same. Imparting knowledge of different types of feeds and feeding methods.

**PSC 503**

**Commercial layer production**

**2+1**

#### **Objectives**

To impart knowledge on different systems of rearing commercial egg laying birds, care and management of commercial layers for optimal egg production.

#### **Syllabus:**

#### **Theory**

##### UNIT I

Layer Industry in India and the World – Systems of layer farming – Location – Lay out of the farm – Systems of housing – Types of roofs, roof materials, pillars, trusses for poultry houses – Design of different Poultry Houses for large & medium size layer farms – Cages & modified cages for egg type birds – Layer farm equipments –Automation in poultry houses and its maintenance – Management of layers in different systems of rearing.

##### UNIT II

Deep litter & cage system of management – Medication and vaccination schedules & procedure for layers – Lighting programme for egg type birds - Water quality standards, watering of layer and water sanitation – Brooder, grower and layer management – All in All out and Multiple batch system of rearing layers.

### UNIT III

Management of layers during peak egg production and maintaining the persistency in production-Factors causing uneven growth and low egg production -Monitoring egg production curve.

### UNIT IV

Culling of unproductive birds - Record keeping - Biosecurity & health management - Management during different seasons - Induced moulting.- HACCP application for safe egg, value added egg production - Production of eggs free from harmful microbes, Mycotoxins & drug residues- Integration in layer production.

#### **Practical:**

Layer farm lay out and blue print- Design of different chick, grower & layer houses, their specifications & blue print of deep litter and cage system- Selection & culling of layers, debeaking, dubbing, deworming, delicing, vaccination & other farm routines and operations - Farm sanitation, disinfection & waste disposal - Maintaining farm records - Visit to commercial layer farms - Record keeping - Calculating Hen day egg production, Hen housed egg production and other economic traits - Case study of production loss, reasons and corrective measures - Preparing project reports for layers under different batch systems - Calculating the cost of production of eggs.

#### **Learning Outcome:**

Students will exposure on different systems of rearing commercial egg laying birds, care and management of commercial layers for optimal egg production.

**PSC 504**

**Commercial broiler production**

**2+1**

#### **Objectives**

To deal with different systems of rearing commercial broilers, manage mental practices for higher bodyweight with best feed efficiency in commercial broilers. Marketing of broilers efficiently.

#### **Syllabus:**

#### **Theory**

##### UNIT I

Broiler Industry in India and the World - Systems of rearing broilers - Location, layout and design of Broiler houses - Broiler farm equipment.

##### UNIT II

Brooding and rearing of broilers- All in all out and multiple batch systems - Litter materials and deep litter management - Lighting for broilers - Environmentally controlled broiler houses & their management - Water quality and Watering of broiler and water sanitation- Management during different seasons.

### UNIT III

Mash, crumble and pellet feeding of Broilers – weekly growth rate, feed conversion and livability in broilers- sex separate feeding – Feeding broilers for optimum growth rate & feed efficiency- Broiler performance indices – Broiler farm records.

### UNIT IV

Broiler farm routine, medication and vaccination schedule – Bio-security and health management and their control – Systems of Integration in broiler production and marketing –transport of broilers- Different ways of marketing of broilers- Regulations and specifications for production of export quality broilers – Organic broiler meat production.

#### **Practical:**

Location and blue print for a broiler farm – Broiler house design – Preparation of project report for broiler farm – Visit to broiler farms – Judging of live broilers and ready-to-cook broilers- Broiler vaccination, medication, brooding and transportation and farm routines. Record keeping - Calculating the cost of production of broilers – Feeding of broilers at different ages – Working out Feed efficiency – Case study on low body weights, reasons and corrective measures.

#### **Learning Outcome:**

Students will exposure on different systems of rearing commercial broilers, manage mental practices for higher bodyweight with best feed efficiency in commercial broilers. Marketing of broilers efficiently.

**PSC 505**

**Breeder stock and hatchery management**

**3+1**

#### **Objectives**

To impart knowledge about care and management of breeders, hatchery operation, health management of breeder stock. And to study about common diseases and disorders of poultry, diagnosis, vaccination, prevention, control and treatment. Bio security measures in control of general & hatchery borne diseases.

#### **Syllabus:**

#### **Theory**

##### UNIT I

History of Natural and Artificial incubation- embryo development-different breeder flocks – Planning a hatchery, breeder farm – Special care of breeder flock –Collection, selection and care of hatching eggs – Breeder male and female management – Flock testing & culling - Farm and hatchery equipments –Incubation practices – Ventilation and temperature control – Hatchery; Management, Fumigation and sanitation – Breeder farm and hatchery operations, routine & schedule - Factors affecting fertility and hatchability.

##### UNIT II

Care of day old chicks and their vaccination - Restricted & controlled feeding of breeders - Sex separate feeding and nutrient supplementation. - Seasonal management of breeders - Location of hatchery - Layout and design of breeder houses, hatchery & other buildings.

### UNIT III

Biosecurity, health management and waste disposal - Vaccination & medication schedule for breeders. Control of vertically transmissible & hatchery borne diseases.

### UNIT IV

Principles of bio security- Farm sanitation and disinfection procedures-Common bacterial diseases- Salmonella, Pasteurella, E.coli, Fowl typhoid, CRD, Infectious; Coryza, Viral diseases- Newcastle, Infectious bronchitis, Infectious laryngo; tracheitis, Mareks, Fowl pox, Infectious Bursal disease, Egg drop syndrome-76; Avian Encephalomyelitis, Avian influenza, Duck viral Enteritis, Duck viral hepatitis-Fungal diseases- Aspergillosis, Mycotoxicosis, Metabolic disorders-Fatty liver haemorrhagic syndrome(FLHS), Gout and Ascites, Protozoan diseases- Coccidiosis, Ecto and endo parasitic infestation of poultry. Diagnosis, vaccination, prevention, treatment and control - Locational, structural & operational biosecurity in Poultry farms - Water sanitation & control of water borne diseases - Quarantine of poultry. Packaging and transportation of hatching eggs and chicks.

### UNIT V

Hatching egg & SPF egg import and export regulations - Maintaining Salmonella and Mycoplasma free breeding flock -Application of HACCP and Good Management Practices (GMP) in hatchery management for better chick quality.

#### **Practical:**

Breeder farms and hatchery records, selection, fumigation, care and storage of hatching eggs. Layout and blue prints for breeder farm and hatchery -Incubation requirements -Incubator management - Hatchery sanitation & fumigation procedures - Pedigree hatching - Hatchery waste disposal and recycling -Calculating cost of production of hatching eggs and day-old-chicks - Attending breeder farm routines & operation - Flock testing & culling of reactors -Analyzing hatchability results and hatchery records-Economics of layer and broiler hatchery.

#### **Learning Outcome:**

Students will get knowledge about care and management of breeders, hatchery operation, health management of breeder stock; common diseases and disorders of poultry, diagnosis, vaccination, prevention, control and treatment. Bio security measures in control of general & hatchery borne diseases.

**PSC 506**

**Management of poultry other than chicken**

**2+1**

**Objectives**

Care and management of different breeds, varieties of poultry other than chicken, methods of rearing and common diseases affecting them and their control measure.

**Syllabus:**

**Theory**

**UNIT I**

Breeds and varieties of Turkey, Duck, Goose, Pigeon, Guinea fowl, Budgerigar, Japanese quail, Emu and Ostrich - Incubation periods & incubation procedure for different species - Housing, cage & equipments for different species - Duck, Turkey, Japanese Quail, Guinea fowl, Emu, Ostrich production and rearing under different systems.

**UNIT II**

Management and rearing of Turkey, duck, goose, Guinea fowl, Japanese quail, pigeon, emu and ostrich- Feeding standards and feeding, watering and rearing systems and procedure for different species of poultry- Breeding policies of egg and meat production in different species - Preparation of Project reports for different species for commercial exploitation.

**UNIT III**

Common diseases affecting poultry other than chicken and their control -Regulations for import and export of different species of poultry - prevention of exotic diseases through import of poultry products and live birds.

**Practical:**

Layout and design of housing & cages for other species of poultry. Visit to commercial Japanese quail, turkey and duck farms. Incubation and care of hatching eggs and young ones - Rearing practices followed by duck, quails and turkey farmers under field conditions. Preparing project reports for different species and calculating the cost of production.

**Learning Outcome:**

Students will get knowledge about care and management of different breeds, varieties of poultry other than chicken, methods of rearing and common diseases affecting them and their control measure.

**PSC 507**

**Poultry products technology and marketing**

**2+1**

**Objectives**

Composition and nutritive value of eggs and chicken meat, grading and preservation methods of eggs and meat, functional and value added poultry products, marketing of eggs and poultry meat.

## **Syllabus:**

### **Theory**

#### UNIT I

Physical and chemical composition and nutritive value of eggs and meat –Grading of eggs & meat by different standards –Preservation of eggs – Egg quality deterioration - Factors affecting egg quality – Handling, processing, packaging materials, packaging, transport and marketing of eggs.

#### UNIT II

Quality control of poultry meat – Quality preservation – Marketing of egg and poultry meat – Marketing channels – Integration in poultry processing and marketing-Functional and value added eggs and meat – Further processing of eggs and meat – Various egg and meat fast foods.

#### UNIT III

Sanitary and phyto sanitary measures to ensure food safety – Post oviposition value addition to the eggs & Post processing value addition to the meat for export– Production of low cholesterol eggs – Microbial safety of poultry products –Import and export of poultry products – Further processing of poultry for export –Implementation of GMP and HACCP procedures for food safety – Codex regulations for poultry products safety.

### **Practical:**

Measuring internal and external egg qualities – Preservation of table eggs, grading of eggs – Processing of chicken – Further processing of poultry – Preservation of poultry meat – Preparation of various eggs and poultry meat products and fast foods – Preservation, packaging and transport – Quality control of value added poultry products – Estimation of pesticides, antibiotics and mycotoxin residues in eggs and meat – Measures of microbial safety of poultry products for export.

### **Learning Outcome:**

Students will get knowledge about composition and nutritive value of eggs and chicken meat, grading and preservation methods of eggs and meat, functional and value added poultry products, marketing of eggs and poultry meat.

**PSC 508**

**Poultry economics, projects and marketing**

**2+1**

### **Objectives**

To study about measures of performance efficiency in poultry farms and its allied sector, components of project reports and preparation of viable projects related to poultry Industry.

## **Syllabus:**

### **Theory**



## UNIT I

Glossary of terms used in poultry economics & projects – Measures of performance efficiency in broiler, layer, breeder and other poultry species, hatcheries and other poultry related operations – Production standards and goals.

## UNIT II

Planning poultry enterprise –Bank norms for poultry projects – Poultry insurance – Methods to improve the production efficiency and reduce the production cost - Components of project reports and preparing projects.

## UNIT III

Integration in Poultry production – Marketing channels for eggs and meat –Integration in marketing of eggs and meat - Cost of production of egg, broiler, hatching egg, day-old chick, compounded feed - Effect of new economic policies on poultry industry – Viability of poultry projects.

### **Practical:**

Preparing different poultry projects for bank finance – Calculating the cost of production of various products under various systems-case study – Preparation of Balance sheet, break even points, benefit: cost ratio & other farm economic indices - Preparation of feasibility & viability reports.

### **Learning Outcome:**

Students will get knowledge about measures of performance efficiency in poultry farms and its allied sector, components of project reports and preparation of viable projects related to poultry Industry.

**PSC 509**

**Physiology of poultry production**

**2+1**

### **Objectives**

To study the basic principles of physiology of poultry production in relation to egg formation, production, incubation, stress and role of environment.

### **Syllabus:**

#### **Theory**

##### UNIT I

Skeletal system of poultry – Comb pattern, plumage - Physiology of poultry digestive system- Digestion, metabolism and absorption of feed and water – Role of enzymes – Poultry circulatory system – Respiratory system – Physiology of growth- muscle growth-bone growth and growth of body parts-Types of muscle fibre and functions.

## UNIT II

Poultry nervous system and its function - Excretory system - Male and female reproductive system-Reproductive tract-Semen production-semen characteristics; Artificial insemination-Semen extenders-reproductive tract-egg formation-egg laying pattern-photo periodic responses - Role of endocrine glands and their functions. Thermoregulatory mechanism - Stress due to adverse environmental factors -Acid -base balance - Poultry ethology.

## UNIT III

Neuro-endocrine control of egg production-Ovulation and Oviposition - Clutch and Pause.

**Practical:** Demonstration of various systems of birds - structure of feather- Identification of endocrine glands -hormones in poultry production and reproduction-Haematology of poultry species - SGOT, SGPT, free fatty acids - Morphology of Poultry spermatozoa.

### **Learning Outcome:**

Students will get knowledge about basic principles of physiology of poultry production in relation to egg formation, production, incubation, stress and role of environment.

**PSC 510**

**Diseases of poultry and flock health**

**2+1**

### **Objectives**

To study about common diseases and disorders of poultry, their diagnosis, vaccination, prevention & treatment, emphasis on control of emerging poultry diseases of zoonotic importance, disease diagnostic techniques.

### **Syllabus:**

#### **Theory**

##### UNIT I

The concepts of disease prevention in poultry - Emerging and reemerging avian diseases -Factors influencing immuno suppression and stimulation - Developing immunity in poultry

##### UNIT II

Water sanitation, hatchery sanitation procedures - Control of vertically transmissible diseases - non-infectious and metabolic diseases in poultry and their control - Bio security - Mycotoxins and their control.

##### UNIT III

Stress alleviation - prevention and control of bacterial and viral diseases in poultry - Biosecurity measures - Control measures of problematic re-emerging diseases of poultry like Ranikhet, Avian influenza, Marek's disease, Infectious bursal disease, Infectious Bronchitis, Infectious laryngo tracheitis.



**Theory:**

Antimicrobial agents-General principles of antimicrobial therapy, Sulfonamides, combination of sulphonamide with trimethoprim or ormethoprim, nitrofurantoin, beta lactam antibiotic, aminoglycoside, tetracyclines polypeptide antibiotic, fluoroquinolone, miscellaneous antibacterial –Isoniazid, Rifampin etc..., Antifungal agent, Anthelmintic antiprotozoal drug-Source ,Chemistry, Mechanism of action, toxicity and drug reaction, clinical application in poultry diseases.

**Practical:**

Relevant courses as stated above, field visit, diagnosis, trial of medicines, preventive and controlling of diseases

**PSC- 513 – Poultry diseases, pathological changes and diagnosis****2+1****Objectives:**

To study about poultry diseases, pathological changes and diagnosis

**Syllabus:****Theory****Bacterial diseases**

Infectious Coryza, Chronic respiratory diseases, Fowl cholera, Fowl typhoid, Fowl paratyphoid, Pullorum diseases, Staphylococcosis, Streptococcosis, Diseases due to Escherichia coli etc.

**Viral diseases:** Newcastle disease, Avian Influenza, Marek's disease, Gumboro disease, Avian pox, Avian infectious bronchitis, Infectious laryngotracheitis etc

**Fungal diseases-**Aspergillosis (Brooder pneumonia), Candidiasis, Mucormycosis, etc.

**Mycotoxigenesis-**Aflatoxicosis, Ochratoxicosis, Rubratoxicosis, Mouldy corn disease

**Parasitic disease-**Round worm, Cestodes, Trematodes, Ectoparasites, Protozoan disease

**Nutritional disease-**Protein, fat, vitamin, mineral deficiency, etc

**Miscellaneous diseases** –Heat stroke, Digestive system, respiratory system, reproductive system etc.

Common vices of poultry and their prevention-Cannibalism, Egg eating, Pica etc.

Managemental problems and tips for their prevention-Rainy season, Summer season, General managemental tips

**Disinfection**

**Common duck diseases and their control-**Viral diseases, Bacterial diseases, Fungal diseases, Protozoan diseases, Parasites, Vitamin and mineral deficiency.

**Practical :**

Diagnosis of diseases on the basis of symptom, Material required for post mortem examination, Post mortem examination, Collection of blood sample, Methods for Total leucocytic count,

Erythrocytic count, Histopathological diagnosis for poultry diseases, vaccines for poultry, Vaccination schedule

**PSC- 514**

**Poultry Medicine & Preventive measures**

**1+1**

**Objectives:**

To study about poultry medicine & Preventive measures

**Syllabus:**

**Theory:**

Application of chemotherapy, antibiotics and other medicine with mode of actions and results in Poultry production. Ethical uses of hormones & probiotics in poultry production. Residual effect of different medicines. Detail of preventive medicine & vaccines in poultry.

**Practical:**

Uses of different drugs and its effect. Application of preventive medicines and vaccines. Observation of the study. Farm visits & extension.

**PSC- 515**

**Poultry wastes management, integrated fish farming with poultry production, Bio-technological intervention and Environment**

**2+1**

**Objectives:**

To study about poultry wastes management, integrated fish farming with poultry production, Bio-technological intervention and Environment

**Syllabus:**

**Theory:**

Utility of poultry droppings in Agricultural crop husbandry including Fish production. Uses of poultry farm yard manure. Uses of poultry slaughter house refusals/ offal's in fish production. Applications of Bio-technology in Poultry production. Poultry farming and its effect in environment with remedial measures.

**Practical:**

Studies of different types of poultry wastes and their uses through manure in Agricultural crops, fish production etc. Visits of modern Farm and poultry.