Faculty of Agriculture
P.K. University
Shivpuri (M.P.)

Evaluation Scheme & Syllabus
M.Sc. (Ag) Seed Technology

Name of Programme: M.Sc. (Ag.) Seed Technology

Academic eligibility for admission: - B.Sc. Ag.

Semester	Course Code & No.	Course Title	Credit Hrs.	Mid Exam	Final Exam		Total
					Theory	Practical	
I st Sem	STY-6371	Seed Development and Morphology	3 (2+1)	30	70	50	150
	STY-6372	Principles of Seed Production in Agricultural Crops	3 (2+1)	30	70	50	150
	STY-6373	Seed Production in Vegetables, Fruits, Flowers, Forage and Fodder Crops	3 (2+1)	30	70	50	150
	AST-6374	Statistical Methods	3 (2+1)	30	70	50	150
		Total	**12**				**600**
II nd Sem	STY-6375	Seed Processing	3 (2+1)	30	70	50	150
	STY-6376	Seed Storage and Viability	3(2+1)	30	70	50	150
	STY-6377	Seed germination and Vigour	3 (2+1)	30	70	50	150
	AST-6378	Design of Experiments	3(2+1)	30	70	50	150
		Total	**12**				**600**
III rd Sem	STY-7371	Seed Testing	3(2+1)	30	70	50	150
	STY-7372	Seed Certification and Quality Control	3(2+1)	30	70	50	150
	STY-7373	Seed Pathology	3(2+1)	30	70	50	150
	STY-7374	Seed Entomology	3(2+1)	30	70	50	150
		Total	**12**				**600**
IV th Sem	STY-7375	Economics of Seed production and Marketing	3(2+1)	30	70	50	150
	STY-7376	Seed Production in Medicinal and Aromatic Plants	3(2+1)	30	70	50	150
	STY-599	Seminar	1	Satisfactory/Unsatisfactory			
	Optional (any one from two)						
	STY-7377	Hybrid Seed Production	12(9+3)	30	70	50	150
	or						
	STY-598	Thesis Research	12	40 % Internal +60% External)			150
		Total	**19**				**450**
		Grand Total	**55**				**2250**

Ist Semester

STY –6371. SEED DEVELOPMENT & MORPHOLOGY

Flower type, Flower Structure in relation to seed development. Pollination mechanism and control of pollination. (Seed development, Sporogenesis, Fertilization, Embryogenesis and Seed Formation) in a typical monocot and typical dicot crops. Different type of embryo, endosperm and cotyledons, development and structure in representative crop plants with reference to food storage. Parthenogenesis, Parthenocarphy, Apomixes Classification, Significance and its utilization in different crops for hybrid seed productions. Seed coat structure, significations mechanical strength and permeability, Seed maturation. Harvest maturity, Influence of season, climate, nutrition's and other cultural management practices on development and maturation of seeds, occurrence of hard seed and seed dormancy etc.Means of achieving uniformity in development and maturation. Seed morphology of important plants and their identification.

Practical: Study of Floral biology of monocot and dicot. Pollen morphology. Monocot and dicot embryos. Variability in seed development, seed maturation and chemical composition of seeds. Seed identifications. Seed coat structure, Seed dormancy etc.

STY – 6372. Principles of Seed Production in Agricultural Crops.

Seed industry development. Classification of crop plant in relation to mode of reproduction, variety, definition, type, development and release system and notification. Objective of seed productions, Generation System. Factor affecting of seed productions, site selection, isolation and rouging, compact area approach. Variety maintenance, nucleus/breeder, foundation and certified seed production in different crops. Hybrid seed production, heterosis; inbreeding depression, genetic, physiological and biochemical basis of heterosis. Two and three line system of hybrid seed production. Development of A, B, and R lines. Male sterility, its kind and use in hybrid seed production. Self-incompability its genesis and use in hybrid seed production. Causes of seed deterioration. Seed production planning, method of production, processing and storing in rice, wheat, maize, sorghum, pearl millet, barley, red gram, gram, green gram, cowpea, pea, soybean, groundnut, mustard, sunflower, linseed, cotton.

Practical: Seed production planning in different crops with special reference to land and isolation requirement, Roguing harvesting and threshing. Nucleus, breeder, foundation and certified seed production in crops like rice, wheat, maize, sorghum, pearl millet, barley, red gram, chickpea, green gram, cowpea, pea, soybean, groundnut, mustard, sunflower, linseed, cotton. Hand emasculation and pollination for hybrid seed production.

STY –6373. Seed Production in vegetable, fruit, flowering, forage and fodder crops.

Principles and methods of production, harvesting, processing and storage of seed in tomato, chilli, brinjal, bhindi, bean, amaranthus radish onion, cabbage, cauliflower, knolkhol, turnip, carrot, beetooots, potato and coriander. Improved varieties and their identification papaya and popular ornamental plants. Reproduction in pasture and forage grasses and legumes. Seeds and clonal propagation perinial, biennial and annual legumes and grasses varietal identification, maintenance of genetic purity. Genetic shifts in generation of multiplication, isolation requirements, pollination control and development of superior pollinators. Selection-and .seed production areas. Influence of season, cultural treatment and management practices. Pollination and seed setting, seed shattering, chemical top killing. Stage of harvesting and processing. Seed treatment, natural reseedling. Post harvest management of field.

Practical: Nursery requirement of different vegetables and flower crops. Seedling age for transplanting. Floral structure and seed identification. Hand emasculation and pollination for hybrid seed production

IInd Semester

STY- 6375: Seed Processing

Introduction and importance of seed processing. Machine used in seed processing their construction, method of operation, control, precautions and maintenance. Different method of seed drying, including dehumidification and its impact on seed quality. Relative humidity and equilibrium moisture content of seed. Preparing seed for processing; scalper debearder, scarifier, hullar, seed cleaner and grader, screen cleaner, specific gravity separators, indented cylinder, separator, velvet separator, spiral separator, disc separator, colour sorter, seed treatment-methods of seed treatments, seed treating compounds, seed disinfestation. Packaging; principles and practices and materials. Processing plant design and layout.

Practical: Visit to seed processing plant. Operation and handling of mechanical drying equipments. Seed processing equipments. Seed treating equipments. Seed extraction. Seed quality upgradation. Seed blending.

STY – 6376: Seed Storage and Viability

Seed storage; importance and factors affecting it. Physiological, biochemical and cytological changes in seed during storage. Causes of seed deterioration. Concepts and significance of moisture equilibrium, methods of maintaining safe seed moisture content. Thumb rule and its relevance, loss of viability in important Agriculture and horticulture crops, viability equation and monograph. Methods to .minimize the loss of seed vigour and viability. Storage losses due to pests. Factors influencing storage losses. Fumigation and its effect on seed viability. Storage structure, storage methods and godown sanitation . Storage pest and their control.

Practical: Effect of temperature, moisture and length of storage on seed viability. Accelerated aging test. Visit to processing and storage plants.

STY – 6377 : Seed Germination and Vigour

Germination requirements in Agriculture and Horticulture crop seed. Factors affecting seed germination and role of the different type of seed in germination. Biochemical changes during germination. Role of promoters and inhibitors. Effect of age, size and position of seed on germination. Seed dormancy - types, mechanism, endogenous and exogenous factors affecting dormancy. Seed vigour and its concept, factor affecting seed vigour, physiological and gentical basis of seed vigour, vigour test, seed vigour and crop performance and yield Chemical compositions and structural architecture of the bio -membranes and its impact on seed germination and viability.

Practical: Germination metabolism. Methods for breaking and including dormancy in various crops species. Determination of seed vigour. Accelerated aging test, activity of enzymes, respiratory rates, quantitative tetrazolium test, position, weight and size of seed in relation to germination.

IIIrd Semester

STY – 7371: Seed Testing

National and international history of seed testing. Seed testing network in India. National and international seed testing rules. Seed testing organizations. Seed sampling, heterogeneity test. Sample receipt and registration. Physical purity analysis. Determination of other seeds by number and determination of other distinguishable for different crops, seedling evaluation. Moisture test. Tetrazolium test - principles, procedure and evaluation. Testing for coated / pelleted seeds. Testing for varietal verification, grow-out test. Seed health. Insect damage, reporting of seed testing results, factors affecting variability, use of tolerance tables in seed testing. Sequential sampling analysis. Seed dormancy, type and methods to break it. Weed seed identification preservation and storage of guard samples.

Practical: Step in seed testing; sampling, entry in records, dividing and mixing, purity analysis, test weight. Identification of weed and crop seeds, moisture estimation, germination test, quick viability test (Tetrazolium test). Accelerated ageing test, use of tolerance tables. Maintenance and handling of seed testing equipements. Maintenance and handling of seed testing results and its communication.

STY – 7372 : Seed Certification and Quality Control

History of seed certification and quality control. Importance of good quality seeds. Seed quality standards - definition and concept. Concept, purpose and phases of seed certification, Certification agency. Variety eligibility, classes and sources of seed, verification of seed sources. Unit of certification, field inspection and reporting of results, isolation distance, comparing field observations with minimum standards, grow out test, tolerance levels. Seed analyst and his duties. Laboratory evaluation and packaging, seed lot size and construction of seed lot numbers, certified seed level, certification tag, validity period of certification, seeds Act and seeds rules and law enforcement. Seed control order. Seed policy. Seed inspectors - powers and duties, inspection procedures and equipment required. Role of "Quality Control" for import and export of seeds.

Practical: Field inspection at various stages. - taking field counts in different crops. Off types, pollen shedders designated seed born diseases. Writing reports of field inspections for different crops.

STY – 7373 : Seed Pathology

Introduction, history and importance of seed pathology. Seed structure and development in relation to infection and infestations. Mechanism of seed infection, factors affecting seed infection. Seed transmission and factor affecting seed transmission of pathogens. Deterioration of seed by storage fungi. Detection and control of seed borne pathogens. Seed treatment, seed certification and plant quarantine for pathogens.

Practical: Techniques of seed health testing - visual examination of seeds, washing test, incubation methods, embryo count method, seed soak method for the detection of certain seed borne pathogens. Methods of seed treatment.

STY – 7374: Seed Entomology

Principles of seed entomology. Study of major insect, pests of principal crops for seed production. Various methods of insect pest control. Different pesticides and their_ handling. Management of storage insect pest, mites and rodents. Fumigation dusting, spraying and Their use. Types of storage structures - domestic and commercial.

Practical: Identification and collection of important storage grain pest. Knowledge about the fumigation and various type of tools for dusting ands spraying insecticides. Storage structure and damage material. Practical record and viva voce.

IVth Semester

STY – 7375: Economics of seed production and marketing

This course is primarily designed to consent, the student with the enterprise of the seed production and its marketing. The main areas covered are principles of seed production and principles of farm management. Importance and scope of seed industries. Demand and production of seeds, cost of production and returns. Financial requirement. Pricing and price policies. Market structure, marketing organization, marketing channels, marketing margins, analysis the problem of marketing. The agencies responsible for determining the rate of quality seed.

Practical: Farm planning and budgeting, record keeping cost analysis.

STY-7376 Seed Production of MAP's

Seed Production , package and practices for Medicinal plants: arpgandha, poppy, sadabahar, digitalis, dioscorea, solanum, brahmi, isabgol, senna, aloe, neem, chincona, Aromatic plants: Essentisl Oils: Mints (Menthol mint, pepper mint, spearmint, bergamot mint). Aromatic grasses (lemon grass, palmarosa, citronella, vetiver) Ocimum, geranium, dill (Sowa), cinamom, , Flower perfume: Lavander, rose, rosemerry, jasmine.

Practical: Package & Practices of seed production and processing of medicinal and aromatic plants.

STY – 7377 Hybrid seed Production

Heterosis: definition, expression and estimation of hybrid vigour; utilization of heterosis in agricultural, horticultural and other crop plants for crop improvement. Pre requisites for hybrid seed production; mechanisms and management of pollination in autogamous and allogamous crops; genetic constitution of varieties, hybrids and basic principles in seed production. Techniques of hybrid seed production - emasculation and crossing: use of self-incompatibility, modification of sex; types of male sterility and exploitation in hybrid development and its use in hybrid seed production; development and maintenance of A, B and R lines. Fertility restoration; use of chemical hybridizing agents, problems of non synchrony in flowering of parental lines and methods to overcome; planting ratios and population density in relation to hybrid seed yield; salient features of hybrid seed production of various crops viz., rice, sorghum, bajra, maize, sunflower, cotton and other major vegetables.

Practical: Methods of hybrid seed production in major agricultural and horticultural crops; planting of rows/blocks of parental lines and manipulations for achieving flowering synchrony for production of hybrid seeds, maintenance of A, B and R lines and production of breeder seed; stable iagnostic characteristics of parental lines and their hybrids; genetic purity tests determination of cost of hybrid seed production of various crops; visit to seed production plots etc.