NANDINI NAGAR P.G. COLLEGE

NAWABGANJ, GONDA (U.P.)

PROSPECTUS

M.Sc. (Ag.) Genetics & Plant Breeding

2013-2014

AFFILIATED TO

Dr. R.M.L. AVADH UNIVERSITY,
FAIZABAD

HOD G/PB

Principal
Nandini Nagar P.G. College
Nawabganj-Gonda (U.P.)

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Ordinance Governing for M.Sc. (Ag.) Genetics & Plant Breeding

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ADMISSION RULE

1- The Course leading to the Master of Science in Agriculture (Genetics & Plant breeding) degree shall extended over two academic years.

2- For eligibility to enter the Master of Science in Agriculture (Genetics & Plant breeding) course a candidate must have passed the B.Sc. (Ag.) / B.Sc. (Bio.) Examination or equivalent examination with 45% marks from any recognized university.

3- Not more than 40 candidates be admitted provided the qualify as per university rules.

4- This course will be completed in to two year, the detail of different papers studies are as follows-

A- M.Sc. (Ag.) Genetics & Plant breeding Part-I (Previous year)

Paper-I	:-	Principles of Genetics
Paper-II	:-	Principles of Cytogenetic
Paper-III	:-	Genetic Engineering and Biotechnology
Paper-IV	:-	Heterosis Breeding
Paper-V	:-	Statistics

B- M.Sc. (Ag.) G.P.B. Part-II (Final year)

Paper-I	:-	Principles of Plant breeding
Paper-II	:-	Methods of Plant breeding
Paper-III	:-	Improvement of Field crops
Paper-IV	:-	Special paper
		Seed Production, Testing and Certification.

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EXAMINATION RULE

1- The Examination for the degree shall consist of two part.

(i) M.Sc. (Ag.) :- G.P.B. Part-I

(ii) M.Sc. (Ag.) :- G.P.B. Part-II

2- Candidate will take M.Sc. (Ag.) Part-I (Previous year) Examination at the first year of the course & M.Sc. (Ag.) Part-II (Final year) at the end of second year of the course.

3- A candidate shall be eligible for appearing at the part-I Examination for the M.Sc. (Ag.) (G.P.B.) degree, If he / she has passed B.Sc. (Ag.) / B.Sc. (Bio) or equivalent examination.

(a) Being selected on the basis of Admission Test-I prevailing in the year when admission is sought in the college.

(b) There should be minimum of 75% attendance in the theory & practical classes separately.

4- A candidate who after passing M.Sc. (Ag.) G.P.B. Part-I exam has completed regular course of studies for one academic year and has put in a minimum of 75% attendance in theory & practical separately shall be eligible for appearing in part-II examination for the M.Sc. (Ag.) (G.P.B.).

5- There shall be annul examination at the end of each year and candidate will have to pass separately in part-I (Previous year) and part-II (Final year examination) (Separately theory & Practical).

6- Candidates who will not complete 75% attendance in theory & Practical separately will not be allowed to appear in the final examination.

7- The result of examination shall be given separately in the marks sheets for each year under two heads (Part-A theory & Part-B Practical).

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8- The degree will includes the division on the basis of Aggregate marks obtained in M.Sc. (Ag.) G.P.B. the Part-I & II all the part i.e.

A) Theory B) Practical

To Pass in theory papers in each of part-I & II Examination the candidates must have secure at least 36% marks in theory and Practical separately.

9- The shall be one special papers viz. Seed production, Testing and Certification or Project/Thesis.

10- The candidates 'are permitted to write their answer in Hindi / English Medium.

11- If candidate is failed in a theory paper by getting less than pass marks, he will be declared successful by giving maximum 8% marks as grace.

12- In M.Sc. (Ag.) G.P.B. Part-I & II the candidate must obtain 36% marks in a part-A theory & Practical separately shall be declared Successful. The unsuccessful candidate shall be permitted to avail the facilities of re-examination in one theory papers under marks / division improvement.

13- A candidate must complete the course of study for the degree of Master of Science in (Ag.) (G.P.B.) and pass the final year examination within a total period of four years commencing from his / her first admission in the M.Sc. (Ag.) (G.P.B.).

14- The division shall be assigned to the successful candidates on the following basis. Third division 36% and above but below 48% of the aggregate marks. Second division 48% and above but below 60% of the aggregate marks. First division 60% and above the aggregate marks distinction 75% or above.

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A student securing 75% or above in any paper shall be declared to have obtained distinction in that provided he / she passed in all the papers in first attempt and this fact shall be mentioned in the degree. Distinction obtained in any theory papers shall be mentioned in the degree awarded to the candidates.

The marks of the part-I and part-II examination of theory & practical respectively M.Sc. (Ag.) (G.P.B.) will count to gather for a place on the basis of pass list for determination of division.

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SCHEME OF EXAMINATION
FOR
M.SC. (AG.) GENETICS & PLANT BREEDING
PART-I (PREVIOUS YEAR)

Part-A Theory	Papers Name	Max. Marks	Min. Pass Marks
Paper-I	Principles of Genetics	50	18
Paper-II	Principles of Cytogenetic	50	18
Paper-III	Genetic Engineering and Biotechnology	50	18
Paper-IV	Heterosis Breeding	50	18
Paper-V	Statistics	50	18
Total		250	90

Part-B Practical	Max. Marks	Min. Pass Marks
Combined Practical Based on Theory paper-I, II, III, IV & V.	250	90
Total	250	90

Particular	Max. Marks	Min. Pass Marks
Part-A – Theory	250	90
Part-B – Practical	250	90
Grand Total	500	180

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SCHEME OF EXAMINATION
FOR
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PART-II (FINAL YEAR)

Part-A Theory	Papers Name	Max. Marks	Min. Pass Marks
Paper-I	Principles of Plant breeding	50	18
Paper-II	Methods of Plant breeding	50	18
Paper-III	Improvement of Field crops	50	18
Paper-IV	Special paper- Seed Production, Testing and Certification or Project/Thesis	50	18
Total		200	72

	Part-B Practical	Max. Marks	Min. Pass Marks
(a)	Combined Practical Based on Theory Paper-I, II , III & IV	200	72
(b)	Viva-Voce and Tour	100	36
	Total	300	108

Particular	Max. Marks	Min. Pass Marks
Part-A – Theory	200	72
Part-B – Practical	300	108
Grand Total	500	180

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SYLLABUS

M.SC. (AG.) PART-I
GENETICS & PLANT BREEDING

Paper-I - Principles of Genetics

Historical perspective on Genetics; Mendelian principles; Gene interactions; Linkage detection and estimation in various organisms Multiple alleles; Mechanisms of sex determination; Sex-linked, sex-influenced and sex-limited traits; Intergenic and intragenic complementation and recombination, complex loci, fine structure analysis of gene; Mutations; induction; detection and mechanisms; Environmental influence on gene expression; Extra nuclear inheritance; Polygenic inheritance; vectors, genetic transformation and genomics introduction to other branches of Genetics.

Paper-II - Principles of Cytogenetic

History of Cytogenetic, Chromosome Structure; prokaryotes and eukaryotes, function and replication. Karyotype analysis, and fine structure: Different forms of chromosomes and their functions significance. Lamp brush chromosomes, Polygene chromosomes, B chromosomes, Sex- chromosomes, Artificial chromosomes. Cell division; Mitotic cell cycle, chromosomes cycle and chromosome movement; behavior of chromosomes during meiosis, and its significance, mechanisms and theories of crossing over, recombination models, cytological basis and role of synaptonemal complex. Structural variation in chromosomes: their cytological consequences, gene mapping and other uses-deficiencies, duplication, inversions and interchanges. Numerical variation in chromosomes: Sources and son sequences; euploidy and aneuploidy-classification, cytogenetics, segregation. Evolutionary significance and use in basic and applied research. Synthesis of natural and new polyploids, haplonitc-diplontic barriers and means to overcome them, chromosomes in evolution.

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Paper-III – Genetic Engineering and Biotechnology

Introduction to Plant Genetic Engineering and Biotechnology, gene identification, gene isolation, synthesis and gene cloning, Restriction enzymes and vectors, Regeneration in crop Plants. Gene transfer systems-vector mediated gene transfer, microinjection, electroporation, direct DNA uptake, gene gun technique, Selectable markers and reporter system. Application of Plant Genetic 'Engineering and biotechnology-Transgenic crops-application of recombinant DNA technology-current status and future prospects. Regulation mechanism for genetically modified crops. Biosafety issues of transgenic crops, Molecular Breeding- morphological, biochemical and DNA based markers (RFLP, RAPD, AFLP, SSLP etc.); Mapping populations (F2s, backcrosses, RILs, NILs, and DHs). Molecular mapping and tagging of agronomically important traits. QTLs analysis in crop plants. Marker assisted selection for qualitative and quantitative traits. Gene pyramiding. Biotechnology application in male sterility/hybrid breeding, Embryo rescues, hybridization and double haploids, Biotechnology in PGR management.

Paper-IV – Heterosis Breeding

Introduction-historical aspects; Development of heterosis concept, genetic, physiological and molecular basis of heterosis; Inbreeding depression; Hybrid breeding methodology-development and improvement of heterotic pool, and inbred lines, evaluation of inbred lines and hybrids, nature and number of testers, combining ability and performance per se, prediction of hybrid performance, BLUP, genetic diversity and heterosis, genotype & environment interaction and heterosis. Male sterility systems (cytoplasmic, genetic, cytoplasmic-genetic, EGMS, gametocid induced and genetically engineered male sterility) origin, development, maintenance and

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exploitation in hybrid breeding; application of biotechnology in heterosis breeding molecular markers, doubled haploids, somatic hybridization; Current status and future prospects of hybrid breeding in selected crops (rice, wheat, mustard, sunflower, cotton, pearl millet, sorghum, maize, castor and vegetable crops).

Paper V – Statistics

Measures of central tendency mean, median, mode, variance, coefficient of variation.

Correlation-Meaning of correlation, type of correlation, Karl Pearson and Limits of Correlation.

Test of significance-Test of significance base of T.Test, Z-Test and F-Test.

Analaysis of Variance-General and basic principles of experimental design specially CRD, RBD, SPD and LSD.

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SYLLABUS

M.SC. (AG.) PART-II
GENETICS & PLANT BREEDING

Paper-I – Principles of Plant Breeding

Introduction to plant breeding-history, objectives, achievements in the pre-Mendelian era, Post-Mendelian plant breeding, potential and opportunities. Introduction domestication and acclimatization, patterns of evolution in crop plants, centers of origin, gene pool concept-primary, secondary and tertiary gene pool, and gene introgression. Modes of reproduction in plants-asexual and sexual reproduction, self-and-cross-pollination mechanisms, male-sterility and self-incompatibility. Mating systems-genotypic and phenotypic assortative and dis-assortative mating and their genetic consequences. Genetic consequences of self and cross-fertilization. Heterosis and inbreeding depression – concepts and theories, genetic basis of plant breeding; principles of mutation breeding, polyploidy and distant hybridization in plant breeding Mechanisms and genetic basis of resistance / tolerance to biotic and a biotic stresses.

Paper-II – Methods of Plant Breeding

Plant genetic resources: importance of plant genetic resources, collection, evaluation and conservation of germplasm. Methods of breeding self-pollinated, cross-pollinated and asexually propagated crops, pure line and mass selection; pedigree selection, bulk method and modification of these methods; hybrid breeding, populations and population improvement, intra and inter population improvement; clonal selection. Mutation breeding, use of polyploidy and distant hybridization in plant breeding. Application of biotechnology to plant breeding-embryo rescue, somaclonal variation, double haploidy, protoplast fusion, transgenics, molecular plant breeding, biosafety issues involved with genetically modified organisms. Release and registration of new varieties, quality seed-classes, production practices and maintenance of pure seed, seed purity standards, UPOV convention and convention on biodiversity.

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Paper-III – Improvement of Field Crops

Eminent Plant Breeders and their achievements; Economic importance of crop, origin and related species, crop genetic respources, inter-relationships and genetics of economic characters and their components, breeding approaches and specific breeding techniques, limitations, achievement, and present status of crop improvement work in respect of crops like cereals (wheat, rice, barley, maize, sorghum and millets); pulses (gram, pea, lentil, pigeon pea, urd and mung bean); oilseeds (groundnut, Brassicas, soybean, linseed, sesame, sunflower), fibre crops (cotton, jute); forage crops (oat, berseem); National and International institutes for crop improvement.

Paper-IV – Seed Production, Testing and Certification

History and importance of seed technology, classes of seeds, characteristics of quality seed, general techniques of seed production in important agricultural and vegetable crops;

Cereals - Wheat, Rice, Barley

Millets - Maize, Sorghum, Bajra

Pulses - Chickpea, Pigeonpea, field pea, urd, bean mung bean and lentil

Oilseeds - Rapeseed, mustard, groundnut, sunflower

Vegetable crops – Cole crops, root crop, solanaceous and cucurbitaceous crops.

Seed testing and its importance, seed testing procedures (purity analysis, moisture testing, germination, viability and vigour testing) and seed health testing.

History of seed certification, seed Acts and seed rules, seed certification-purpose, organization and functions, standards for different classes of seeds. Isolation, post-harvest inspection and procedure, sampling, role of central and state seed testing labs in seed quality control.

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