DEPARTMENT OF SEED SCIENCE AND TECHNOLOGY UNIT

Seed Science and Technology Unit consists of four collaborative academic departments of the university. The departments are Department of Agronomy, Department of Genetics and Plant Breeding, Department of Horticulture and Department of Plant Pathology. The Unit offers graduate programs leading to M.S. and Ph. D. degrees. Field and laboratory facilities are available in the Unit for research in different aspects of seed science and technology.

Faculty of the Unit: Dr. Md. Golam Rasul, Professor and Coordinator, Dr. M. Abdul Karim, Professor; Dr. M. Moynul Haque, Professor; Dr. Md. Abu Ashraf Khan, Professor.

Adjunct Faculty: Dr. M. N. Huda, Former Consultant, SID/DANIDA, MoA; Dr. M. Shafiqul Aktar, Head of Agriculture, Krishibid Seed Ltd., Dr. Rina Rani Saha, CSO, Agronomy Division, BARI.

COURSES

Irrespective of the departments that offer courses which prefixed with SST form the major courses of the Unit.

SST/AGR 501 Principles of Crop Production (3 Cr.): Scenario of food security in Bangladesh; Sustainable Development Goals (SDG) & future roadmap of Bangladesh Agriculture; Agricultural statistics- resource constraints and utilization; yield gap; domain of agronomy; organization of plants; plant genetic resource and genetic diversity; plant environment; soil physical constraints to crop production; soil and climate change drivers relationships; yield components and determining crop yield; radiation effects on plants & economics of gas exchange; improving photosynthesis & designing cereal ide types; abiotic stress management of crops; biodiversity in relation to climate change and food security; agronomic research vision.

SST/PLP 506 Seed Pathology (3 Cr): Studies on seed-borne diseases and their etiology, transmission of seed-borne pathogens, epidemiology and control. Introduction to seed certification, seed quarantine and production of healthy seed. Field observation and collection are also required. Laboratory sessions deal with methods in seed pathology.

SST 510 Seed Technology Functions (3 Cr.): Variety development: definition, characteristics, importance of variety; activities in variety development; principles of variety development of self, cross and clonal crops; variety evaluation and release. Seed production: genetic and agronomic principles; methods of seed production. Seed processing and preservation: cleaning, drying and storing; treating and packing. Quality control: seed legislation and seed law enforcement; seed testing and certification. Seed marketing: marketing plan, elements of seed marketing, seed distribution systems; marketing channel; seed sale, seed dealers; extension and promotional activities of seed marketing.

SST/GPB 521 Plant Breeding (3 Cr.): Introduction of plant breeding, origin crop plants, distribution and domestication under natural selection, mode of reproduction and their significance in plant breeding. Genetic basis of plant breeding, germplasm- collection, evaluation, maintenance and utilization, plant breeding methods- introduction, selection and hybridization, handling of the segregating population, selection and its genetic basis, pollination controlling mechanisms and their signification: self-incompatibility, male sterility. Mutation, polyploidy and Apomictic breeding.

SST/AGR 525 Principles of Seed Science and Technology (3 Cr.): origin, evolution, ecology and physiology of seed development; morphology, chemical composition and seed quality; seed dormancy: biological significance, dormancy, types and implication; seed quality: genetic, physical, physiological and pathological quality; seed moisture: isotherm relationship, seed moisture test; pure seed definition, purity test; seed viability, estimation; germination test, physiology of seed germination; seed and seedling vigor, stimulation, estimation; germination under stress conditions; hardseededness, seed priming; seed health; seed quality control during production, processing and storing; hybrid seed production; custom seed production; seed deterioration, physiology of seed deterioration; seed certification; seed legislation; seed marketing.

SST 530 Methods in Seed Technology (3 Cr.): Operation and maintenance of laboratory equipments. Field inspection: observation during inspection, taking field counts from thickly sown row crops, medium spaced row crops, wide spaced row crops, broadcast seeded crops. Control plot test. Seed processing: cleaning, drying, treating, packing. Seed testing: sampling, purity analysis, determination of other species by number, germination test, biochemical tests for viability. Seed health testing. Verification of species and cultivar. Determination of seed moisture content; issuing certificate. Tolerance in seed testing.

SST 596 Reading and Conference (Credit to be arranged but not more than 3 Cr.): Special study assigned by the Major Professor on the recommendation of the Advisory Committee and/or interest of the student.

SST 597 Special Problems (Credit to be arranged but not more than 3 Cr.): Investigation of special problems in seed technology not related to a thesis problem. The investigations may consists of original research and / or literature survey.

SST 598 Seminar (1 Cr.): Discussion on assigned topics.

SST 599 Thesis Research (Credit to be arranged but not less than 12 Cr.): Original thesis research.

SST 612 Seed Biotechnology (3 Cr.): Introduction, biotechnology in seed conservation; problems encountered in genetic conservation. Cryopreservation of seed, plant materials and callus. Cellular and molecular gene bank. Incompatibility and other genetic barriers for seed; over coming of incompatibility barriers. Anther and pollen culture, embryo culture, protoplast fusion, in-vitro flowering and seed production. Genetic purity of seed and clone; factors affecting genetic purity of seed; application of marker protein, RFLP and RAPD in genetic purity of seed.

SST/GPB 615 Plant Genetic Resources (3 Cr.): Evolution of crop plants, center of origin and diversity, genetic erosion ; importance of germplasm in plant breeding; systematic approaches of exploration, collection, storage, characterization, evaluation and utilization of germplasm; genetic resources, quarantine regulation for exchanging plant genetic resources, cryopreservation, evaluation and characterization of germplasm, documentation, utilization of germplasm, encapsulation for transportation of germplasm; seed laws, seed production, processing, marketing and quality control.

SST/HRT 631 Vegetable Seed Technology (3 Cr.): Status and scope of vegetable seed production of Bangladesh; principles of vegetable seed production; pro¬cess¬ing and storage; seed production technology of major vegetable crops; seed certification and seed legislation.

SST/AGR 640 Seed Production of Field Crops (3 Cr.): Agro-ecological and climatic considerations; types of seed production; classes of seed production. Inputs and equipment requirements, cost analysis in seed production. Seed production planning; environmental and management factors influencing seed yield and quality; principles of seed production. Methods of seed production: land selection, crop alteration, isolation, land preparation, spacing, planting, nutrition, irrigation, weed control, rouging, fertilization control, plant protection, field inspection, maturation and seed harvesting, Seed production technology of cereals, pulses, oilseeds, jute and sugarcane.

SST 645 Seed Technology Around the World (3 Cr.): Historical development and present status of seed system in agriculturally developed countries such as Australia, China, European Union, India, Indonesia, Japan, Korea, Pakistan, Taiwan, Thailand and USA. Studies on seed and seed related organizations such as AOSA, AOSCA, APSA, FAO, FIS, ICRISAT, ICARDA, IPPGR, IRRI, ISTA. International seed regulation, seed trade, trade organizations such as GATT and WTO. Seed sector development in Bangladesh.

SST 650 Seed Enterprise Development and Management (3 Cr.): Introduction, traditional and organized seed sector, evolution of seed program, government service sector, commercial enterprises. Policies for enterprise development: general considerations, development of seed policy, essential pre-requisites, enterprise development resource institutions. Seed enterprise management: objectives, organizational structure, management steps. Seed supply: production targets, organizing seed production, contract growing. Seed marketing: organization,

plan, procedures, seed pricing, promotion and publicity. Management of accounts and finance: analysis, establishing accounting system, record keeping, profit and loss, balance sheet. Credit and banks: credit requirement, bank credit, calculating financial requirement, approaching bank, banking policy and financing. Legislation.

SST/GPB 655 Heterosis Breeding and Hybrid Seed Technology (3 Cr.): Heterosis- an introduction; history of heterosis breeding; heterosis and inbreeding depression, basis of heterosis, genetic diversity, combining ability and heterosis; estimation of the extent of heterosis; mode of pollination and methods of reproduction in crop plants in relation to hybrid breeding: factors influencing hybrid breeding; factors influencing hybrid seed production; use of self- incompatibility and male sterility for hybrid seed production; synthetic and composite varieties- a way for partial utilization of heterosis; population improvement in hybrid varieties; exploitation of heterosis in cereals, vegetables, fruits and ornamentals; heterosis breeding- present and future. (prerequisite GPB 521).

SST 660 Seed Quality Assurance (3 Cr.): Management: quality policy, staff training, handling of ISTA rules and regulation, scope of ISTA accreditation, preparing procedures and instructions for seed quality test, purchase of equipments, chemicals and other materials that ensure quality test; handling of non conformity, internal audit and management review. Calibration and handling of equipments, control and maintenance of equipments, maintaining logbook, checking of results, house keeping, preservation of records, handing of visitors, protection against claims. Working instructions: Identification of seed lot, collection and handling of seed samples, preservation of samples, moisture determination, dividing of samples, weighing, calculation, purity analysis, germination test, seed health test, proficiency test.

SST/GPB 665 Maintenance Breeding and Breeder's Seed Production (3 Cr.): Steps in breeding, release and multiplication of varieties, production of Breeder's and foundation seed: its procedure, seed certification, genetic purity: its concept and importance in seed production, life span of varieties and factors responsible for other deterioration and shift in their genetic makeup, prevalence of natural crossing in crop plants, isolation requirement for seed production, maintenance of existing varieties and component lines of hybrid varieties.

SST 670 Seed Storage and Preservation (3 Cr.): Introduction, purpose, significance. Decline in seed viability, death, theories regarding seed deterioration. Factors affecting storage life: moisture content, pre-harvest effect, seed structure, seed composition, maturity, size, dormancy, vigor, mechanical damage, genetic effect, hardseededness and others. Storage environment and seed longevity: temperature, relative humidity; inter relationship among storage factors; light, heating, respiration and use of chemicals. Physiological and biochemical changes during seed deterioration; micro-flora and seed deterioration. Methods of seed preservation: seed storage structure, controlling temperature and relative humidity. Monitoring seed storage environment and seed conditions. Seed care in transit.

SST 696 Reading and Conference (Credit to be arranged but not more than 3 Cr.): Special study assigned by the Major Professor on the recommendation of the Advisory Committee and/or interest of the student.

SST 697 Special Problems (Credit to be arranged but not more than 3 Cr.): Investigation of special problems in Seed Technology not related to a thesis problem as assigned by the Major Professor to be taken once in the program period but not more than 2 units at a time. The investigations may consists of original research and/or literature survey.

SST 698 Seminar (2 Cr. Not more than 1 Cr. per term): Discussion on assigned topics.

SST 699 Dissertation Research (Credit to be arranged but not less than 30 Cr.): Original dissertation research.

Note: Students having GPA below 3.00 will not be allowed to enroll SST 596, SST 597, SST 696 or SST 697 until he/she raised the GPA to 3.00 or above.

Table 1. Minimum course and research requirement For MS degree[1]

A. Major Courses	Credit	Minor Courses	Credit
1a. Core	12	2a. Core	6
SST/ PLP 506 Seed Pathology	3	ENT 530 Seed Entomology	3
SST 510 Seed Technology Functions	3	STT 510 Design of Experiments	3
SST/AGR 525 Principles of Seed Science & Technology	3		
SST 530 Methods in Seed Technology	3		
1b. Elective	6	**2b. Elective**	6
SST/AGR 501 Principles of Crop Production	3	AEC 540 Agricultural Development	3
SST/GPB 521 Plant Breeding	3	AER 501 Agricultural Extension & Communication	3
SST 612 Seed Biotechnology	3	CBT 503 Plant Physiology I	3
SST/HRT 631 Vegetable Seed Technology	3	CBT 541 Plant Biochemistry I	3
SST/AGR 640 Seed Production of Field Crops	3	CBT 516 Plant Embryology	3
SST 650 Seed Enterprise Development and Management	3	SSC 538 Soil Fertility	3
SST/GPB 655 Heterosis Breeding and Hybrid Seed Technology	3	Other courses[2]	
SST 660 Seed Quality Assurance	3		
SST 670 Seed Storage & Preservation	3		
B. Seminar	1		
SST 598 Seminar	1		
C. Thesis Research	12		
SST 599 Thesis research	Variable		
	Total		**43**

[1] Degree requirement may be changed on the recommendation of the Academic Committee and the Advisory Committee

[2] Approved by the Advisory Committee

Table 2. Minimum course and research requirement for PhD degree[1]

A. Major Courses	Credit	Minor Courses	Credit
1a. Core	15	**2a. Core**	6
SST/PLP 506 Seed Pathology	3	CBT 675 Seed Physiology	3
SST/AGR 640 Seed Production of Field Crops	3	SSC 538 Soil Fertility	3
SST 650 Seed Enterprise Development and Management	3		
SST/GPB 655 Heterosis Breeding and Hybrid Seed Technology	3		
SST 670 Seed Storage and Preservation	3		
1b. Elective	12	**2b. Elective**	6
SST/AGR 501 Principles of Crop Production	3	AEC 540 Agricultural Development	3
		CBT 503 Plant Physiology I	3
SST 510 Seed Technology Functions	3	CBT 516 Plant Embryology	3
SST/AGR 525 Principles of Seed Science and Technology	3	CST 515 Data Analysis by Microcomputer	3
SST/GPB 527 Plant Breeding	3	ENT 530 Seed Entomology	3
SST 530 Methods in Seed Technology	3	ENT 547 Biological Control	3
SST 612 Seed Biotechnology	3	ENT 580 Integrated Pest Management	3
SST/GPB 615 Plant Genetic Resources	3	STT 501 Methods of Statistics	3
SST/HRT 631 Vegetable Seed Technology	3	STT 510 Design of Experiments	3
SST 645 Seed Technology Around the World	3	Other Courses[2]	
SST 660 Seed Quality Assurance	3		
SST/GPB 665 Maintenance Breeding and Breeder's Seed Production	3		
B. Seminar	2		
SST 698 Seminar	2		
C. Dissertation Research	36		
SST 699 Dissertation Research	Variable		
Total			**77**

[1]Degree requirement may be changed on the recommendation of the Board of Studies and the Advisory Committee

[2]Approved by the Advisory Committee