

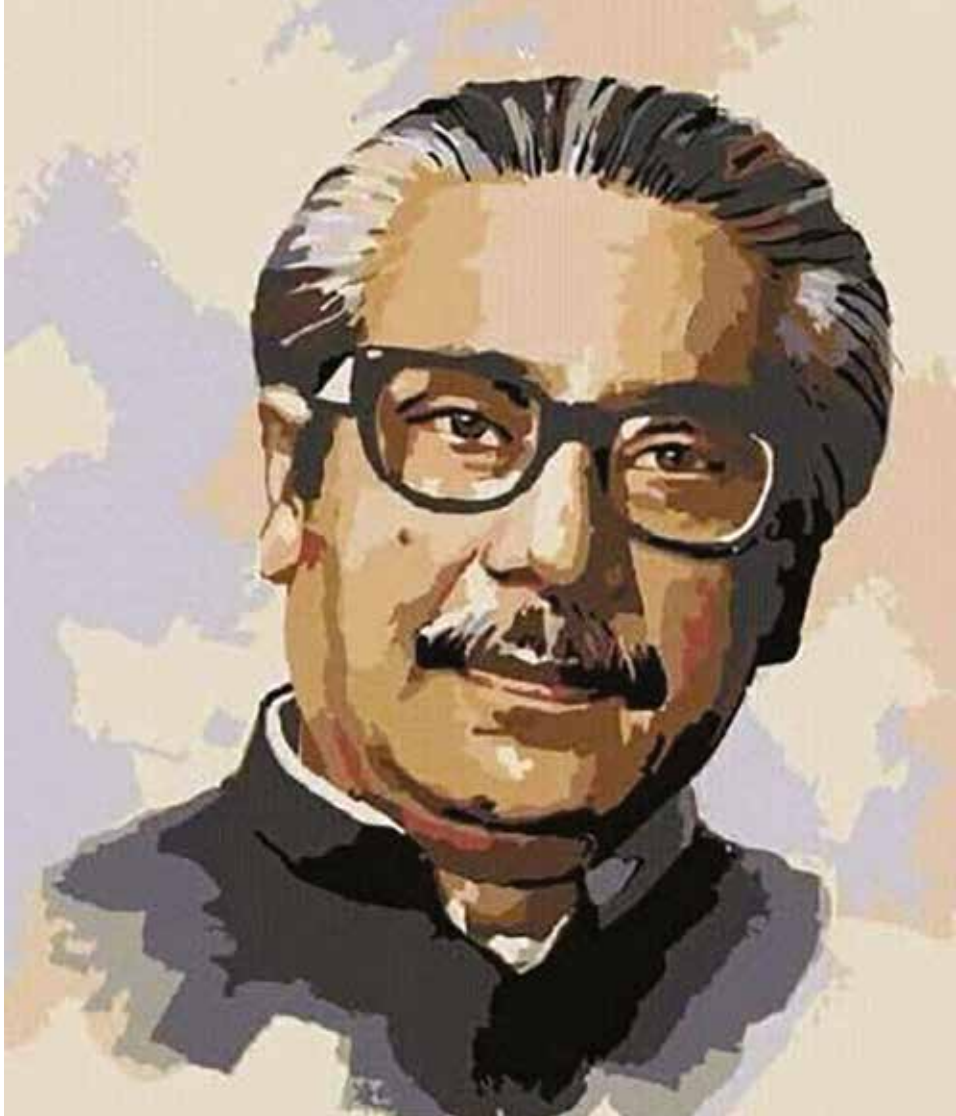


# UNDERGRADUATE CATALOG

**Bachelor of Science in Agriculture  
[BS (Agriculture)]**

**Faculty of Agriculture**  
**BANGABANDHU SHEIKH MUJIBUR RAHMAN AGRICULTURAL UNIVERSITY**  
GAZIPUR 1706, BANGLADESH





**Father of the Nation**  
**Bangabandhu Sheikh Mujibur Rahman**

# UNDERGRADUATE CATALOGUE

**2<sup>nd</sup> Edition, February 2022**

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# Foreword



**Vice-Chancellor**

Bangabandhu Sheikh Mujibur Rahman  
Agricultural University  
Gazipur 1706

It's a great pleasure for me to know that the Faculty of Agriculture, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) is going to publish 2<sup>nd</sup> Edition of Undergraduate Catalog. BSMRAU is the only public Agricultural University where the North American Trimester system is followed for maintaining the academic calendar. The Undergraduate Catalog is the official academic Catalog of BS (Agriculture) program. It provides information related to administrative processes, program requirements, policies, and university resources and services. This catalog also provides lists of all courses in the undergraduate curriculum, undergraduate requirements, and academic policies. BSMRAU regularly reviews its policies and procedures to ensure clarity and consistent application of rules, regulations and the best practices. The information in this Catalog is based on the most current information available at the time of publication (February 2022). It is student's responsibility to familiarize himself/herself with the rules and regulations described in this Catalog and to seek further clarity and assistance from the Dean, department Head or appropriate authority of the university. The university reserves the right to change all related information contained herein, at any time, without notification, and as rules and regulations require. Information will also be available via University website at [www.bsmrau.edu.bd](http://www.bsmrau.edu.bd).

The BS (Agriculture) program is designed to assist students in building the knowledge, skills, and abilities essential to meet the challenges of their profession. Our faculties who are leaders in their fields are strongly committed to help students to achieve their academic professional goals.

Finally, I would like to thank all faculty members, students and staff of the university those who contributed in producing information that have been incorporated in this Catalogue. I also thank all the members of the Compilation Committee, specially Dean, Faculty of Agriculture for their efforts in its publication.

I look forward for the best of the information.

(Prof. Dr. Md. Giashuddin Miah)



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# **Undergraduate Catalogue**

## **BS (Agriculture)**

### **1. INTRODUCTION**

The Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) was established in 1998 (Act No. 16 of 1998). Initially it was established as Bangladesh College of Agricultural Sciences (BCAS) in 1983. Subsequently the college was renamed as Institute of Postgraduate Studies in Agriculture (IPSA) in 1994 (Act No. 1 of 1994) through the tripartite collaboration and co-operation of the Governments of Bangladesh, Japan, and the USA. After a decade of its successful operation of Graduate Program, BSMRAU launched Undergraduate Program in 2005 to offer Bachelor of Science degree in Agriculture (BS Agriculture). The faculty members are committed to uphold the academic excellence of the University at all levels, and are always ready to extend their cooperation to the students.

The University is located at Salna, Gazipur, about 10 km north-west of the Gazipur district headquarters about 40 km north of Dhaka, the capital city of Bangladesh. The campus covers an area of 187 acres (76 ha) land including about 50 acres (20 ha) of well-developed experimental farm area. It is located in a beautiful rural setting in between Joydebpur Chawrasta and National Park of Rajendrapur, surrounded by the renowned Sal Forest of the Madhupur Tract characterized by the topographical diversity with undulated land, BSMRAU maintains a unique, calm non-political campus most suitable for academic pursuit.

The University is committed to the policy of providing educational opportunities to all eligible students regardless of their economic or social status, and will not discriminate on the basis of race, color, sex, creed, age, marital status or national origin.

### **2. VISION OF THE UNIVERSITY**

Fostering quality teaching and research that develop highly skilled and educated people necessary to advancing the well-being of the nation in general and farming communities in particular.

### **3. MISSION OF THE UNIVERSITY**

Contributing to society through the pursuit of agricultural education, research and innovation for sustainable development.

### **4. OBJECTIVES OF THE UNIVERSITY**

- \* To serve as a “Center of Excellence” for agricultural education leading to BS, MS and PhD degrees;
- \* To provide an education consistent with international standards through well designed academic programmers;
- \* To conduct basic and applied research to generate appropriate and sustainable technologies in different fields of agriculture;
- \* To disseminate and transfer generated technologies to the end users through training and outreach activities;

- \* To provide policy support focusing on local and national issues within the national agricultural research framework with emphasis on food and nutrition securities of the country.

## **5. ORGANIZATION**

Bangabandhu Sheikh Mujibur Rahman Agricultural University is a statutory organization comprising Chancellor (Honorable President of the People's Republic of Bangladesh), Vice-Chancellor, Treasurer and the members of Syndicate, Academic Council and other statutory officers. The University management structure comprises four wings: Administrative, Academic, Research and Outreach. Vice-Chancellor provides leadership in achieving the objectives of the University. The University Grants Commission (UGC) monitors and evaluates University activities. The UGC also processes and recommend to the higher authority the annual budget and other financial requirements and development projects for their approval.

### **5.1. Officers of the University**

Besides the Chancellor and Vice-Chancellor, followings are the other officers, who are at present, actively involved in carrying out the day to day activities of the University.

1. Deans of the Faculties
2. Heads of the Departments/Coordinator
3. Treasurer
4. Registrar
5. Director (Research)
6. Director (Outreach)
7. Director (Student's Welfare)
8. Director (Planning and Development)
9. Director (Transport)
10. Director (International Affairs)
11. Director (Central Laboratory)
12. Director (IQAC)
13. Director (VTH)
14. Director (IBGE)
15. Proctor
16. Provosts
17. Library Chief
18. Chief Engineer
19. Chief Medical Officer (presently represented by Deputy Chief Medical Officer)
20. Farm Manager

## **5.2. Administration Wing**

The administration at BSMRAU is headed by a Vice-Chancellor who is the Chief Executive of the University. He is assisted by a Registrar in administrative affairs and advised by the Treasurer in financial matters.

## **5.3. Syndicate**

Syndicate is the chief executive authority and is in charge of overall operation of the university in compliance with the Act and Regulations and exercises the power of supervising the teachers, students, officers' and staff of the university. The details of functions and responsibilities of the Syndicate are describing in the Act of the university. The Syndicate comprises of Vice-Chancellor, who is also its Chairman, 3 members of Parliament nominated by the Speaker, Pro-Vice Chancellor(s) (at present none) and Treasurer of the university, Vice-Chancellor of Bangladesh Agricultural University (BAU), 2 Officers of Secretary level nominated by the government, Director-General (DG) of Bangladesh Agricultural Research Institute (BARI), any one nominated by the government from amongst the Executive Chairman of Bangladesh Agricultural Research Council (BARC), DG of Department of Agricultural Extension (DAE) and DG of Bangladesh Rice Research Institute (BRRI), one DG nominated by government from amongst the agricultural research institutes other than BARI and BRRI, 2 eminent agricultural scientists or agricultural educationists nominated by Chancellor, 2 Deans nominated by Chancellor on rotation basis; and 2 teachers nominated by the Academic Council (AC). The nominated members function for a tenure of 3 years, who, however, continue until the replacement is provided.

## **5.4. Academic Council**

Academic Council (AC) is the prime academic affairs authority of the university, and is held responsible for upholding quality of teaching and education and examination as per Act and Regulations and it has the authority to exercise the power of control and supervision of academic affairs. The details of functions and responsibilities of the AC are described in the Act of the university. The AC comprises of Vice-Chancellor, who is also its Chairman, Pro-Vice Chancellor(s) (at present none), all Deans, all departmental Heads, all Professors and Associate Professor, Director (Research), Director (Outreach), Library Chief, one agricultural research specialist not below the rank of Director to be nominated by the government from amongst the agricultural research institutes, and one Dean of BAU nominated by the Syndicate. The nominated members function for a 2 years' tenure, who, however, continue until the replacement is provided.

## **5.5. Academic Wing**

The Academic Wing consists of 14 academic departments, 02 academic Units and 01 Institute. The Dean, Faculty of Agriculture, coordinates the academic activities of the Faculty of Agriculture at undergraduate level. The Department Head administers the academic programs of the respective department.

The 14 Departments, and 02 Units and 01 Institute are: Agricultural Extension and Rural Development (AER), Agroforestry and Environment (AFE), Agronomy (AGR), Agricultural Engineering (AGE), Agro-Processing (AGP), Biochemistry and Molecular Biology (BMB),

Crop Botany (CBT), Computer Science and Information Technology (CST), Entomology (ENT), Environmental Science, (ENS), Genetics and Plant Breeding (GPB), Horticulture (HRT), Plant Pathology (PLP) and Soil Science (SSC). The academic units named as Seed Science and Technology Unit (SSU), and General Education Unit (GEU) and the institute named as Institute of Biotechnology and Genetic Engineering (IBGE).

### **5.5.1. Board of studies (BOS)**

Each academic department has a Board of Studies (BOS) comprising all faculty members of respective department/unit and an external expert member of the same discipline nominated by the Vice-Chancellor of the University. The BOS is chaired by the head of the respective department/unit. The BOS reviews departmental academic programs, course requirements, course offering plan and related matters.

### **5.5.2. Lecture hall and laboratory**

Each lecture hall is well equipped with modern audiovisual aids and sounds system. Each department has adequate number of laboratories with sophisticated modern equipment.

### **5.5.3. Computer center**

The computer center is equipped with sufficient number of microcomputers and peripheral equipment. It provides training facilities for students and staff.

## **6. FACULTY OF AGRICULTURE**

The Faculty of Agriculture of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) starts in 2001 by appointing Dean and functioning for Undergraduate Program through offering degree of Bachelor of Science in Agriculture [BS (Agriculture)] since Summer 2005 term.

### **6.1. Vission, Mossion and Objectves of the Faculty**

#### *Vision*

Providing world standard education in the field of agriculture.

#### *Mission*

Producing quality graduates equipped with modern knowledge and technology in agriculture.

#### *Objectives*

- To develop skilled human resources in agriculture through theoretical education and practical exercise;
- To enrich course curricula with updated knowledge and information;
- To encourage undergraduate students towards research and innovation;
- To prepare graduates competent enough to disseminate technology and provide community service; and
- To promote professional development of academics of the faculty.

## **6.2. BS (Agriculture) Program**

Faculty of Agriculture starts through offering degree of Bachelor of Science in Agriculture [BS (Agriculture)]. The goal of BS (Agriculture) program is to contribute to the national development by providing intellectual leadership through producing quality graduates in different fields of agriculture. The Faculty of Agriculture follows the North American term-based course-credit system of education having three academic terms viz. Summer, Autumn and Winter in a Calendar Year. There are 14 academic departments, 02 academic Units and 01 Institute under the Faculty of Agriculture which yield integrated degree as BS (Agriculture). Each department has highly qualified teachers, well-equipped laboratories. The Dean, Faculty of Agriculture administers the BS (Agriculture) Program. This is a fixed model Program which requires to complete a 200 Credits Hour (Theory, Practical and Internship) by 12 terms within four years (**Table 1**).

## **6.3. Admission to BS (Agriculture) Program**

As per suggestions and recommendations of University Grants Commission (UGC), Ministry of Education, Government of the Peoples Republic of Bangladesh, the admission at undergraduate level of different Agricultural Universities, Agriculture dominated Science and Technology University is being conducted through “Cluster System Admission in Agricultural University” since 2020. Every university lead the whole admission process on a rotational basis for a particular year. However, the general terms and conditions for an eligible student to appear in the admission test is stated as follows:

### **6.3.1. Admission requirements**

To be eligible to apply for admission to BS (Agriculture) program the candidate must have passed SSC (Science Group), HSC (Science Group) examinations or equivalent examinations from a recognized Board or Institution. The candidate must have an acceptable GPA in both SSC and HSC as mentioned in the “Admission Notification” as decided by the Admission Committee.

### **6.3.2. How to apply**

To get admission for Bachelor of Science in Agriculture Program a candidate needs to wait for “Admission Notification”. The “Admission Notification” is published in the Daily Newspapers, and through electronic media.

### **6.3.3. Preliminary screening**

Applications received through prescribed forms or internet within the deadline are subject to preliminary screening to make a shortlist of the candidates eligible for sitting the Admission Test.

### **6.3.4. Admission test**

Admission Test is taken in Biology, Chemistry, Physics, Mathematics and English, based on HSC syllabus and General Knowledge. A total of 100 points is allotted for Admission Test which is conducted on MCQ basis. Subject-wise point distribution in Admission Test is as follows:

## Distribution of points

Subject	Points
Biology	20
Chemistry	20
Physics	20
Mathematics	15
English	15
General Knowledge	10
<b>Total</b>	<b>100</b>

### 6.3.5. Scoring for admission

Merit list is prepared based on the combination of test results and academic records. A total of 200 points are distributed as shown in tabular form below:

Examination	Points	Remarks
Admission Test	100	-
SSC/Equivalent	40	Excluding Optional Subject
HSC/Equivalent	60	Excluding Optional Subject
Total=	200	-

The candidate's earned GPA in SSC/equivalent and HSC/equivalent examinations are multiplied by 8 and 12, respectively and added to the point obtained in the Admission Test to compute the total score of the candidate.

### 6.3.6. Publication of admission test results

Based on merit, the required numbers of candidates will be selected for admission. List of the selected candidates will be published. A separate waiting list of the same number of candidates will also be published.

### 6.3.7. Medical test

Successful candidates must undergo medical test for physical fitness. Any candidate found to have diseases that may impair the candidate's academic activities is considered to be unfit for admission.

### 6.3.8. Admission of selected candidates

Candidates selected on merit will be admitted on specific date and time mentioned in the 'Admission Notification'. Selection is cancelled if the candidate fails to get admission on the scheduled date and time. Selected candidates must submit the original Transcripts of both SSC and HSC examinations at the time of admission.



## 6.4. Academic Policy

Once admitted, the students are supposed to follow the academic policies as mention below:

English is the medium of instruction at BSMRAU. The study at BSMRAU comprises Term based Course Credit System, which the students can understand going through the following points thoroughly:

- (i) **Course Credit System:** The course credit system involves course work with regular classes, assignments, unnoticed quizzes, and pre-scheduled two midterms and final examination. In this system, subject matter is taught in modules (courses) of reasonably homogenous subject matter, the students will receive “Grades” for each of the courses taken to indicate the extent of his/her mastery of the subject matter taught in each respective course.
- (ii) **Term:** An academic year is divided into three terms – Summer, Autumn and Winter. Each term consists of 12 (twelve) effective weeks.
- (iii) **Credit:** One class hour in a week during a term shall be considered as one credit. For laboratory classes, two class hours shall be considered as one credit.
- (iv) **Course:** A course is a set of topics delivered to the students by lectures, contact hours’ practical exercises on a specific subject incorporated in the approved curricular layout and developed by Board of Studies (BOS) to offer in a term.
- (v) **Course Coding:** Each course is designated by 3 (three) capital letters and a 3-digit number. The 3 letters indicate the department offering the course. Of the three digits, the first digit indicates academic year in which the course is normally offered. The next two digits indicate the offering term, where 01-30 stand for First term, 31-60 for Second term and 61-99 for Third term.

## 6.5. Course and Credit Requirements

For the BS (Agriculture) degree a student will have to complete a total of 56 courses of 200 credits. The curricular layout covering the courses arranged in different terms over a period of 4 years are shown in **Table 2**.

## 6.6. Duration of Program

The duration of BS (Agriculture) program is 12 (twelve) terms over a period of 4 years. If a student passes all the courses in each term as per the curricular layout, he/she can have the degree in 12 terms. But if a student obtains ‘F’ grade in any course, which he/she must repeat; or obtains ‘D’ grade, which he/she may like to repeat for improvement; or if a student misses any term for any of his/her personal justified reasons, he/she requires more than 12 terms. Under such situation he/she may be allowed an extension of maximum 3 (three) terms. For having such extension, a student must apply before the end of 12<sup>th</sup> term to the Dean describing his/her status and seeking extension with proper justification for required number of terms. Otherwise, after 12 terms his/her admission shall automatically stand terminated. Similarly, after having extension of 3 terms, if a student cannot fulfill all the requirements for the degree in a total of 15 terms, his/her admission shall also automatically stand terminated. Under no circumstances, a student shall be allowed more than a total of 15 terms for the degree.

## 6.7. Course Enrollment

- (a) The student must enroll course(s) as per the curricular layout on the day of admission paying required enrollment fees.
- (b) In the subsequent terms, students shall enroll course(s) during the 10<sup>th</sup> and 11<sup>th</sup> week of the current term paying regular fees. Late enrollment with late fee is allowed up to the previous day of the forth coming term. However, a student who is on probation shall not be allowed to enrolled courses for the next term before publication of the results of current term.
- (c) If a student obtains 'F' or 'W', which he/she must repeat and/or 'D' grade, which he/she likes to improve he/she shall select course(s) that best fit his/her course offering plans and course schedules for all batches including his/her original batch. In this case, he/she can enroll a maximum of 6 (six) courses while enrolling a minimum of 4 (four) courses is a must in a term. For enrolling, a student must consider the course offering plans and class routine, which shall be published well ahead of the day of enrollment. In selecting the course for repetition, a student must be very careful. For example, if a student got 'F' grade in one course and 'D' grade in another, he/she must repeat the course with 'F'.

## 6.8. Class Attendance

The students are expected to attend all scheduled classes, course meetings and exercises. In order to qualify for final examination, stipend, scholarship, fellowship and/or any other financial assistance, a student must maintain a minimum of 80% class attendance in all courses taken in the term.

## 6.9. Examination

The student's achievements in a course shall be evaluated based on his/her performance in class tests, quizzes, midterms, final examination, laboratory study, assignments, presentation and regularity etc.

- a) In theory, there shall be three quizzes, two midterms and one final examination. The duration of each midterm examination shall be one class hour (50 minutes) and that of the final examination shall be two hours (120 minutes). One course in a term shall be evaluated on the basis of 150 points out of which 100 points for theory and 50 for practical examination. The points allotted for three quizzes is 10%, two mid-term examinations carry 50% (25% each) and the final examination holds 40% of the total points allotted.
- b) In practical part of a course, if any, there shall be field and laboratory study during classes carrying 60%, and one final examination carrying 40% of the total points allotted.
- c) The 1<sup>st</sup> and 2<sup>nd</sup> mid term examinations, scheduled by the Dean, Faculty of Agriculture, shall be in 4<sup>th</sup> and 7<sup>th</sup> weeks of the term, respectively. The final examinations of theory and practical shall be given on 11<sup>th</sup> and 12<sup>th</sup> week of the term, respectively. One invigilator for every 25 students or fraction thereof will be assigned by the Dean to conduct two midterms and theory part of final examination. Similarly, one invigilator for each course will be assigned to conduct practical examination.

- d) All examinations will be conducted, administered and evaluated by the course instructor(s). The course instructor(s) will also evaluate reports and other assignments.
- e) The decision of the course instructor(s) in terms of evaluation of a student's performance in a course is final. If any student feels that justice was not done to him/her in grading the course, he/she may submit a petition to the Dean, through departmental head offering the course. If the petition is acceptable to the Dean, he/she may form a committee to review the grade.
- f) When a student is unable to appear at a mid term examination due to serious illness or accident he/she should inform it to the course instructor. In such cases, a student must appear at the examination before the beginning of 12<sup>th</sup> week of the term after paying an extra fee as decided by the authority for holding examination. Such a chance may be given to a student by the instructor with prior information to the Dean with a reduction of 20% points from the total points allotted for that examination.
- g) If a student misses any quiz, it will not be repeated.

### 6.10. Grading Results

The grading system consists of 10 basic grades. The ranges of numerical values against the letter Grades along with Grade Points are as follows:

Numerical Value	Letter Grade	Grade Points
80% and above	A <sup>+</sup> (A plus)	4.00
75% to 79.99%	A (A regular)	3.75
70% to 74.99%	A <sup>-</sup> (A minus)	3.50
65% to 69.99%	B <sup>+</sup> (B plus)	3.25
60% to 64.99%	B (B regular)	3.00
55% to 59.99%	B <sup>-</sup> (B minus)	2.75
50% to 54.99%	C <sup>+</sup> (C plus)	2.50
45% to 49.99%	C (C regular)	2.25
40% to 44.99%	D	2.00
Less than 40%	F	0.00

In the transcript, the Letter Grade and the corresponding Grade Points and finally, cumulative GPA will be shown. The grade 'D' is the minimum acceptable passing grade in a course. The minimum GPA for continuing as a student is 2.50. Other grades are 'E', final examination not taken; 'I', incomplete accomplishment. When a student fails to remove 'E' within specified timeframe, grade 'E' will automatically be converted to 'W'.

Removing 'I', 'E', and 'W'

- (i) A student must remove an 'I' grade before beginning of the next term. To remove an 'I' grade a student must complete the deficiency within the time granted by the Instructor. If an 'I' grade is removed in the allotted time, the Instructor shall submit the appropriate

grade. If the deficiency is not removed before beginning of the next term and the time allotted by the course Instructor, the Instructor shall submit a grade ('A' to 'F') other than 'I' based on the performance of the student.

- (ii) The student must remove an 'E' grade before beginning of the next term. To remove an 'E' grade a student must apply to the Dean, Faculty of Agriculture through the course Instructor offering the course for permission showing acceptable reason(s) for missing the final examination after paying an extra fee as decided by the authority for holding examination. In such case the final grade will be calculated with a reduction of 20% points from the total points allotted for that examination. If an 'E' grade is not removed before beginning of the next term, it will be changed to 'W'.
- (iii) To remove 'F' and 'W' grades the student must repeat the course(s) in any term before graduation. The student must enroll the course(s) for repeating from course plans offered for batch(es) other than his/her original year batch. Remember, a student must enroll at least 4 courses and a maximum of 6 courses in a term. He/she can enroll the course(s) for repetition only in addition to courses of his/her original course schedule. He/she can also consult any of his/her teachers or the Academic Counselor in enrolling course(s) for repetition. But he/she must consult with the Dean's office well ahead of the term and apply for permission in prescribed form.
- (iv) When a student repeats a course having 'W' and obtain a grade (minimum acceptable grade), the grade 'W' shall be erased from his/her transcript.
- (v) The credits in the repeated courses shall be considered only once for calculating GPA and for fulfillment of graduation requirements. In case of repeated course(s) with grades 'D' and 'F', the average of lower and improved values of grade points shall be used in GPA calculation. However, both the lower and improved grades shall appear in the transcript.

### 6.10.1. Grade point average

- (i) Grade point average (GPA) is the weighted average of the grade points obtained in all the courses passed by a student. Thus, GPA is computed by dividing the total grade points (GPs) accumulated up to date by the total credits earned as follows:

$$GPA = \frac{\Sigma(\text{Grade points} \times \text{Credits})}{\Sigma \text{Credits}}$$

- (ii) GPA calculation: In GPA calculation the following basic points should be taken into consideration:
  - The corresponding numerical grade point against each letter grade.
  - The credits in the repeated courses shall be considered only once for calculating GPA and for fulfillment of graduation requirements.
  - The credits should be multiplied by respective grade points, all the products should be summed-up and then the total or cumulative Grade Points should be divided by the total or cumulative of credits to obtain the cumulative GPA.

### 6.10.2. Grading system

The letter grades A<sup>+</sup>, A, A<sup>-</sup>, B<sup>+</sup>, B, B<sup>-</sup>, C<sup>+</sup>, C, D and F are numerically equal to 4, 3.75, 3.50, 3.25, 3, 2.75, 2.50, 2.25, 2 and 0 (zero), respectively. For example, a student enrolled 5 courses namely AGR 101, CBT 110, HRT 105, SSC 101, and GEU 110 in 1<sup>st</sup> term. Here 3 courses are of 3 (2+1) credits and 2 courses are of 2 (2+0) Credit. He/she obtained A<sup>+</sup>, B<sup>-</sup> and C grades in AGR 101, CBT 110 and HRT 105, respectively and D and F grades in SSC 101 and GEU 110, respectively. Now the total grade points of the five courses shall be  $4.00 \times 3 + 2.75 \times 3 + 2.25 \times 2 + 2.00 \times 2 + 0 \times 2 = 30.75$ , and total credits shall be  $3+3+2+3+2=13$ . The calculated GPA for the 1<sup>st</sup> term shall be  $30.75 \div 13 = 2.37$ . The same is shown in tabular form below:

Course	Credits	Grade Obtained	Grade Points	Grade Points for the Courses
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5 (Col.2 x Col. 4)
1	3	A <sup>+</sup>	4.00	12.00
2	3	B <sup>-</sup>	2.75	8.25
3	2	C	2.25	4.50
4	3	D	2.00	6.00
5	2	F	0.00	0.00
Total=	13			30.75

GPA for the 1<sup>st</sup> term =  $30.75 \div 13 = 2.37$

Thus, the cumulative GPA or GPA for all the courses including the repeated courses so far completed can be calculated in this system.

### 6.11. Submission of Grade Report and Displaying

The course Instructor(s) shall submit the grades of the course to the Dean, Faculty of Agriculture within 10<sup>th</sup> day after completion of the term final examination. The grade report after being compiled by Dean Office shall be displayed on the Notice Board of the Faculty within a week of submission of grades by the Instructor(s).

### 6.12. Correction of Erroneous Grades

Erroneous grade given by an Instructor, if any, may be corrected and submitted by the Instructor to the Dean, Faculty of Agriculture before beginning of the next term. Therefore, if a student finds any error in his/her grade, he/she should immediately report to his/her Instructor directly for its correction.

### 6.13. Academic Deficiency and Academic Probation

(a) If a student achieves a GPA of less than 2.5 in any term he/she shall be placed on probation in subsequent term. Such probation shall not be allowed for more than two consecutive terms just after the term of falling GPA below 2.5. He/she must raise his/her GPA to 2.5 within next two consecutive terms. Otherwise, his/her admission shall stand automatically terminated.

b) The Dean, Faculty of Agriculture, shall prepare a grade report at the end of each term. The report shall be notified for all concerned persons. Reviewing the grade reports at the end of each term, the Dean, Faculty of Agriculture, shall communicate the academic deficiency to the student, if any.

#### **6.14. Repeating Course**

Courses with 'W' or 'F' grade must be repeated in any term before the final term of graduation and must obtain a minimum acceptable grade of 'D'. A course with 'D' grade may be repeated for improvement. Such repetition to improve GPA may be allowed only once for a course and for a maximum of 5 courses. The credit hours in the repeated courses shall be considered only once for calculating GPA and for fulfillment of graduation requirements. In case of repeated course(s) with grades 'D' and 'F', the average of lower and improved values of grade points shall be used in GPA calculation. However, both the lower and improved grades shall appear in the transcript.

#### **6.15. Academic Discipline**

- (a) The administration of the classes and tests shall rest upon the course Instructor. When any evidence of a student academic dishonesty comes to the notice of the course Instructor, the Instructor shall document the incidence and permit him/her to provide an explanation.
- (b) Considering the seriousness of the incidence, the Instructor may impose any academic penalty including giving an 'F' grade after informing the student of the action taken. The Instructor must report the incidence to the Dean, Faculty of Agriculture, through Head of the department offering the course. If he/she is penalized, he/she may appeal to the Dean through the Departmental Head of the concerned course for grade.

#### **6.16. Disciplinary Measures**

- (a) Student Disciplinary Committee deals with issues that arise from student's misconduct. Any of a student's behavior that disregards/ disobeys the norm, policy, procedure and rules of the University will be treated as misconduct.
- (b) If a student has been suspended or expelled for academic deficiencies or serious breach of discipline, he/she shall be deprived of all the privileges of the University and readmission.

#### **6.17. Petitions and Appeals**

The student may occasionally encounter special problems whose proper solutions may require deviation from the Academic regulations and procedures or policies. Requests for such deviations in the regulations must be presented to the Dean, Faculty of Agriculture. Petitions received by the Dean shall be forwarded to the proper committee or office for review and suggest appropriate action and place it before the Academic Council.

#### **6.18. Conferral of Degree**

The degree of Bachelor of Science in Agriculture [BS (Agriculture)] shall be conferred on a student upon his/her fulfillment of the following requirements:

- (a) The student must complete the required credit hours before graduation.
- (b) The student must maintain a minimum GPA of 2.5 or above for graduation.
- (c) The student must clear all fees and dues of the University before graduation.

### **6.19. Application for Graduation and Award of Degree**

- (a) Upon fulfillment of the academic requirements for the degree of Bachelor of Science in Agriculture, a student shall have to apply in prescribed Form to the Dean, Faculty of Agriculture. On the recommendation of the Academic Council, the Registrar shall issue provisional certificate.
- (b) The Syndicate upon recommendation of the Academic Council shall approve conferral of the degree.

### **6.20. Cancellation of Admission**

A student's admission shall be cancelled if he/she fails to:

- \* Complete first three consecutive terms after admission (for cancellation of admission a student must pay fees as fixed by the authority),
- \* Maintain a minimum GPA of 2.5 for more than two consecutive terms after probation,
- \* Fulfill all the requirements for the degree within 12 terms or 15 terms upon permission of extension, and
- \* Comply with the regulations of the University.

## **7. STUDENT CONDUCT, PUNITIVE MEASURES AND APPEALS**

Followings are the policies related to student conduct, punitive measures and student grievances.

### **7.1. Student Conduct**

When a student enrolls in the University, he/she assume an obligation to conduct himself/herself in a manner compatible with the University's function as an educational institution. Otherwise he/she shall have to face consequences for any of his/her misconducts as prescribed in the “ছাত্র-শৃঙ্খলা কমিটির ক্ষমতা ও কার্যাবলী অধ্যাদেশ” (Chhatra -Srinkhala Committeer Khomota O Karjaboli Odhyadesh) of Bangabandhu Sheikh Mujibur Rahman Agricultural University) and the Ordinance for the Proctorial System. According to the Ordinance, any of his/her following acts and deeds would be considered as misconduct:

- a. If he/she disobliges any order, regulations or rules/norms, or revolts against or defames any reasonable decision or Ordinance of the University Authority, or misbehaves with any teacher, officer or staff of the University or lodge any application with false complaint(s) against any person of the University, or perform any such activity that amounts to committing subversive to the University's discipline;
- b. If he/she plagiarisms morally or with character, or remains involved in displaying, preserving or distribution of pornography or objectionable films; carries, drinks, preserves or distributes/supplies narcotics /or alcohols; carries, preserves, distributes/supplies or use arms, explosives, sharp knives or sticks;

- c. If he/she carries or preserves acid or alike or any other harmful chemicals, or intentionally throw such chemicals at any student;
- d. If he/she alone or in group gets involved in clash among themselves or provokes others to get involved in clash or commits any anti-disciplinary offence;
- e. If he/she alone or in group calls strike, rally, meeting or assembly, or resists any student to attend class or examination, or prevents or attempts to prevent any student from going to research farm, laboratory or library;
- f. If he/she teases any student, or tortures physically or mentally, scares, encourages or compels to drink alcohol or any narcotics, or compels or motivates to get indulged in unsocial activities;
- g. If he/she presents any false message, or delivers any speech or statement against the interest of the University or intends to create indiscipline or intends to defame;
- h. If he/she destroys, harms, de-shapes or deform any asset of the University; either alone or in-group participates without the permission of the bonafide authority in affixing poster or banner, or writing on wall or on any establishment of the University, or provokes or compels others to such acts;
- i. If he/she is suspected to be of loose-character and
- j. If he/she gets indulged in activities subversive to the existing state law.

## **7.2. Supervisory Authority on Student Conduct**

The Proctor and the Assistant Proctor(s) appointed by the University authority from amongst the teachers on a two-year term are the responsible officers to look after the student conduct in the University campus outside the Hall premises. However, the Proctor can seek cooperation from any teacher, officer or staff for maintaining law and order situation in the campus. The Student Disciplinary Committee is the supreme authority to take any final decision regarding the student conduct in the campus.

## **7.3. Punitive Procedures**

The student faces punitive measures ranging from warning letter, undertaking, fine, forfeit of caution money, termination of scholarship or stipend, confiscation of compensation, temporary or permanent expulsion from the dormitory or from the University; or cancellation of certificate. However, the University authority, depending upon the degree of offence, shall assign a student such punitive measure(s) as judged appropriate for his/her misconducts.

The Proctor can fine a student a maximum of Tk. 1000.00 (Tk. one thousand) for misconduct. If the proctor is not satisfied with such penalty, he/she can recommend to the Vice Chancellor (VC) for expelling this student from the University for a maximum period of 6 months (two terms). If the VC finds it necessary to expel this student for more than six months he forwards it in written for action to the Students Disciplinary Committee.

## **7.4. Student's Grievance/Appeal Procedure**

The student has an opportunity to resolve any complaints he/she may have alleging that any other rules or policies of the University were inappropriately applied and resulted in an injury



to him/her. He/she can lodge an appeal to the appropriate authority through the Authority sanctioning punitive measures. However, such appeal must be submitted within 30 (Thirty) working days after imposing of punishment. The procedure is not applicable to certain kinds of complaints for which other appropriate appeal procedures exist, such as a grade appeal based on the application of non-academic criteria.

## **8. STUDENT LIFE ON CAMPUS**

The University authority appreciates that the accent of student life and activities on the campus is to provide an invigorating and creative environment, which promotes independent thinking and introspection and leads the young students to become more aware of the consequence of their own actions. This allows them to weave a pattern of life, which equips them to stand up to the many pressures of community living, to train them in the making of inferences in everyday situations, to help them derive more insight into their personal relationships and to arouse in them a sensibility of aesthetic experience. With this realization, development initiatives have been undertaken, and are in progress.

### **8.1. Student ID Cards**

Every student must have a student ID card issued by the University. Student ID card is his/her official identification as a student of BSMRAU. The University issues ID card to each student. For student ID card, the student will have to submit 2 copies passport size photographs at the time of admission.

### **8.2. Halls of Residence**

There is one BS Students Hall (Shahid Ahsan Ullah Master Hall) exclusively for undergraduate male students, and two Female Students Hall (Bangamata Sheikh Fazilatunnesa Mujib Hall and Ila Mitra Hall). The Halls are administered in accordance with the “হল ব্যবস্থাপনার নিয়মাবলী বিষয়ক অধ্যাদেশ” [(Hall Babosthaponar Neomaboli Bishoyak Odhyadesh) Hall Management rules and regulations].

The students of the University must be affiliated with the Hall. All undergraduate students are entitled to have accommodations in the Hall provided sufficient seats are available.

#### **8.2.1. Hall administration**

Each hall is administered by a Provost, who is assisted by Assistant Provosts and House Tutors. They are appointed from amongst the teachers on a two-year term.

#### **8.2.2. Resident students**

The students who reside in the Hall are called resident students. The resident students must reside in the Hall for at least 80% of the working days of the term. This is essential for getting seat allocation in the next term.

#### **8.2.3. Non-resident students**

The students who with the permission of the authority stay outside of the Hall are called non-resident students. The non-resident students must be affiliated with any of the Hall. They have to pay all prescribed fees other than seat rents.

#### **8.2.4. Seat allocation procedure**

The newly admitted students shall apply in prescribed Form provided the seat rents and caution money have been paid along with other fees at the time of admission. The seats are allotted on merit basis based on availability. The decision of the Hall authority regarding seat allotment shall be the final. Each room is allotted to a maximum of 4 students depending on the size of the room. However, to meet the acute need, there may be exception.

In case of continuing student, the seat allocations are renewed in each term, i.e., the seats are cancelled at the completion of each term. Seat allotment is given only to the enrolled student. Studentship is a must for seat allocation in the Hall. The seats are renewed to a student provided the student maintains his/her studentship. The resident students must reside in the Hall for at least 80% of the working days of the term. This is essential for getting seat allocation in the next term.

#### **8.2.5 Facilities in hall**

Each Hall is planned to be self-contained with amenities. At present each Hall is provided a common room with smart TV, an indoor games room, a lounge, a dining hall with the mess, prayer room and WiFi connections. The Hall administration provides games and sports items, newspapers, magazine, television, utensils etc. for mess.

#### **8.2.6. Cleaning of hall**

To keep the Hall clean is every resident's responsibility. The resident student on his/her own responsibility keeps the room clean. However, as a general responsibility, the Hall authority organizes cleaning of the outside of the room deploying cleaners.

#### **8.2.7. Mess management**

Each Hall has its own mess. The mess of the Hall is managed by the students under the supervision and guidance of the Hall administration. The Mess Boys, Cook, and all other necessary facilities for the mess are provided by the Hall administration.

#### **8.2.8 Rules for visitors**

- a. Any guest or visitor can enter into the Hall entering their names, address and other necessary information into the Guest Register kept at the Entry gate of the Hall. The guest/visitor must sign in the register while leaving the Hall.
- b. Entrance of female guest into Male student Hall, and that of male guest into Female student Hall are completely prohibited without the written permission of the Provost. This prohibition is applicable for the BSMRAU students also.

#### **8.2.9. Prohibitory rules for resident students of hall**

The resident students must abide by the rules and regulations of the Hall Management. The students must follow the restrictions/prohibitions imposed upon them by the Ordinance on the Hall Management Procedures. Such restrictions/ prohibitions are as follows:

- No resident student can stay out of the Hall between 9.00 pm to 5.00 am during October - March and between 10.00 pm to 5.00 am during rest of the year without the prior

permission of the Provost. However, under special circumstances, permission may be obtained from the Provost.

- No resident student can stay in the Hall during holidays without prior permission of the Provost.
- No resident student can leave the Hall in day(s) other than holidays without prior permission of the Provost
- Changing of any type in structure or paint of room of the Hall, writing name or anything with permanent ink or paint on doors or walls of the room, are completely prohibited. Such prohibitions are applicable to any part or furniture of the Hall.
- No additional furniture other than those allocated by the Provost is allowed in the room.
- No meeting, gathering or assembly can be organized inside the Hall or in any premise adjacent to it without the prior permission of the Provost.
- No Forum or Association or any such organization can be formed in the Hall without the prior permission of the Provost, no student can organize any meeting, discussion on any special day, or party in the Hall.
- No student can keep any pet animals or bird inside the Hall or in any place adjacent to the hall.
- Resident students cannot deploy anybody else for their own work inside the Hall.
- No student can keep his/her own bike or motorcycle inside the Hall without the permission of the Hall authority. However, they can keep them in the fixed place in their own responsibility with the permission of the authority.
- Playing CD player, MP3, DVD or Loud Speaker or any such musical instrument loudly, shouting, singing loudly, or taunting with objectionable words, ridiculing, etc., are prohibited. Ragging with new students inside/outside of the hall is punishable offence.
- Entrance of hawkers, milkmen, or such people into the Hall is prohibited.
- Entrance of female guest into Male student Hall, and that of male guest into Female student Hall are completely prohibited without the written permission of the Provost. This prohibition is applicable for the BSMRAU students also.
- No play or sport items or newspaper/magazine of the Hall can be taken to the room.
- Damaging or cutting of trees/vegetation, tearing/picking flower or fruits or intentionally breaking anything is prohibited.
- Intentional breaking or taking into room for use any dining materials such as utensils (plate, glass etc.) is prohibited. These prohibitions are applicable to other usable items or furniture of the Hall too.
- Environment polluting materials such as wastes materials, waste papers, etc., cannot be thrown in place other than earmarked for such purpose inside the Hall.
- No student can keep any guest overnight in his/her room without the prior permission of the Provost.

- No student can change his/her room without the permission of the provost.
- Keeping any type of sticks, knives, firearms and weapons inside the room is completely prohibited.
- Keeping, drinking or using of any type of narcotics or alcohols is prohibited.
- Threatening, physical assault, preventing from work/duty, or behaving impolitely or indecently with any staff of the Hall shall be considered as anti-disciplinary act.
- Use of non-permitted electrical equipment such as electrical oven, electrical calendar, or unwanted intervention or interference in electrical supply system shall be considered as the anti-disciplinary act.
- Any intervention or action by student alone or in-group to resolve any crisis/problem or to increase/improve any facility of the Hall shall be considered as disturbing Hall administration, and shall be treated as breach of discipline.
- Affixing of photos of any political leader or objectionable or indecent scenery or displaying of pornography or blue picture anywhere inside the Hall is prohibited.
- Any such restrictions/prohibitions that may create non-conducive environment in the Hall but not included in above shall be imposed as per the recommendation of the University authority from time to time.
- There is a security hotline (01716-628324).

#### **8.2.10. Special rules for female student hall**

- a. All resident female students must be present in the Hall between 6.30 pm to 6.00 am during October to March and between 7.00 pm to 6.00 am during rest of the year.
- b. No resident female student can stay in any other house without the permission of parents or local guardians.
- c. The entrance of any outsider into the Hall without the permission of the Hall authority is completely prohibited. However, under special circumstances, female guest of resident female student can be allowed to the concerned female resident student's room provided the guest must be identified, and the name and address of the student and the guest's name and address must be written in the register kept at the gate. The guest like own mother, sister or close female relative of the female resident student can stay one/two nights in the Hall with the permission of the Hall authority.
- d. Under no circumstances, any student of any other institution or any other female guest identified as relative can stay in the female student Hall.

#### **8.2.11 Punitive measures**

The violation of any of the prohibitions/restrictions enlisted above shall be considered as the anti-disciplinary offence, and in such case, the Provost can expel the student temporarily or permanently from the Hall. The Hall Caution money of the penalized student shall be forfeited. Besides, if necessary, the Provost shall recommend to the higher authority for taking action against the penalized student as per the University rules.

## **9. SERVICES AND FACILITIES**

### **9.1 Library Services**

The library is an important organ in support and development of high quality teaching, research and outreach programs. The University library building has a comprehensive and current collection of local and foreign journals relating to the agricultural and social sciences. The library possesses nearly 25,000 books and is under expansion through a regular acquisition program. In addition to book and journal collection, the library provides an interlibrary loan service and a computerized database of Bangladesh research titles and abstract. The library is opened throughout the year, except on government holidays. It is accessible to students, teachers, officers and other personnel associated with the University. E-journal, e-book and internet facilities are available. An audiovisual room with modern equipment is attached to the library building and is available as a training classroom and for holding conferences, seminars and workshops. Some group study rooms are also available. The library is air-conditioned with adequate sitting and reading facilities. The library is managed in accordance with the “লাইব্রেরী ব্যবস্থাপনা অধ্যাদেশ ১৯৯৮” (Library Babosthapona Odhyadesh 1998). There have a ‘Bangabandhu corner’ established in 2020 having books on Bangabandhu, liberation war and independence history of Bangladesh.

#### **9.1.1. Library management**

The overall management of the Library lies with the Library Committee. However, the library is headed by the Library Chief appointed for a two-year term from amongst the Professors of the University. He is assisted by permanently appointed Librarian, Deputy Librarian, Assistant Librarian, and other staffs. The library is run as per the “Library Management Ordinance” approved by the Syndicate.

#### **9.1.2. Library timing**

The library is kept open from 9.00 am to 8.00 pm in Winter (November to February) and from 9.00 am to 9.00 pm in Summer (March to October) on all days except Friday. However, any change in library timing shall be communicated immediately.

#### **9.1.3. Library entrance**

The students for entering into the library shall leave all their personal book, bag, sticks, umbrella, briefcase, newspaper, pullover, etc., to the Attendant at the entry gate of the library. However, necessary notebooks and other materials can be taken into the library provided those must be subject to search by the Attendants at the gate before leaving. The reserved books cannot be shifted without the permission of the concerned staff. All the materials left with the Attendant must be taken back before 15 minutes of closing time of the library. The library staff may physically inspect anyone, if necessary, while inside or leaving the library.

### **9.2. Library Card and Fees**

All the students get the library Card immediately after admission. The student shall have to submit two copies of stamp size photographs for getting the library card. The library card is the library entry pass for the students.

### **9.2.1. Borrowing procedure**

Undergraduate students having library card can borrow at a time a maximum of three books. Journal cannot be issued to any student. Encyclopedia, dictionary and other reference materials can be borrowed with the prior permission. The students are not allowed to take out any reserved book. Thesis and dissertation can be issued only with the permission of the Library Chief.

The students must return the book as per schedule as well as whenever they are asked to return, if necessary. For every day delay in returning book a fine per day per book shall be charged. The students must return the books issued to them immediately after Final Examination of the term is over. If they fail to return the books within 7 (seven) days, they shall be charged fine per day from 8th day onward.

No book can be issued to a student unless he/she returns the issued books, and in such case his/her library card may be suspended. The VC can cancel the library card of any student on the recommendation of the Library Chief, who does not return book regularly as per rules.

### **9.3. Restrictions**

No one is allowed to smoke, fire match or shout in the library. All students like all others have to follow the rules and regulations of the library

## **10. TRANSPORT SERVICE**

The transport service of the University is organized and managed in accordance with the “যানবাহন নীতিমালা ২০০৭” (Janbahon Nitimala 2007). The University provides the undergraduate student transport facility mostly for campus life. There is a Shuttle Service operating as per a fixed schedule from the University Campus to Joydebpur back.

Moreover, an exclusive service (Saloon Service) is available for the student in the evening to enable them shopping at Joydebpur market. Another bus service is available to the student on Friday. This bus leaves the campus at 9.00 am leaves Dhaka (BARC) at 4.00 pm The students can avail the Ambulance service on medical ground, for which the Provost/Assistant Provost shall give requisition.

The students are to pay Tk. 300.00 as Transport Development Fee once at the time of admission, and Tk 100.00 per term (subject to change by the authority) at the time of enrolment for availing the Shuttle service. Saloon service and Friday service during the ensuing term. They shall have to pay bus rent as usual for any other service. If a transport or Ambulance is needed for the student(s), the Provost/Assistant Provost shall submit the requisition on the students' behalf to the Director (Transport).

## **11. FINANCIAL ASSISTANCE**

All newly admitted undergraduate students get general stipend @ Tk. 200.00-300.00 per month on basis of GPA. The continuing student can also get merit scholarship from 2nd term onward. The merit scholarship is given to the student on competitive basis, based on academic performance in the previous term. For this, the students have to submit their application in prescribed Form. A number of undergraduate students covering all batches are given merit scholarship. The rest of the enrolled students, who maintain the minimum GPA 2.5 get general

stipend. For the General stipend also the students shall have to submit application in prescribed Form to the Dean, Faculty of Agriculture.

## **12. STUDENTS' WELFARE SERVICE**

The Students' Welfare Service is headed by a Director (Students Welfare) appointed by the University on a two-year term from amongst the Professors. The Students' Welfare Service aims at assisting students in matters other than academics. The service mostly aims at assisting students in sorting out their difficulties and dilemmas in an environment where they can talk freely and in confidence about any matter which is troubling them. Students seek counseling for a variety of reasons, such as difficulties in adjusting to campus life, problems in relationship, being shy, feeling lonely, anxious, depressed, confused, unmotivated, inferiority, having difficulties with coping academic pressures and competition, worries about the future, low self-confidence, problems related to their facilities etc. The Director (Students Welfare) keeps constant touch with the students and monitors their problems. He/she assists the students to resolve any problem(s) in their campus life. He/she provides /or organizes all facilities related to students' programs on any special occasions. He/she is the only officially assigned authority in the University to look after overall welfare of the students.

## **13. CO-CURRICULAR ACTIVITIES**

The University campus is located in an isolated area, long away from Dhaka City and far from Gazipur district head quarter. Thus, there is limited opportunity of students for co-curricular pursuits outside the University. However, there is a provision of socio-cultural and other facilities like physical education, cultural club, debating club, indoor and outdoor sports in the University.

## **14. CAFETERIA**

There is a central cafeteria, Teacher Student Centre (TSC) and a private restaurant at the Essential Service Centre of the University.

## **15. MEDICAL FACILITIES AND SERVICES**

The University has a Medical Centre centrally situated in the campus. The Medical Centre is headed by a Deputy Chief Medical Officer assisted by Senior Medical Officer, Male Medical Officer, Female Medical Officer, Dental Surgeon, Senior Compounder, Dresser and Technician. It provides facilities for primary health care and minor treatment with supply of simple medicines. The Medical Centre remains open from 9.00 am till 9.00 pm. There has a hotline (0172300168) for emergency service. The students at their ailment visit the doctors at the Centre. In case of emergency, the doctors also visit the ailing student(s) at the Hall. It has a Pathology Lab. providing facilities for blood, urine and stool examination, ECG and physio-therapy facilities. The Medical Centre has an Ambulance for 24 hours' service. For major treatments or complicated problems, the students are referred to the District Hospital at Joydebpur or to any Government Hospital in Dhaka. If the students prefer to have treatments at private clinic/hospital, they are allowed to do so. In all these cases, the Medical Centre provides them Ambulance service at University's cost.

## 16. ESSENTIAL SERVICE CENTRE

The University has established an essential service Centre for enabling all the residents including the students of the University to buy their essential items within the campus. The essential service Centre has all utility shops including bookshops, stationery shops and confectionary shops etc. which run privately.

## 17. SOLUTION OF UNSPECIFIED PROBLEMS

Anything not covered in this catalogue will be referred to and decided by the Academic Council.

## 18. ACADEMIC CALENDAR

At beginning of each academic year, detailed calendar of all academic activities is provided to the student.

## 19. DEPARTMENT WISE COURSE AND CREDIT DISTRIBUTION

**Table 1: Department Wise Course and Credit Distribution of BS [Agriculture]**

Department	Course Code and Course Title	Credit T+P	Total Course	Total Cr.
Agricultural Extension and Rural Development	AER 155 Fundamentals of Agricultural Extension and Rural Development	3+1		
	AER 265 Rural Sociology and Educational Psychology	2+0	04	14
	AER 301 Management of Agricultural Extension Organization	3+1		
	AER 425 Communication and Technology Transfer	3+1		
Agroforestry and Environment	AFE 301 Fundamentals of Agroforestry and Environment	3+1	02	07
	AFE 350 Silviculture	2+1		
Agronomy	AGR 101 Fundamentals of Agronomy	2+1		
	AGR 175 Fundamental of Cereal Crop Production	3+1		
	AGR 255 Agro-climatology	2+1		
	AGR 280 Seed Science and Technology	3+1	07	26
	AGR 330 Weed Science	3+1		
	AGR 375 Production of Pulses, Oilseeds and Industrial Crops	3+1		
Agricultural Engineering	AGR 455 Irrigation and Farm Management	3+1		
	AGE 180 Farm Mechanics	3+1	01	04
Agro-Processing	AGP 330 Fundamentals of Food and Agro-Processing	2+0	01	02
Biochemistry and Molecular Biology	BMB 135 Chemistry of Biomolecules	2+1	02	07
	BMB 230 Metabolism of Biomolecules	3+1		
Crop Botany	CBT 110 Plant Taxonomy and Economic Botany	2+1		
	CBT 230 Plant Anatomy and Embryology	2+1	04	14
	CBT 250 Plant Physiology	3+1		
	CBT 455 Plant Ecology	3+1		
Computer Science and Information Technology	CST 140 Fundamentals of Computer Science	2+1	02	07
	CST 310 Information and Communication Technology	3+1		



	ENT 175 Insect Morphology	2+1		
	ENT 230 Insect Taxonomy and Systematics	3+1		
Entomology	ENT 260 Insect Ecology	2+1	05	18
	ENT 370 Economic Entomology	3+1		
	ENT 430 Insect Pest Management	3+1		
Environmental Science	ENS 355 Environmental Degradation and Management	2+0	01	02
	GPB 195 Cytology	2+1		
	GPB 235 Elementary Genetics, Evolution and Biodiversity	3+1		
Genetics and Plant Breeding	GPB 310 Introductory Cytogenetics	2+1	05	18
	GPB 355 Principles of Plant Breeding	3+1		
	GPB 460 Methods of Plant Breeding	3+1		
	HRT 105 Fundamentals of Horticulture	2+0		
	HRT 255 Vegetable and Spices Production	3+1		
Horticulture	HRT 280 Fruits and Plantation Crop Production	3+1	05	18
	HRT 370 Floriculture and Landscape Horticulture	3+1		
	HRT 415 Propagation and Nursery Management	3+1		
	PLP 212 Fundamentals of Plant Pathology	3+1		
	PLP 290 Principles of Plant Pathology	2+1		
Plant Pathology	PLP 340 Diseases of Field Crops	3+1	05	18
	PLP 390 Disease of Horticultural and Plantation Crops	3+1		
	PLP 450 Post-harvest Pathology	2+1		
	SSC 101 Introductory Soil Science	2+1		
	SSC 225 Soil Survey, Classification and Conservation	2+1		
Soil Science	SSC 355 Soil Physics	3+1	06	21
	SSC 365 Soil Chemistry and Fertility	3+1		
	SSC 425 Agricultural and Agro-Industrial Chemistry	2+1		
	SSC 440 Soil Microbiology	3+1		
Agricultural Economics	AEC 155 Agricultural Economics	3+0	01	03
Statistics	STT 270 Basic Statistics	3+1	01	04
Institute of Biotechnology/Genetic Engineering	BTL 410 Introductory Biotechnology	3+1	01	04
	GEU 110 Communicative English	2+0		
General Education	GEU 171 বাংলাদেশের অভ্যুদয়ের ইতিহাস	2+0	03	06
	GEU 410 Career Planning and Development	2+0		
Project Work/ Internship	Internship			07
<b>Grand Total=</b>		<b>145+48</b>	<b>56</b>	<b>200</b>

## 20. CURRICULAR LAYOUT FOR BS (AGRICULTURE) PROGRAM

**Table 2: Curricular Layout for BS (Agriculture) Program (Effective from Summer 2020 Term)**

### 1<sup>st</sup> year

Summer Term	Credit	Autumn Term	Credit	Winter Term	Credit
AGR 101 Fundamentals of Agronomy	2+1	AEC 155 Agricultural Economics	3+0	AGR 175 Fundamental of Cereal Crop Production	3+1
CBT 110 Plant Taxonomy and Economic Botany	2+1	AER 155 Fundamentals of Agricultural Extension and Rural Development	3+1	ENT 175 Insect Morphology	2+1
HRT 105 Fundamentals of Horticulture	2+0	BMB 135 Chemistry of Biomolecules	2+1	AGE 180 Farm Mechanics	3+1
SSC 101 Introductory Soil Science	2+1	CST 140 Fundamentals of Computer Science	2+1	GPB 195 Cytology	2+1
GEU 110 Communicative English	2+0			GEU 171 বাংলাদেশের অভ্যুদয়ের ইতিহাস	2+0
<b>Total Cr. hrs.</b>	<b>10+03</b>		<b>10+03</b>		<b>12+04</b>

Total Course and Cr. hrs. for 1<sup>st</sup> year = 14, and 42 (T+P: 32+10)

### 2<sup>nd</sup> Year

Summer Term	Credit	Autumn Term	Credit	Winter Term	Credit
BMB 230 Metabolism of Biomolecules	3+1	CBT 250 Plant Physiology	3+1	AER 265 Rural Sociology and Educational Psychology	2+0
PLP 212 Fundamentals of Plant Pathology	3+1	HRT 255 Vegetable and Spices Production	3+1	AGR 280 Seed Science and Technology	3+1
SSC 225 Soil Survey, Classification and Conservation	2+1	ENT 260 Insect Ecology	2+1	STT 270 Basic Statistics	3+1
CBT 230 Plant Anatomy and Embryology	2+1	AGR 255 Agro-climatology	2+1	HRT 280 Fruits and Plantation Crop Production	3+1
ENT 230 Insect Taxonomy and Systematics	3+1	GPB 235 Elementary Genetics, Evolution and Biodiversity	3+1	PLP 290 Principles of Plant Pathology	2+1
<b>Total Cr. hrs.</b>	<b>13+05</b>		<b>13+05</b>		<b>13+04</b>

Total Course and Cr. hrs. for 2<sup>nd</sup> year = 15 and 53 (T+P: 39+14)

### 3<sup>rd</sup> Year

Summer Term	Credit	Autumn Term	Credit	Winter Term	Credit
GPB 310 Introductory Cytogenetics	2+1	GPB 355 Principles of Plant Breeding	3+1	HRT 370 Floriculture and Landscape Horticulture	3+1
AFE 301 Fundamentals of Agroforestry and Environment	3+1	AFE 350 Silviculture	2+1	AGR 375 Production of Pulses, Oilseeds and Industrial Crops	3+1
AER 301 Management of Agricultural Extension Organization	3+1	PLP 340 Diseases of Field Crops	3+1	ENT 370 Economic Entomology	3+1
AGP 330 Fundamentals of Food and Agro-Processing	2+0	SSC 355 Soil Physics	3+1	SSC 365 Soil Chemistry and Fertility	3+1
CST 310 Information and Communication Technology	3+1	ENS 355 Environmental Degradation and Management	2+0	PLP 390 Diseases of Horticultural and Plantation Crops	3+1
AGR 330 Weed Science	3+1				
<b>Total Cr. hrs.</b>	<b>16+05</b>		<b>13+04</b>		<b>15+05</b>

Total Course and Cr. hrs. for 3<sup>rd</sup> year = 16 and 58 ( T+P: 44+14)

### 4<sup>th</sup> Year

Summer Term	Credit	Autumn Term	Credit	Winter Term	Credit
HRT 415 Propagation and Nursery Management	3+1	AGR 455 Irrigation and Farm Management	3+1		
AER 425 Communication and Technology Transfer	3+1	CBT 455 Plant Ecology	3+1		
ENT 430 Insect Pest Management	3+1	PLP 450 Post-harvest Pathology	2+1		
GEU 410 Career Planning and Development	2+0	SSC 440 Soil Microbiology	3+1		
BTL 410 Introductory Biotechnology	3+1	GPB 460 Methods of Plant Breeding	3+1	Internship	07
SSC 425 Agricultural and Agro-Industrial Chemistry	2+1				
<b>Total Cr. hrs.</b>	<b>16+05</b>		<b>14+05</b>		<b>07</b>

Total Course and Cr. hrs. for 4<sup>th</sup> year = 11 and 47 (T+P+I: 30+10+7)

Total Course = 56, Total Cr. hrs. = 200 (Theory 145 Cr. hrs. + Practical 48 Cr. hrs. + Internship-07 Cr. hrs.)

## 21. COURSE CURRICULA AND FACILITIES OF DIFFERENT DEPARTMENTS

### 21.1 Department of Agricultural Extension and Rural Development

The Department offers courses both in Undergraduate (BS) and Graduate (MS and PhD) programs. Research facilities are available for field studies in extension and rural education using the farmers' situation as a social laboratory. Major research thrusts are identification of constraints to agro rural development; development of alternative extension methods, strategies and approaches; and extension teaching methods and techniques; adoption and diffusion of new agricultural innovations and their sociocultural barriers and development of feedback mechanism on farmers' reactions on new technologies. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course Code	Course Title	Credit	Offering Year	Term
01	AER 155	Fundamentals of Agricultural Extension and Rural Development	3+1	1 <sup>st</sup> year	Autumn
02	AER 265	Rural Sociology and Educational Psychology	2+0	2 <sup>nd</sup> year	Winter
03	AER 301	Management of Agricultural Extension Organizations	3+1	3 <sup>rd</sup> year	Summer
04	AER 425	Communication and Technology Transfer	3+1	4 <sup>th</sup> year	Summer

#### 21.1.1 AER 155: Fundamentals of Agricultural Extension and Rural Development

<b>Course Type (Core/Electives)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

To provide knowledge to the beginner agriculture student to explain the concept and evolution of agricultural extension and its scope, objectives and principles and philosophies of agricultural extension; clarify education and its types, objectives, laws, and theories of learning; and develop a clear concept of rural development, scope, goal, approaches and essential elements of rural development.

#### Theory (Credit 3.0)

**Agricultural extension:** describe the concept of agricultural extension, explain the situation of agricultural extension in Bangladesh, explain the importance of agricultural extension education in Bangladesh, clarify the scope, philosophy, and principles of agricultural extension.

**Education and learning:** explain the different types of education with an emphasis on extension education, distinguish different types of education, identify and describe different types of learning, principles, and laws of learning, and elements of the learning process.

**Motivation in extension:** discuss expertly the concept and meaning of motivation, explain the motivation cycle and the role of motivation in job performance, describe the Maslow's need theory, the implication of Maslow's need theory in agricultural extension education.

**Rural development:** introduce the concepts, scope, goals, and approaches of rural development, familiarize with the organizations which are working with the rural development of Bangladesh.

**Rural youth:** define and characterize rural youth, explain the basic needs of rural youth in Bangladesh, identify and discuss the possibilities of rural youth in involving agriculture, agricultural extension, and other nation-building activities.

**Rural women:** explain the basic needs of rural women in Bangladesh, identify and discuss the possibilities of rural women in involving agriculture, agricultural extension, and other nation-building activities, acquire knowledge on landless farmers' categories, their salient features, and present status in Bangladesh.

### **Practical (Credit 1.0)**

1. Basic facts of Bangladesh: agriculture, population, education, administration, exports, and import of agricultural products.
2. Introduction to different organizations related to agricultural development and their main objectives and activities-DAE, DLS, DOF, and BADC
3. Introduction to different non-government organizations related to agricultural development and their main objectives and activities - ACI Agribusinesses, BRAC, PROSHIKA and CARE
4. Teaching aids used in extension education
5. Preparation and use of some low-cost extension teaching aids –poster, flash cards
6. Using multimedia projector as an extension teaching aids
7. Lecture and its practice
8. Visit to GOs (BRDB/BARD/RDA) and NGOs (BRAC/PROSHIKA/CARE/ACI)

### **21.1.2 AER 265: Rural Sociology and Educational Psychology**

<b>Course Type (Core/Electives)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory)</b>	: 2.0
<b>Contact Hours</b>	: 24 hours
<b>Total Marks</b>	: 100

## Course Objectives

To provide knowledge and skills to the student on the concept of rural sociology, rural social values, social control, rural social institutions and groups. This course also explains the socialization process, social stratification, personality, intelligence, attitude, perception, etc. Moreover, it also helps the learner to understand human psychology as a whole.

### Theory (Credit 2.0)

**Rural Sociology:** Definition, meaning, nature, scope, importance, limitations and elements of rural sociology; origin and development of rural sociology; society: characteristics of rural society; rural-urban characteristics; culture, norms, values and beliefs; rural sociology and other social sciences, anthropology: concept and types.

**Social Institutions:** Family: concept and meaning, types, functions, importance, group: concept and meaning, types, characteristics, preconditions of group formation, comparison of different types of groups; religion; marriage: divorce and separation; social mobility, community and its characteristics; migration: causes & consequences.

**Psychology:** concept of psychology; education and educational psychology; methods of obtaining information in psychology; scope of psychology; educational psychology as applied to extension; education; objectives and contributions of psychology; aims of educational psychology.

**Biological Basis of Human Behavior:** Concept and meaning of socialization, socialization process; social stratification; personality-concept and meaning, characteristics, factors affecting personality development; frustration-concept and meaning, causes of farmer's frustration, adjustment to frustration, social stratification.

### 21.1.3 AER 301: Management of Agricultural Extension Organizations

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory+ Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory+ Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

## Course Objectives

To impart knowledge to the students on organization, management, and administration so that they can acquire the techniques of managing agriculture-based projects, programs, agencies, organizations, or institutions.

### Theory (Credit 3.0)

**Extension organization:** describe the concept, meaning, elements, characteristics, and principles of agricultural organization, acquaint with organizational structure, policy, duties and responsibilities of different categories of personnel of DAE, identify and envision the problems

of agricultural extension work, future extension approaches, and strategies in Bangladesh.

**Management administration and supervision:** explain concept and meaning, level functions of management, and managerial skill, discuss the concept and characteristics of agricultural administration, increase efficiency in administration, identify and describe condition necessary for effective supervision, principle, function, and qualities of a good supervision

**Motivation and management theories:** explain the concept of motivation, motivation cycle, role of motivation in job performance, describe Maslow's need theory, theory X, and theory Y, their implication in the management of agricultural extension organization, explain the relationships between Maslow's need theory, theory X and theory Y.

**Group dynamics and team building:** explain the concepts of group, team, and group dynamics, and the phases of team building activities, describe the group conformity and deviance and social loafing, explain the group cohesiveness and factors leading to group cohesiveness.

**Leadership in agricultural extension:** explain the concepts, types, and important characteristics of leadership, comprehend the importance of leadership in extension and clarify the duties and responsibilities of professional and local leaders.

Program planning and evaluation in extension: explain the concept, importance, principles of agricultural extension program planning, describe the steps of extension program planning for agricultural development, describe the meaning, purpose, principles, and steps of monitoring and evaluation of projects related to extension work.

**Project planning and management:** describe the concept of project and project planning, beneficiaries and stakeholder, impact on target groups, Comprehend and describe the project development model and describe 3Cs of the project proposal, baseline study, need assessment, feasibility study, describe the project monitoring and evaluation and causes of project failure.

**ICT in agriculture:** describe the concept and types of ICT and ICT advances in the developed nation, explain the reason, prospect, constraint, and impact of ICT in agriculture, acquaint with E-agriculture and different APPs in Bangladesh agriculture practiced by DAE and other organizations.

### **Practical (Credit 1.0)**

1. Different organizations related to agricultural development in Bangladesh
2. Preparation of plan of work and calendar of work
3. Preparation and practicing of a training program
4. Planning of an agricultural extension program
5. Development of logical framework (log-frame) of some projects
6. Handling of office management procedures
7. Preparation of problem tree
8. SWOT analysis

#### 21.1.4 AER 440: Communication and Technology Transfer

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Autumn
<b>Pre-requisite (if any)</b>	: Previously offered AER courses
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

To impart knowledge and skills and change the attitude in extension communication; extension teaching methods; extension teaching aids; and transfer of technologies.

#### Theory (Credit 3.0)

**Extension communication:** explain the concept, scope, functions, and importance of communication, identify the models, types of elements, and feedback of the communication process, analyze the barriers and noise in communication.

**Extension teaching method:** explain the meaning, recognize the steps and classify extension teaching methods, compare and contrast extension teaching methods and plan situation-specific effective extension teaching method, recognize the factors to be considered in selecting and combining extension teaching methods for greater effectiveness.

**Extension teaching Aids:** describe extension teaching aids, classify and recognize their benefits, diagnose the advantages and limitations of extension aids, determine the criteria for selection and evaluation of extension teaching aids.

**Transfer of technologies:** define innovation, compare and contrast the types of innovation and describe the adoption and diffusion of agricultural innovation, elucidate innovation-decision process, innovativeness, and adopter categories and prepare diffusion curve, categorize the barriers to adoption and diffusion of innovations and sort the factors affecting the transfer of agricultural technologies in Bangladesh.

#### Practical (Credit 1.0)

1. Conduction of seminar, symposium, workshop, and conference
2. Preparation of printed materials: folder, leaflet, bulletin, handout, etc.
3. Preparation of farm RADIO talks and its practice
4. Data analysis and presentation techniques
5. Scientific report writing and presentation
6. Identification and preparing an inventory of important technologies in the field of agriculture
7. Conduction of extension education field trip at Upazila level and submission of its report



### 21.1.5 Faculty members of the department

Name	Designation	Mobile	E-mail
Dr. Md. Enamul Haque	Professor	01925-791440	<a href="mailto:denamul_aer@bsmrau.edu.bd">denamul_aer@bsmrau.edu.bd</a>
Dr. Md. Safiul Islam Afrad	Professor	01712-584820	<a href="mailto:Afrad69@gmail.com">Afrad69@gmail.com</a> ,
Dr. Shaikh Shamim Hasan	Professor	01920-156373	<a href="mailto:shamimaer@bsmrau.edu.bd">shamimaer@bsmrau.edu.bd</a>
Farhana Yeasmin	Professor	01711-053616	<a href="mailto:farhanaaer@bsmrau.edu.bd">farhanaaer@bsmrau.edu.bd</a>
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Dr. Muhammad Ziaul Hoque	Associate Professor	01931-527513	<a href="mailto:zia.bsmrau@gmail.com">zia.bsmrau@gmail.com</a>
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Mr. Shahriar Hasan	Lecturer	01834-001767	<a href="mailto:soumitra@bsmrau.edu.bd">soumitra@bsmrau.edu.bd</a>
Mr. Soumitra Saha	Lecturer	01913-505967	<a href="mailto:shahriar@bsmrau.edu.bd">shahriar@bsmrau.edu.bd</a>

### 21.2 Department of Agroforestry and Environment

The Department of Agroforestry and Environment has been functioning since 1996 to produce quality graduates in the field of Agroforestry and Environment and offering BS, MS and PhD programs. It has modern research facilities. The department gives emphasis on impact study, resource use and livelihood for students' research work. Besides its academic research, the department has good reputation of conducting contract research programmes funded by other organizations, particularly international organizations. Since its inception, the Department had successfully completed several research projects funded by BARC World Bank, UNESCO, FAO, EC and USDA. The Department has wide scope and facilities for undertaking research. The Department has well managed experimental field of 2.5 ha, with well-equipped laboratory facilities. The Department is acting as liaison office of the International Centre for Research in Agroforestry (ICRAF) in Bangladesh since 2003. The Department is actively involved in the Man and Biosphere Research in Bangladesh, and Asia-Pacific Network for Global Change Research (APN) as Scientific Planning Group Member since 2005. The Department has been providing technical services to the National and International organizations working in the country in relevant fields (agroforestry, environment, rural development, food security, land use etc.) through attending the program planning, midterm evaluation and program ending meetings/workshops. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course Code	Course Title	Credit	Offering Year	Term
01	AFE 301	Fundamentals of Agroforestry and Environmental Science	(3+1)	3 <sup>rd</sup> year	Summer
02	AFE 350	Silviculture	(2+1)	3 <sup>rd</sup> year	Autumn

### 21.2.1 AFE 301: Fundamentals of Agroforestry and Environmental Science

<b>Course Type (Core/Electives)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory+ Practical)</b>	: 4 (3.0 + 1.0)
<b>Contact Hours Theory+ Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

To enable the students, gather theoretical and practical knowledge about various aspects of agroforestry and environmental science.

#### Theory (Credit 3.0)

**Concept of agroforestry:** define agroforestry, describe characteristics of agroforestry, classify Agroforestry systems

**Forest ecosystems of Bangladesh:** identify major forest ecosystem in Bangladesh, describe floral and faunal composition of the major forest ecosystem in Bangladesh.

**Importance and development of agroforestry:** describe the need of agroforestry, discuss the importance of agroforestry, describe the history of agroforestry as a discipline.

**Agroforestry and relevant discipline:** distinguish Agroforestry, social forestry and community forestry.

**Species selection:** describe the characteristics of multipurpose tree species, select suitable tree species for Agroforestry system, manage tree species in agroforestry.

**Agroforestry hypothesis:** explain different hypothesis in agroforestry.

**Concepts of environment:** define environment, components of environment, discuss the importance of environment, differentiate hydrosphere, lithosphere and biosphere.

**Climate change and global warming:** describe different atmospheric layers, describe climate, climate variables, describe GHG and their contribution in global warming.

**Environmental pollution:** describe air and water pollution, measure air pollution and water pollution, discuss climate change and its impact on agriculture.

#### Practical (Credit 1.0)

1. Study on agroforestry classification
2. Management of agroforestry systems
3. Management of agroforestry species
4. Tree plantation technique and after care
5. Forest eco system of Bangladesh
6. Study on World forest
7. Bioecological zones of Bangladesh

8. Water pollution measurement BOD
9. Water pollution measurement COD
10. Water pollution measurement DO

### 21.2.2 AFE 350: Silviculture

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3 (2.0 + 1.0)
<b>Contact Hour (Theory+ Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To enable the students, gather practical knowledge about various aspects of silviculture, Bangladesh forests, seed processing, storage; nursery establishment; seedling raising, propagation and management; planting design.

#### Theory (Credit 2.0)

**Concept of silviculture and forests:** define the agroforestry, silviculture and related terms, describe different forests, classification and silvicultural practices in Bangladesh forest ecosystems.

**Seed sources and collection:** identify and describe different seed sources, seed collection area, time, quality, and method, time of maturity, equipment of seed collection.

**Seed processing and transportation:** describe seed processing and its importance, illustrate the sorting of fruits, extraction, cleaning, grading, drying, storage of seeds and transportation.

**Seed dormancy and quality:** know seed dormancy with classification and describe different mechanisms of breaking seed dormancy.

**Seedling raising and propagation:** discuss how to maintain seed documentation, explain different ways of seedling preparation with advantage and disadvantage, explain different types of sexual and asexual propagations with mechanisms.

**Nursery and plantation:** construct a nursery - types, infrastructure, main operation, and nursery stocks, design planting out – time, pattern, spacing, transporting planting materials and method of planting, planting survey, planting plan, tending operation and harvesting.

#### Practical (Credit 1.0)

1. Identification and characterization of major agroforestry tree species
2. Estimation of volume of Log of Sting Trees
3. Measurement of tree seed quality by seed testing
4. Propagation of tree planting materials
5. Study on some common agroforestry tree species (Botany, ecology, adaptation, distribution and use)

### 21.2.3 Faculty members of the department

Name	Designation	Mobile	E-mail
Dr. Md. Giashuddin Miah	Professor	01715-401443	<a href="mailto:giash1960@gmail.com">giash1960@gmail.com</a>
Dr. Md. Main Uddin Miah	Professor	01925-113813	<a href="mailto:mmumiahbsmrau@gmail.com">mmumiahbsmrau@gmail.com</a>
Mr. Tofayel Ahamed	Professor	010775-144738	<a href="mailto:tofayela@gmail.com">tofayela@gmail.com</a>
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Dr. Noor Shaila Sarmin	Professor	01816-923427	<a href="mailto:noorshaila@bsmrau.edu.bd">noorshaila@bsmrau.edu.bd</a>
Dr. Shohana Parvin	Associate Professor	01960-761244	<a href="mailto:jhuma929@yahoo.com">jhuma929@yahoo.com</a>
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Dr. Minhaz Ahmed	Associate Professor	01912-664678	<a href="mailto:minhaz@bsmrau.edu.bd">minhaz@bsmrau.edu.bd</a>
Dr. Satyen Mondal	Assistant Professor	01712-405149	<a href="mailto:satyen1981@gmail.com">satyen1981@gmail.com</a>

### 21.3 Department of Agricultural Engineering

The department of Agricultural Engineering started functioning since 2005 with a view to disseminating the basic knowledge of Agricultural Engineering among the BS (Agriculture) graduates of this University. It helps engenders knowledge in the field of Farm Power Machinery, Irrigation Water Management, Farm Small Structures and Farm Mechanization as a whole. The department accomplishes its intended function rendering knowledge to the BS (Agriculture) students through a course AEG-180 Farm Mechanics during winter term using two well equipped laboratories e.g. (1) Farm Machinery Laboratory and (2) Irrigation and Drainage Laboratory along with an (3) Engineering Workshop. The department also has a (4) Weather Station to collect meteorological data as well as to demonstrate the BS (Agriculture) students. Along with teaching the department is also involved in some basic and applied research on different aspects of irrigation and water management in the field of agriculture. The department of Agricultural Engineering is now in a state to offer MS degree on 'Irrigation and Water Management' in near future. List of the courses offered from the department in undergraduate program are as follows-

Sl. No	Course Code	Course Title	Credit	Offering year	Term
01	AGE 180	Farm Mechanics	3+1	1 <sup>st</sup> Year	Winter

#### 21.3.1 AGE 180: Farm Mechanics

<b>Course Type</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> year, Winter
<b>Prerequisite</b>	: Not required
<b>Credit (Theory+ Practical)</b>	: 4.0 (3.0 +1.0)
<b>Contact Hours (Theory+ Practical)</b>	: 60 hours (36 + 24)
<b>Total Marks</b>	: 150 (100 + 50)

## Theory (Credit 3.0)

**Farm mechanization:** describe the history, scope, importance and limitation of farm mechanization, explain the different approach of mechanization, and sustainability of agricultural mechanization, explain the ‘mechanization policy’ in Bangladesh, appreciate the need for mechanization research.

**Farm power:** describe the sources of farm power, engine and its classification, differentiate the operating principles of two stroke and four stork engines, clarify the engine working systems – fuel, ignition, cooling, lubricating and transmission system, engine trouble shooting, repair and maintenance.

**Farm implement and machinery:** classify farm implements and machinery, manage tillage implements, pre and post-harvest farm machineries, and plant protection machineries, select appropriate farm machinery, appreciate the hard ship of farm labor, change the attitude towards farm mechanization.

**Post-harvest technology:** define the importance of post-harvest technology (drying and storage of food grains), illustrate the principles and methods of drying and storing of food grains, assess the moisture content of food grains, fruits and spices and its determination,

**Engineering materials:** define and discuss the importance of construction materials, quantify Constituents, classification and uses of Bricks, and Sand, Cement, Steel and other construction materials.

**Irrigation drainage:** explain the importance, scope of irrigation and irrigation development in Bangladesh, analyze the legal and ethical issues regarding water resource development, distinguish the methods of irrigation, and their comparative advantages, be able to calculate water requirement of crops using different methods, and prepare irrigation schedule for a farm quantify the components required for micro irrigation systems, distinguish different water application devices in the market, classify irrigation pumps and wells, heir uses, and installations, classify pumps, read the pump performance datasheet and to maintain and troubleshoot pump problems, perform cost accounting of irrigation system components and to explore drainage tools and its importance in agriculture.

## Practical (Credit 1.0)

1. Tools and implements used in mechanized agriculture
2. Functional components of power sources
3. Farm implements
4. Tillage implements
5. Field application

### 21.3.2 Faculty members of the department

Name	Designation	Mobile	E-mail
Dr. Md. Moinul Hosain Oliver	Professor	01552-407298	<a href="mailto:oliver@bsmrau.edu.bd">oliver@bsmrau.edu.bd</a>
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Mr. Khokan Kumar Saha	Assistant Professor	01722-419061	<a href="mailto:ksaha@bsmrau.edu.bd">ksaha@bsmrau.edu.bd</a>
Mr. M. Moniruzzaman	Assistant Professor	01757-600426	<a href="mailto:moniruzzaman@bsmrau.edu.bd">moniruzzaman@bsmrau.edu.bd</a>
Mr. Md. Zamil Uddin	Lecturer	01733-782886	<a href="mailto:zamil@bsmrau.edu.bd">zamil@bsmrau.edu.bd</a>

## 21.4 Department of Agro-processing

The studies in Agro-processing are designed to strengthen the knowledge of students of the relevant engineering, biological, sociological and economic aspects of food processing as well as preservation, storage and marketing of those products. Agro-processing graduate will be equipped with theory and practical knowledge in grasping field problems associated with post production system. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course code	Course Title	Credit	Offering year	Term
1	AGP 330	Fundamentals of Food and Agro-Processing	2+0	3 <sup>rd</sup> Year	Summer

### 21.4.1 AGP 330: Fundamentals of Food and Agro-Processing

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: (2.0 +0.0)
<b>Contact Hour (Theory)</b>	: 24 hr.
<b>Total Marks</b>	: 100

### Course Objectives

To enable students to understand basic concept on food and gather practical knowledge about various aspects technological know-how of food and agro-product processing, preservation and product development.

### Theory (Credit 2.0)

**Basics of food and nutrition:** define, classify of foods based on origin, perishability, functions and acidity, water activity and pH., know the nutritional constituents of agro-products with their sources and functions.

**Basics treatments and behavior of food during processing:** be familiar with blanching, pasteurization and sterilization, browning reaction, caramelization, crystallization, lyophilization, purification, food additives and food fortification.

**Processing technology of field crops:** introduce major field crops suitable for processing in Bangladesh. Importance of postharvest processing of cereals, pulses and oilseeds, apply common methods for processing and preservation of major field crops.

**Processing technology of fruits and vegetables:** know the current status of production and processing of fruits and vegetables, minimal processing and storage of fresh fruits and

vegetables, product processing from fruits and vegetable, traditional methods for processing and preservation of fruits and vegetables.

**Processing technology of animal origin foods:** know the importance of fish, meat and dairy products; causes of spoilage and remedy, hygienic practices for postmortem changes in fish and meat; fermentation and fermented dairy products.

**Roles of beneficial and harmful microorganisms and enzymes associated with food:** know beneficial and harmful microorganism; food contamination, rancidity and spoilage; probiotics and prebiotics.

**Packaging techniques in food preservation:** understand the importance of food packaging, know common materials and machinery used in food packaging.

**Analysis of end product quality:** define risks and hazards, and critical control points, analyze HACCP and GMP, environmental hazards in agro-process industries and their uses.

**Management and utilization of food wastes:** know the management and utilization techniques of food wastes and by-products.

#### 21.4.2 Faculty members of the department

Name	Designation	Mobile	E-mail
Dr. Md. Amdadul Haque	Professor	01934-499867	<a href="mailto:mahaque@bsmrau.edu.bd">mahaque@bsmrau.edu.bd</a>
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Dr. Md. Aslam Ali	Associate Professor	01710-382040	<a href="mailto:aslam_agp@bsmrau.edu.bd">aslam_agp@bsmrau.edu.bd</a>
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#### 21.5 Department of Agronomy

The department offers courses for BS, MS and PhD Programs. Research facilities are available for field and laboratory works in most areas of stand establishment, crop physiology, eco physiology, crop management, weed science and seed science aspects of crop production. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course code	Course Title	Credit	Offering year	Term
1	AGR 101	Fundamentals of Agronomy	2+1	1 <sup>st</sup> Year	Summer
2	AGR 140	Fundamentals of Cereal Crop Production	3+1	1 <sup>st</sup> Year	Winter
3	AGR 255	Agro-climatology	2+1	2 <sup>nd</sup> Year	Autumn
4	AGR 325	Seed Science and Technology	3+1	2 <sup>nd</sup> Year	Winter
5	AGR 330	Weed Science	3+1	3 <sup>rd</sup> Year	Summer
6	AGR 375	Production of Pulses, Oilseeds and Industrial Crops	3+1	3 <sup>rd</sup> Year	Winter
7	AGR 455	Irrigation and Farm Management	3+1	4 <sup>th</sup> Year	Autumn

### 21.5.1 AGR 101: Fundamentals of Agronomy

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory+ Practical)</b>	: 48 hours (24 hours + 24 hour)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

Course objectives: The objective of the course is to develop knowledge base of the students in formulating crop production strategies in a condition of complex nature of agriculture.

#### Theory (Credit 2.0)

**Introduction- concept, importance and branches of agriculture:** define the agronomy, agriculture and history of agriculture, identify the scope and importance of Agriculture, describe the constraints and branches of agriculture.

**Basic principles of Agronomy and field crops:** describe the basic principles of Agronomy, classify different field crop of Bangladesh.

**Crop growth and cropping season:** describe crop growth and development process, identify cropping seasons in Bangladesh.

**Weather and climate:** define the weather and climate, identify the weather elements that influence crop.

**Seed:** define seed, identify the different structure of seed, classify seed, characterize good quality seed, illustrate seed germination process and supply of energy.

**Tillage:** define and classify tillage and importance of tillage, define tith and to illustrate the process involved in plough pan formation.

**Methods of crop cultivation:** define sowing, planting, plant population density, describe the systems of crop management, illustrate the intercultural practices.

**Plant nutrition:** define the different functions of plant nutrients.

**Crop geography of Bangladesh:** describe the crop geography of Bangladesh.

#### Practical (Credit 1.0)

1. Identification of cereal crops
2. Identification of pulse crops
3. Identification of oil seed crops
4. Identification of seeds of different crops and calculation of seed rate
5. Identification of different fertilizers and calculation of fertilizer dose
6. Identification and utilization of farm implements
7. Preparation of seed bed for rising rice seedling
8. Practicing intercultural operation



### 21.5.2 AGR 175: Fundamentals of Cereal Crop Production

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory+ Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

Course objectives: The objective of the course is to equip students with the knowledge on the cereal crops-environment interaction for maximum productivity and to get students practically acquainted with the physiological mechanisms of crop growth and development under changing microclimatic situations, especially under field conditions.

#### Theory (Credit 3.0)

**Concept of cereal crop:** understand the art and strategies of cereal crop production, understand the role, use and classification of cereal crops.

**Morpho-physiology of rice plant:** understand the mechanisms of growth processes at different developmental stages of a rice plant, Learn the physiology of growth and developmental processes of rice.

**Rice ecology:** acquaint with rice based cropping system, learn state of the art of rice production technology.

**Wheat plant:** develop strong background on understanding morphology and plant process of wheat crop, Understand the physiology of wheat plant related to growth and development.

**Cultivation of wheat:** get into state of the art of production technology of wheat for maximum utilization of natural resources.

**Cultural practices of maize:** understand the art of maize production technology under different climatic conditions.

**Barley production:** Get into knowledge on the morphology and physiology of barley plant, Understand state of the art of barley production technology under different climatic conditions.

**Cultivation of minor cereals:** develop strong background on understanding the morphology and physiology of proso millet and foxtail millet, understand the art of maximum use of natural resources for harnessing potential yield of minor cereals.

#### Practical (Credit 1.0)

1. Germination and seedling evaluation of rice, wheat and maize
2. Identification of different growth stages of rice plant
3. Leaf Area Index (LAI) measurement and seed rate, yield calculation
4. Study on yield and yield contributing characteristics of rice

5. Study of a wheat plant and determination of growth stages
6. Effect of irrigation and fertilizer on the growth and yield of Maize, Wheat and Barley cultivar
7. Effect of nitrogen and spacing on the growth and yield of rice

### 21.5.3 AGR 255: Agro-climatology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0+ 1.0)
<b>Contact Hour (Theory+ Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

Its aim is to enable students gather practical knowledge about various aspects of climatology and apply climatological information for the purpose of improving farming practices and increasing agricultural productivity both in terms of quantity and quality.

### Theory (Credit 2.0)

**Concept of weather and earth climate history:** describe the climate and weather, importance of agroclimatology, climatic variability, describe the Earth's climatic history, clarify the Earth's atmospheric layers.

**Atmospheric composition:** explain the biosphere and atmospheric gases, describe the sources of ozone (O<sub>3</sub>) in Earth's atmosphere, its harmful effects.

**Radiation balance:** discuss warming of the earth and the atmosphere, define and clarify radiation, light and energy balance, discuss radiation, temperature and radiation laws.

**Elements of weather and climate:** clarify relative humidity and air pressure: causes of high and low atmospheric pressure, illustrate relative humidity and air pressure: responsible for land breeze and sea breeze, hotness and coldness of seasons, discuss water cycle: processes of water movement and energy transfer in the Earth-Atmospheric system.

**Concept of Cloud:** describe cloud types, characteristics, and formation of cloud.

**Atmospheric pressure and earth rotation:** describe earth rotation: causes of Earth's season and characteristics of the seasons, clarify atmospheric pressure: factors and mapping, discuss atmospheric wind: nature, cause, flow and direction.

**Classification of world climate:** classify world climatic zone: Koppen climate classification system, describe World Climatic zone: study of the world map of Koppen-Geiger climate classification.

**Agro-climate of Bangladesh:** discuss agro-ecological zones (AEZ) of Bangladesh: Elements of formulating the AEZ, describe agro-climate of Bangladesh, clarify daily water balance model.

**Different climatic variables and crop production:** discuss the climatic variables and crop response: radiation day light and temperature, clarify the climatic variables and crop response: evaporation and rainfall, illustrate crop plants grown under different temperature and moisture regime.

### **Practical (Credit 1.0)**

1. Visit the weather station of BSMRAU
2. Study of weather instruments and data recording: Different types of Thermometer, Hygrometer
3. Study of weather instruments and data recording: Rain Gauge, Pan Evaporimeter and Aerovane
4. Data analysis on Spatial and temporal variability of temperature in Bangladesh
5. Data analysis on Spatial and temporal variability of Rainfall in Bangladesh
6. Study of Agro-ecological Zones (AEZ) of Bangladesh

#### **21.5.4 AGR 280: Seed Science and Technology**

<b>Course Type</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory+ Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

- i) Understand propagules used in crop production
- ii) Develop skill in production, processing and storing of seed
- iii) Assess seed quality attributes at laboratory condition
- iv) Know seed legislation and quality control

### **Theory (Credit 3.0)**

**Concept of seed:** know role, use and classification of seed, use propagules in crop production.

**Seed development and maturation:** explain flower bud initiation, male and female gametophyte development, describe process of fertilization, illustrate pattern of seed development and maturation.

**Chemical composition of seed:** compare chemical composition of different kind of seed, relate seed quality with chemical composition, seed and seedling structure.

**Seed dormancy:** understand significance, types and implication of seed dormancy, break different types of seed dormancy.

**Seed quality:** classify seed quality attributes, seed sampling and assess seed quality, examine seed health, categorize seed and field standard.

**Seed production:** determine factors of seed production, isolation distance and rouging of off-types plants, identify optimum time of harvest for quality seed, distinguish different parental lines for hybrid seed production.

**Seed processing:** clean, dry, treat and packing of seed, regulate storage environment for increasing life span of seed.

**Seed quality control:** certify seed based on prescribed standard, describe factors regulating seed marketing.

### **Practical (Credit 1.0)**

1. Seed identification
2. Seed structure
3. Seed sampling
4. Purity analysis
5. Seed moisture test
6. Seed germination test
7. Seed vigor test
8. Calculation of seed rate
9. Seed treatment

### **21.5.5 AGR 330: Weed Science**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objective**

The objective of the course is to develop knowledge base of the students on weed infestation patterns and formulating weed management strategies under diverse cropping environments.

### **Theory (Credit 3.0)**

**Concept, definition, and characteristics of weeds:** define, characterize and classify weeds, biology, propagation and distribution of weeds, persistence of weeds; study of the common agricultural weeds.

**Crop weed interference:** understand crop-weed interference, identify elements of completion, critical period of crop-weed competition, factors affecting competition, concept of allelopathy; types of allelopathy and allelochemicals.

**Weed management:** describe concept and principles of weed management including integrated weed management.

**Weed control techniques:** gain understanding on various methods of weed control with their applicability, merits and demerits.

**Chemical weed control:** gain knowledge on herbicide classification, formulation and additives; behavior of herbicides in plant and soil; mode of action of herbicides, learn herbicide application techniques, associated hazards and safety measures; brief accounts of commonly used herbicides in Bangladesh agriculture.

**Weed management in BD agriculture:** crop-based weed management systems in major field crops.

### **Practical (Credit 1.0)**

1. Collection, identification and characterization of major upland and lowland weeds
2. Identification, description and use of major weeding implements
3. Identification, description and use of herbicide sprayers
4. Identification, description and use of commonly used herbicides.
5. Weeding exercise by using different weeding implements under upland and lowland situation.
6. Dose calculation of herbicides and calibration of herbicide sprayer
7. Determination of weed seedbank status in grains.

### **21.5.6 AGR 375: Production of Pulses, Oilseeds and Industrial Crops**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory+ Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

The objective of the course is to develop knowledge base of the students in the act of producing pulses; oilseeds and industrial crops through conserve the natural resources for the future generation to achieve the sustainable development goal.

### **Theory (Credit 3.0)**

**Introduction-concept, importance of pulses, oilseeds and industrial crops:** describe the importance of pulses, oilseeds and industrial crops, identify the problems to grow pulses, oilseeds and Industrial crops in Bangladesh.

**Production technology of lentil and grass pea:** describe origin, distribution and classification of lentil and grass pea, identify the suitable soil and climate for growing lentil and grass pea crops, prepare appropriate schedule for growing lentil and grass pea crops.

**Production technology of green gram, black gram and chick pea:** describe origin, distribution and morphological features of green gram, black gram and chick pea, identify suitable soil and climatic for growing green gram, black gram and chick pea, prepare appropriate schedule for growing green gram, black gram and chick pea.

**Production of oilseed crops:** identify the causes of low productivity of oilseeds crops in Bangladesh, describe the techniques of increasing yield of oilseed crops in Bangladesh.

**Production technology of mustard, sesame and ground nut:** describe origin, distribution, morpho-physiology and classification of Mustard, Sesame and Ground nut, identify suitable soil and climate for mustard, Sesame and ground nut crops, prepare appropriate schedule for growing mustard, sesame and ground nut crops.

**Production technology of soybean, sunflower, safflower and niger:** describe origin, morphology and classification of soybean, sunflower, safflower and niger, identify suitable soil and climate for growing of soybean, sunflower, safflower and niger crops, prepare appropriate schedule for growing soybean, sunflower, safflower and niger crops.

**Production of industrial crops:** describe the importance, classification and name and causes of low productivity and low yield of industrial crops in Bangladesh, suggest the techniques or means of increasing yield and production of industrial crops.

**Production technology of cotton and jute:** describe origin, distribution and classification of cotton and jute, identify the suitable soil and different growth stages of cotton and jute crops, suggest and prepare an appropriate production schedule of cotton and jute crops.

**Production of sugar producing crops:** describe the importance, classification of sugar crops, identify the causes of low productivity of sugar crops in Bangladesh, suggest know the means of increasing sugar crop yield and production.

**Production technology of sugarcane and sugar beet:** describe morphology and growth stages of sugarcane and sugar beet, identify suitable soil and climate of sugarcane and sugar beet crops, suggest and prepare an appropriate production schedule of sugar and sugar beet.

### **Practical (Credit 1.0)**

1. Practicing different methods of planting sugarcane
2. Study on the effects of salinity on growth and development of soybean plant
3. Study on the effects of drought on growth and development of cowpea plant
4. Study on the effects of waterlogging on growth and development of soybean plant
5. Study on the effects of shade on growth and development of soybean plant
6. Study on the effects of fertilizer management on growth and yield of mustard plant
7. Study on the effects of plant density on growth and development of chickpea
8. Study on the effects of weeding on growth and development of chickpea

### 21.5.7 AGR 455: Irrigation and Farm Management

<b>Course type</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Autumn
<b>Prerequisite</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact hour</b>	: 60 hours (36 hours + 24 hours)
<b>Total marks</b>	: 150 (100 + 50)

#### Course Objectives

The objective of the course is to develop knowledge base of the students in quantifying irrigation water requirement, describing irrigation methods and determining irrigation efficiency and scheduling, and managing agricultural farm including financial and human resources with proper planning.

#### Theory (Credit 3.0)

**Soil, soil water and plant related to irrigation practices:** describe the role of irrigation water in agricultural systems, describe the factors contribute to developing a workable and efficient irrigation schedule, define the soil-water and plant factors related to irrigation.

**Estimation of crop and irrigation water requirement:** describe various methods of estimating crop water need, estimate when to irrigate and how much water to apply.

**Methods and practices of irrigation:** discuss different irrigation systems and methods with their advantages and disadvantages, describe irrigation scheduling of upland and wetland crops.

**Irrigation water use efficiency and management:** explain various irrigation efficiencies, describe various irrigation management strategies and technologies.

**Farm management concepts and farming:** define farm and farm management, explain economic principles of farm management, describe farming types and farming systems.

**Farm resource mapping and utilization:** identify the factors to be considered for sustainable farming, mapping and describe the strategies of farm resource management, explain the precision farming.

**Farm budgeting and farm planning:** define the commercial farming, explain enterprise and partial budgeting, prepare a whole farm budget and planning.

**Financial, personnel and risk management in a farm:** discuss financial and risk management in a farm, explain human resource management of a farm, describe farm efficiency and farm enterprise diversification.

**Irrigation and farm management practices:** theoretical aspects of farm layout, experimental layout, preparing crop rotation and cropping scheme.

## Practical

1. Calculation of irrigation water requirement for upland crops
2. Soil test base (STB) fertilizer recommendation of different crops
3. Determination of water need of rice for different irrigation methods
4. Preparation of crop rotation schedule
5. Preparation of crop calendar
6. Crop cutting experiment
7. Preparation of experimental layout
8. Farm records and maintenance
9. Visiting an agricultural farm

### 21.5.8 Faculty members of the department

Name	Designation	Mobile	E-mail
Dr. Md. Abdul Karim	Professor	01758-098591	<a href="mailto:akarim1506@gmail.com">akarim1506@gmail.com</a>
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### 21.6 Department of Biochemistry and Molecular Biology

The department offers courses for undergraduate and Postgraduate programs. List of the courses offered from the department in undergraduate program are as follows-

Sl. No	Course Code	Course Title	Credit	Offering year	Term
01	BMB 135	Chemistry of Biomolecules	2+1	1st year	Autumn
02	BMB 230	Metabolism of Biomolecules	3+1	2 <sup>nd</sup> year	Summer



## 21.6.1 BMB 135: Chemistry of Biomolecules

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To enable the students, demonstrate the roles biomolecules in living organisms, explain properties and functions, and gain detail aspects of structural features of various biomolecules, including carbohydrates, proteins, enzymes, lipids/fats, and nucleic acids.

### Theory (Credit 2.0)

**Basics of biochemistry and molecular biology, and biomolecules:** define biochemistry and molecular biology and various terms related to this subject, understand and explore the scope and importance and to introduce with the principle achievements of biochemistry and molecular biology, define biomolecules and classify biomolecules and to provide an overview on biomolecules and their relationships in biological system.

**Biomolecule 1-carbohydrates:** carbohydrates on the basis of structure and functions, understand different functions and sources of carbohydrates, define monosaccharides, aldoses, ketoses, and to illustrate properties and stereochemistry of monosaccharides; isomerism, D-, L-isomers, chiral carbon, optical activity, racemic mixtures, meso-compound, enantiomers and diastereoisomers, cyclization of monosaccharides, mutarotation and derivatives of monosaccharides, define understand the functions of disaccharides, trisaccharides, polysaccharides, understand glycosidic linkages, reducing and non-reducing sugars, and structural features of starch, glycogen, cellulose, chitin, dextran, and heteropolysaccharides like heparin, hyaluronic acids, Keratan sulfate etc.

**Biomolecule 2-proteins:** introduce and discuss the discovery of amino acids, define amino acids, and proteins, and to explore the functions and properties of amino acids and proteins, classify amino acids and understand the general structure of amino acids proteins, illustrate peptide bond formation the features of peptide bond, understand structural organization, properties and functions of proteins.

**Biomolecule 3-proteins (enzymes):** introduce brief history of enzymes, define and classify enzymes, and to assess the importance of enzyme study, explore differences between catalysts and biocatalysts, understand and nomenclature and properties of enzymes; including regulation of enzyme activity, ribozymes, exo- and endo-enzymes.

**Biomolecule 4- lipids and fats:** define, classify, and understand the biological functions of lipids and fats, define and classify fatty acids based on structures and nutritional aspects, understand nomenclature and structure of various essential and non-essential fatty acids, define and understand the structure and function of cholesterol and other complex lipids.

**Biomolecule 5- nucleic acids:** define and classify nucleotides and nucleic acids, understand properties and structural features of DNA and RNA, Chargaff's rule, Watson and Crick model of DNA, differentiate between nucleosides and nucleotides, and DNA and RNA, discuss the occurrence of nucleic acids in different species and cellular compartments.

### Practical (Credit 1.0)

1. Demonstration on lab-safety rules, and use of pH meter and analytical balance
2. Identification of organic compounds and color tests for biomolecules
3. Preparation of 0.1 N Sodium Carbonate and determination of the strength of supplied HCl solution
4. Estimation of glucose by Nelson Somogyi method
5. Separation and identification of different sugars and amino acids by thin layer chromatography (TLC)
6. Estimation of acetic acid content in the supplied vinegar solution
7. Determination of dissociation constant ( $K_a$ ) of a weak acid using half volume method
8. Preparation of buffer solution and demonstration on the determination of buffering capacity of acid and basic buffers

### 21.6.2 BMB 230: Metabolism of Biomolecules

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: BMB 135 (Chemistry of Biomolecules)
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To enable the students, gather in-depth knowledge on metabolisms of biomolecules including carbohydrates, proteins, lipids and nucleic acids, as well as understand the interrelationships of various pathways involved in the metabolisms of those biomolecules, and obtain technical knowledge for analyzing various metabolites associated with cellular metabolisms.

### Theory (Credit 3.0)

**Basics of metabolism:** define metabolisms and to differentiate between different classes of metabolism in biological system, explore the list of major metabolic pathways involved in living cells, introduce intermediary metabolism and metabolic regulations.

**Carbohydrate metabolism-I:** illustrate basic on different pathways and fates of carbohydrate metabolism, understand carbohydrate biosynthesis by taking examples of glucose, sucrose, starch, glycogen and cellulose, know carbohydrate catabolism in terms of glycolysis, glycogenolysis, and starch mobilization, understand the differences between aerobic and anaerobic glycolysis,

and their importance in living cells, define and understand the alternative fate of glucose metabolisms in terms of pentose phosphate pathways, understand the importance of pentose phosphate pathway in biological reactions, explain gluconeogenesis and its hormonal regulation, illustrate cori-cycle and its importance in health, explore glyoxalate cycle and its importance.

**Carbohydrate metabolism-II:** introduce and discuss tricarboxylic acid (TCA) cycle and its regulation, understand the biosynthetic roles of TCA cycle intermediates, and anaerobic reactions, illustrate electron transport chain (ETC), and its different complexes involved in ETC, explain chemiosmotic hypothesis and oxidative phosphorylation for ATP production in ETC, understand the contribution of ETC to reactive oxygen species (ROS) production and antioxidant mechanism for ROS detoxification.

**Amino acid and protein metabolism:** explain protein turnover, and amino acid biosynthesis and regulation, identify the pathways that convert amino acids to specialized products, describe amino acid catabolism by transamination and oxidative degradation, define the metabolic fate of carbon skeletons derived from amino acid catabolism, explain biosynthesis and importance of ketone bodies, understand the importance of urea cycle for nitrogen metabolism, establish the linkage between Urea cycle and TCA cycle, explain how hormones regulate protein biosynthesis.

**Nucleotide and nucleic acid metabolism:** understand the biosynthesis of purine and pyrimidines using salvage and de-novo pathways, explain the formation of deoxy-nucleotides, elucidate the pathways involved in the synthesis of nucleotide co-enzymes, e.g. NAD (P), Coenzyme A, FAD etc., illustrate degradation of nucleotides and associated metabolic disorders, understand the synthesis of DNA from DNA (replication), RNA from DNA (transcription) and protein from RNA (translation).

**Lipid and fat metabolism:** elucidate the cell membrane structure made up of different types of lipids, illustrate fat mobilization and production of fatty acids, understand the biosynthesis of saturated and unsaturated fatty acids, acquire knowledge on how fatty acids are catabolized by different types of oxidation reactions and their regulations, understand the biosynthesis of (phyto) cholesterol and its roles in vitamin-D synthesis, explain synthesis and degradation of phospholipids and glycolipids.

**Intermediary metabolism and bioenergetics:** define the concept of bioenergetics, understand free energy, enthalpy, entropy, and standard free energy change, illustrate ATP's role as universal energy carrier and ATP-ADP cycle.

### **Practical (Credit 1.0)**

1. Verification of Beer-Lambert law and determination of absorption maxima ( $\lambda_{max}$ ) of proteins and nucleic acids
2. Demonstration on photosynthetic pigments and estimate of photosynthetic pigments in a given plant sample
3. Estimation of secondary metabolites (e.g. phenolic) from plant leaves
4. Estimation of soluble sugars, reducing and non-reducing sugars in a given plant sample
5. Determination of activity of antioxidant enzymes from plant samples
6. Determination of protein content in plant samples by biuret and Bradford method

7. Estimation of ascorbic acid content in supplied fruit juice by Bessel's titrimetric method
8. Extraction of total nucleic acids from plant tissues and qualitative test for nucleic acids
9. Determination of fat and oil contents in biological samples

### 21.6.3 Faculty members of the department

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### 21.7 Department of Crop Botany

The department offers courses for undergraduate and postgraduate programs. The Department of Crop Botany has major research programs on: various physiological processes under normal and stressful conditions, plant nutrition, ecophysiology of different crops, hormonal regulation of crop growth and development, embryological aspects of fruit development and biochemical and nutritional aspects of fruits and vegetables. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course Code	Course Title	Credit	Offering year	Term
01	CBT 110	Plant Taxonomy and Economic Botany	2+1	1 <sup>st</sup> year	Summer
02	CBT 230	Plant Anatomy and Embryology	2+1	2 <sup>nd</sup> Year	Summer
03	CBT 250	Plant Physiology	3+1	2 <sup>nd</sup> Year	Autumn
04	CBT 455	Plant Ecology	3+1	4 <sup>th</sup> Year	Autumn

#### 21.7.1 CBT 110: Plant Taxonomy and Economic Botany

**Course Type (Core Course/Electives)** : Core Course

**Level/Term and Section** : 1<sup>st</sup> Year, Summer

**Pre-requisite (If any)** : Not required

**Credit (Theory + Practical)** : 3.0 (2.0+1.0)

**Contact Hours (Theory + Practical)** : 48 hours (24 hours+24 hours)

**Total Marks** : 150 (100 + 50)

#### Course Objectives

To comprehend the plants on morphological basis and get clear idea on modern plant classification and nomenclature system, to get idea on morphological descriptors for characterization and identification of crop plants, and to get a vivid idea about the economic importance of different plant families.

## Theory (Credit 2.0)

**Introduction to taxonomy and systematics:** understand the principles of plant taxonomy and systematics, gather knowledge on modern system of plant classification.

**Plant Nomenclature:** can explain the scientific procedure of plant naming.

**Morphology of root (descriptor):** describe different modifications of root, group plants on root type.

**Morphology of shoot (descriptor):** describe different modifications of stem and leaf., broadly classify plants on the morphological features of shoot.

**Floral and fruit biology (descriptor):** apply the acquired knowledge to classify inflorescence, flower and fruits, can explain the reproductive biology of plants.

**Families and their economic importance:** both monocot and dicot, identifying features of the important crop families, describing the crop plants of important families by morphologically, evaluate the economic importance of different families.

## Practical (Credit 1.0)

1. Morphology of normal and modified roots
2. Morphology of normal and modified shoot
3. Inflorescence of crop plants
4. External morphologies of crop plants of economically important families viz. Poaceae, Solanaceae, Fabaceae, Malvaceae, Cucurbitaceae, Tiliaceae etc.

### 21.7.2 CBT 230: Plant Anatomy and Embryology

**Course Type (Core Course/Electives) :** Core Course

**Level/Term and Section :** 2<sup>nd</sup> Year Summer

**Pre-requisite (If any) :** Not required

**Credit (Theory + Practical) :** 3.0 (2.0 + 1.0)

**Contact Hours (Theory + Practical) :** 48 hours (24 hours + 24 hours)

**Total Marks :** 150 (100 + 50)

## Course Objectives

To understand the internal structures i.e. micromorphology along with their tissue and tissue systems, primary and secondary growth of tissue in the crop plants, and to get a comprehensive idea on the embryogenesis and its practical implications.

## Theory (Credit 2.0)

**Organization of tissue and its types and functions:** understand what plant tissue namely meristematic and permanent tissues, elucidate the classification and functions of tissue.

**Tissue system:** describe the arrangement of tissues in roots, stem and leaves, understand the tissue system of roots, stem and leaves.

**Primary and secondary growth of stem and roots:** explain the primary and secondary growth of crop plants, understand stele and vascular transition, gather knowledge of cambium, periderm and understand the annual ring and type of wood.

**Micro and mega gametogenesis of angiosperm:** understand the micro and mega sporangium, understand the process of micro and mega spore formation, understand the micro and mega-gametogenesis.

**Fertilization of gametes, endosperm and embryo formation:** understand the process of fertilization with their types, describe post fertilization consequence, perceive the formation of endosperm and embryo of both monocots and dicots.

**Apomixes and somatic embryogenesis:** understand apomixes and its type, describe the polyembryony, understand somatic embryogenesis.

### **Practical (Credit 1.0)**

1. Tissue and its types and functions demonstrations of cell, stomata
2. Tissue system of monocot and dicot crop plants namely Poaceae, Fabaceae, Tiliaceae, Cucurbitaceae family
3. Primary and secondary growth of stem and roots
4. Micro and mega gametogenesis of angiosperm demonstration of pollination
5. Fertilization, apomixes and somatic embryogenesis

### **21.7.3 CBT 250: Plant Physiology**

**Course Type (Core Course/Electives) :** Core

**Year and Term :** 2<sup>nd</sup> Year, Autumn

**Pre-requisite (If any) :** Not required

**Credit (Theory + Practical) :** 4.0 (3.0 + 1.0)

**Contact Hours (Theory + Practical) :** (36 hours + 24 hours)

**Total Marks :** 150 (100 + 50)

### **Course Objectives**

To provide a comprehensive knowledge of plant's cell functioning to upgrade students' ability for demonstrating the integrated functions of plant growth resources like water, CO<sub>2</sub>, solar radiation, nutrients etc. for growth, development and productivity.

### **Theory (Credit 3.0)**

**Cell water relation:** understand functions of water in a plant cell, explain the processes and energy of water movement across the membrane and its energy relation.

**Plant water relation:** describe water movement from root to leaf, acquire knowledge of stomatal movement with transpiration.

**Light harvesting by pigment system:** elucidate the ultrastructure of chloroplast, explain the mechanism and functions of light harvesting system, describe the synthesis of assimilatory power.

**Integrating light energy, water and CO<sub>2</sub> in photosynthesis, and photorespiration:** explicate the pathways of CO<sub>2</sub> assimilation, and their significance, describe the photorespiratory effects on plant growth.

**Photoassimilate transport:** explain phloem loading, and transport mechanism of photoassimilates from source to sink.

**Respiratory pathways and utilization of photoassimilates:** illustrate the mechanism of energy and carbon regeneration from photoassimilates and their utilization.

**Hormonal regulation of plant growth and development:** explain physiological action of growth hormone, discuss the mechanism of plant growth movement, understand the physiology of flowering.

**Plant growth analysis and regulation of growth:** gather knowledge on growth and development of a plant, quantify plant growth and development.

**Plant stress physiology regarding implication of abiotic stresses in plant growth and development:** gather knowledge on the acclimation of plants to abiotic stresses, understand the mechanisms abiotic stress acclimation process.

**Physiology of flowering, photoperiodism, vernalization, ageing and senescence:** understand the physiology of flowering.

### **Practical (Credit 1.0)**

1. Cell water movement
2. Transpiration
3. Photosynthesis
4. Respiration
5. Plant growth analysis
6. Demonstration of apical dominance activity

### **21.7.4 CBT 455: Plant Ecology**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To comprehend the interactions of organisms and their environments, to give detailed idea on the ecosystem, and energy flow in different ecosystem the consequences of biotic and abiotic interactions for population and community dynamics and ultimately for plants' adaptation to different habitats.

## Theory (Credit 3.0)

**Plant ecology and environmental factors:** understand what plant ecology is and its classification, elucidate the roles of environmental factors on the vegetation.

**Ecosystem:** describe the links between different factors of an ecosystem, understand the biological productivity and energy flow in natural systems.

**Population and community ecology:** explain different aspects of plant population interactions and dynamics, discuss different types of community structures and their relationship with vegetation and crop inter-culture.

**Plant succession:** explain the progressive stages of an ecological succession, explicate the role that plants play in maintaining biodiversity, elucidate how organisms survive after their ecosystem has been disturbed.

**Plant adaptation under normal and adverse condition:** detect different types of adaptations made by plants, connect plant adaptations with environmental characteristics.

**Phytogeography and plant conservation:** realize the importance of conservation, describe the methods of plant conservation and preservation.

**Elucidate the roles of atmospheric gases in plant productivity:** able to explain the impact of greenhouse and other atmospheric gases.

## Practical (Credit 1.0)

1. Structural comparison of C3, C4 and CAM plants and their respond to environmental factors related to plant growth.
2. Field visit to plant ecosystem study.
3. Species interactions and their effects on plant growth.
4. Analyze structural characteristics of a plant community namely frequency, density and abundance.
5. Vegetation analysis and measurement of species diversity using quadrat method
6. Structure of plants on light/salinity sensitivity (psammophyte/ halophyte).
7. Adaptive features of hydrophytes, xerophytes and sciophytes to changing climate.

### 21.7.5 Faculty members of the department

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## 21.8 Department of Computer Science and Information Technology

This is a newly developed supporting department offering courses for Undergraduate and Graduate programs. It has a computer laboratory. List of the courses offered from the department are as follows-

Sl. No	Course Code	Course Title	Credit	Offering Year	Term
01	CST 140	Fundamentals of Computer Science	2+1	1 <sup>st</sup> year	Autumn
02	CST 310	Information and Communication Technology	3+1	3 <sup>rd</sup> year	Summer

### 21.8.1 CST 140: Fundamentals of Computer Science

**Course Type (Core Course/Electives)** : Core Course

**Year and Term** : 1<sup>st</sup> Year, Autumn

**Pre-requisite (If any)** : Not required

**Credit (Theory + Practical)** : 3.0 (2.0 + 1.0)

**Contact Hours (Theory + Practical)** : 48 hours (24 hours + 24 hours)

**Total Marks** : 150 (100 + 50)

### Course Objectives

To acquaint the agricultural graduates with the concepts of computer basics with particular attention to agricultural examples obtain applied skills on the fundamentals of hardware, software, and application programming as they pertain to agriculture to enable the students gathering practical and theoretical knowledge about the use of Computer Technologies in the field of agriculture.

### Theory (Credit 2.0)

**Introduction to computer:** define the term, computer and describe the relationship between data and information, explain the classification of computer, computer generation, characteristics of computer, computer application and limitation of computer.

**Basic computer organization:** simplify block representation of computer, describe the component of computer system.

**Computer memory:** describe various types of storage devices and their storage capacities, discuss various concepts related to memory of the computer.

**Network and internet:** explain the concept of network and internetwork of agricultural commodities, determine the application of Internet in agricultural sector.

**Data, information, software and ICT tools:** define the term, hardware, software, classification of software and describe the relationship between hardware and software, explain the concept of computer programming, describe translator and their types, discuss program development process and the various stages in the development of computer program.

**Data communication and computer network:** explain the concept data communication,

classify the data transmission method and data transmission mode, compare among the medium of data communication, explain computer network, networking devices and network topology.

**Uses ICT in agriculture:** apply internet of things (IoT) in agriculture, execute social network in agriculture.

### **Practical (Credit 1.0)**

1. Practical Based Lab Work Plan
2. Application of MS word in preparing class assignment and tutorial
3. Graphical representation of agricultural data
4. Navigating workbook and Spreadsheets
5. Explore to digital libraries, archives and eBooks
6. Web search engine
7. Scientific presentations

### **21.8.2 CST 310: Information and Communication Technology**

**Course Type (Core Course/Electives) :** Core Course

**Year and Term :** 3<sup>rd</sup> Year, Summer

**Pre-requisite (If any) :** Not required

**Credit (Theory + Practical) :** 4.0 (3.0 + 1.0)

**Contact Hours (Theory + Practical) :** 60 hours (36 hours + 24 hours)

**Total Marks :** 150 (100 + 50)

### **Course Objectives**

To enable the students gathering practical and theoretical knowledge about the use of information and communication Technologies in the field of agriculture acquaint the agricultural graduates with scope of ICT in agriculture obtain applied skills on ICTs implementation as they pertain to agriculture.

### **Theory (Credit 2.0)**

**Introduction to ICT:** learn introductory knowledge of ICT, ICT infrastructure, understand the application of ICT for agricultural development.

**Data processing:** gather knowledge on data, information, data processing, types along with modes of processing.

**Data structure and E-R diagram:** explain data structure and classification of data structure, comprehend the concept of database and entity relationship, understand terms related to database design and management systems.

**Structured query:** describe structured programming language such as DDL/DCL/DML, describe different types of structured query language (SQL).

**Geographical information system (GIS):** introductory terms of Geographical Information

Systems (GIS) and different components of GIS, GIS application in agriculture, skills requirement for different GIS analysis and geospatial data representation.

**Data communication and Computer network:** explain the concept of data communication, classify the data transmission method and data transmission mode, capable to compare among the medium of data communication, develop skills to explain computer network, networking devices and network topology.

**Network, internet, and IoT in agriculture:** understand practical and theoretical knowledge of network, internet, and internet of things (IoT) for agriculture, use of practical ICT especially for agricultural resource management.

### Practical (Credit 1.0)

1. Practical Based Lab Work Plan
2. Agricultural online survey design using cloud services
3. Design and Develop Agricultural Information System Using DBMS
4. Introduction and Installation of ArcGIS for Desktop
5. Insertion of data from “Google earth” and “storage mediums” into Arc Map
6. Creating and Editing shape file in Arc Map (Lesson 3), Use of “SELECT” toll in Arc GIS (Lesson 4), Over layer Analysis/ Union of two layers

### 21.8.3 Faculty members of the department

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### 21.9 Department of Entomology

The department offers Undergraduate (BS Agriculture) courses and Graduate programs leading to MS and PhD degree. The Entomology department has a major research thrust on i) ecological and biological studies of insect pests and their natural enemies, their behavior for insect pest suppression, and management, ii) integrated pest management, iii) biological studies of pollinators and their utilization in vegetable seed production and migratory beekeeping for honey production, iv) environmental toxicology of pesticides and v) collection, identification and preservation of insect pests and their natural enemies. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course Code	Course Title	Credit	Offering year	Term
01	ENT 175	Insect Morphology	2+1	1 <sup>st</sup> year	Winter
02	ENT 230	Insect Taxonomy and Systematics	3+1	2 <sup>nd</sup> year	Summer
03	ENT 260	Insect Ecology	2+1	2 <sup>nd</sup> year	Autumn
04	ENT 370	Economic Entomology	3+1	3 <sup>rd</sup> year	Winter
05	ENT 430	Insect Pest Management	3+1	4 <sup>th</sup> year	Summer

### 21.9.1 ENT 175: Insect Morphology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To achieve the basic and practical knowledge about morphology and physiology of insects.

### Theory (Credit 2.0)

**Introduction to entomology:** provide scope and prospects of entomology, introduction to morphology and structure of insects.

**Insect head and its appendages:** structure and functions of insect head and its appendages (antennae, mouthparts, eyes), classify and identify the insect head and its appendages.

**Insect thorax and its appendages:** study, classify and identify the insect thorax and its appendages (Legs and wings).

**Insect abdomen:** modification and appendages: study the details of insect abdomen and its appendages.

**Insect reproductive system:** To study the structure and functions of male and female reproductive system of insect, study the different types of reproduction by insects.

**Insect integument, moulting and metamorphosis:** learn the structure and functions of insect integument, study the moulting and metamorphosis process by insects, study and identify the different life stages of insect with their types.

**Digestive and excretory system of insect:** acquire knowledge about the structure, functions and process of digestive system of insect, study the excretion process of insect.

**Respiratory and circulatory system of insect:** acquire knowledge about the structure and functions of respiratory and circulatory system, study the methods of respiration and blood circulation by terrestrial, aquatic and end parasitic insects.

**Nervous system and sense organs of insect:** study the types of neuron as well as structure and functions of insect nervous, study the structure and functions of various sense organ of insects.

**Hormone, Endocrine and exocrine glands:** learn about the hormone as well as endocrine and exocrine glands of insect, study the secretion process from endocrine and exocrine glands.

### **Practical (Credit 1.0)**

1. Study on the external structure of a typical insect
2. Study on external structure of insect head
3. Study on the orientation of insect head
4. Study on the different types of insect antennae
5. Study on the different mouthparts of insects and their modifications
6. Study on insect thorax and abdomen
7. Study on general structure and some modification of insect legs
8. Study on insect wings and their modifications
9. Characterization of some important insect Orders
10. Identification of insect life stages of holometabolous and hemimetabolous insect

### **21.9.2 ENT 230: Insect Taxonomy and Systematics**

<b>Course Type (Core/Elective)</b>	: Core course
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Insect Morphology
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To enable the students of classifying and identifying the insects with emphasizing the knowledge of different theories and principles of systematic biology.

### **Theory (Credit 3.0)**

**Basics of insect taxonomy and systematics, arthropod evolution corresponding geological timescale:** basis of insect taxonomy and systematics and the principles of classification and identification, and evolutionary principles and theories of arthropod classification.

**Phylogeographic study and its implication in zoogeographic distribution of insects:** study the zoogeography based on geological, geographical and ecological ranges of insects, correlate the phylogenetic classification of insects with zoogeography.

**Biological species concepts and the hierarchical categories of the higher taxa:** learn different theories on biological species concepts classify hierarchical categories of the higher taxa and systems of classification.

**Taxonomic keys, taxonomic publication and rules of zoological nomenclature:** know the different articles and rules of zoological nomenclature, learn the procedure of using taxonomic keys and taxonomic publications for identifying the insects.

**Study of taxonomic identification of apterygotes and ametabolous insects:** taxonomic information for identification and characterization of Thysanura, Diplura Collembola, Protura, describe the significance of these orders in agriculture.

**Identification and familiarization of the insects of exopterygotes/hemimetabolous insects:** provide taxonomic information about exopterygote insects and their significance in Agriculture, learn the identification techniques of Hemiptera, Homoptera, Ephimeroptera, Plecoptera, Phasmida, Dermaptera, Embiptera, Orthoptera, Odonata, Dictyoptera upto family categories.

**Identification and familiarization of endopterygotes/ holometabolous insects:** provide taxonomic information about endopterygotes/ holometabolous insects and their significance in Agriculture, To learn the field identification techniques of Lepidoptera, Coleoptera, Hymenoptera, Isoptera, Diptera, Mallophaga, Siphunculata, Psocoptera orders upto family categories.

**Techniques of insect collection and preservation:** different techniques of insect collection from diversified agro ecosystem, various insect preservation techniques (dry and wet).

### **Practical (Credit 1.0)**

1. Insect collection and the process of preservation
2. Identification and familiarization of insects: Thysanura, Collembola. Protura and Diplura
3. Identification and familiarization of insects: Odonata, Dermaptera
4. Identification and familiarization of insects: Dictyoptera, Orthoptera
5. Identification and familiarization of insects: Thysanoptera, Heteroptera, Homoptera
6. Identification and familiarization of insects: Diptera, Coleoptera
7. Identification and familiarization of insects: Lepidoptera, Hymenoptera

### **21.9.3 ENT 260: Insect Ecology**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To apply the basic aspects of insect ecology and synthesize ecological principles by applying interpretation of ecological problems and their solutions.

## Theory (Credit 2.0)

**Introduction to insect ecology:** definition, history and development, classification, approaches and scope of insect ecology.

**Population estimation:** types and methods: define and classify population estimation, learn and practice of different methods of population estimation.

**Ecosystem (aquatic, terrestrial and agroecosystem):** learn the concept and component of ecosystem, study the details of aquatic and terrestrial ecosystem, study and analyze of agroecosystem.

**Ecological energetics and process (succession and biogeochemical cycles):** study the energy flow in the ecosystem including food chain, food web and trophic level, study the types, causes and processes of succession in reference to insect community, define and study the various types of biogeochemical cycle.

**Dispersion and migration:** learn the processes of dispersion and migration of insect and their impact on their community.

**Concept of balance of life:** gain the concept of balance of life, know the methods of population change in insect community.

**Environmental factors and their impact on insect population:** study the biotic and abiotic factors of environment, acquire knowledge on the impact of biotic and abiotic factors of environment to insect population.

**Community:** nature, structure and influences: discuss the nature, structure and factors influence on insect community, study and determine the richness, diversity and abundance of insect in their communities.

**Interaction (competition and predation):** define and study the various types interaction in insect community, study the interaction between plant and herbivore.

**Insect pest monitoring, surveillance and forecasting:** study the processes of insect pest monitoring, surveillance and forecasting, practice the methods of insect pest monitoring, surveillance and forecasting program in field.

## Practical (Credit 1.0)

1. Study on some ecological methods used in pest management decisions
2. Estimation of white head infestation (%) in rice by rom sampling (Quadrat) method
3. Damage assessment in crop field by stratified rom sampling technique
4. Damage assessment in crop field by systematic sampling technique
5. Study on a typical agro ecosystem and its analysis
6. Practicing of the relative methods of insect population estimation
7. Insect population estimation by using pitfall and bait traps
8. Monitoring of brinjal shoot and fruit borer using sex pheromone traps
9. Comparison of species richness of insect community in two crop fields
10. Determination of species abundance and diversity index in agricultural field

## 21.9.4 ENT 370: Economic Entomology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Insect Taxonomy, Insect Morphology, Insect Ecology
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 +5 0)

### Course Objectives

To provide the students with theoretical and practical knowledge about the economic importance of insect pests and their base on their nature of damage and control measures in the farmer's field and storage. Students will also able to understand and the principles and practices of apiculture, sericulture and lac culture techniques.

### Theory (Credit 3.0)

**Basic concept of economic entomology, types of pests and NE's – levels of the organization:** define economic entomology, know about pests and their natural enemies, approaching of different terminology of GEP, EIL, AT for pest management decision.

**Insect pests of major field crops by identifying affected symptoms and control measures:** identify the major insects and pests of rice, jute and sugarcane by investigating the damage incidence and appeared symptoms, learn their host range, biology and distribution pattern in forecasting strategy against the insect pest species of those particular crops, be able to take pest management decision and apply best fit pest control strategies.

**Insect pest of summer and winter vegetables, their nature of damage and control measures:** identify the major insects and pests of summer and winter vegetables (brinjal, potato, tomato, cabbage, okra, cauliflower, bean, pumpkin, gourd, etc. by investigating the damage incidence and appeared symptoms, learn their host range, biology and distribution pattern in forecasting strategy against the insect pest species of those particular crops, pest management decision and best fit pest control strategies.

**Insect pest of summer and winter fruits, their nature of damage and control measures:** identify the major fruit pests (mango, papaya, banana, guava, coconut, jackfruit, litchi, citrus etc.) by investigating the damage incidence and appeared symptoms, learn their host range, biology and distribution pattern in forecasting strategy against the insect pest species of those particular crops, be able to take pest management decision and best fit pest control strategies.

**Status of insect mite pests in storages and their control:** define and discuss the importance of stored grain products and their common insect mite pests, explore the nature of damage and control measures against the stored grain insect pests and rodents.

**Status of rodent pests in storages, fields and their control:** focus the status of rodent pests in storage and fields, explore the nature of damage and control measures against the rodent pests.



**Apiculture:** explain the scope and importance of apiculture, in Bangladesh, explore the detailed techniques of migratory beekeeping and apiculture management.

**Sericulture:** explain the scope and importance of sericulture in Bangladesh, explore the detailed management techniques (rearing of silk moth, larvae and host plant) of sericulture.

**Lac culture:** explain the scope and importance of lac culture in Bangladesh, explore the detailed techniques (rearing of lac insects, hosts plant and management practices and pests control strategies) of lac culture.

### **Practical (Credit 1.0)**

1. Transmission of Insect borne diseases in plants
2. Field identification of the insect pest in vegetables and their management
3. Field identification and management of insect pests in rice
4. Spot Identification and management of stored grain pests and rodents
5. Field identification and management strategies of insect pest of flowers and ornamental crops
5. Hs off training of raising the apiary for beekeeping
7. Field study of major Insect pests of fruits and their management practices

### **21.9.5 ENT 430: Insect Pest Management**

<b>Course Type (Core/Electives)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: ENT 260 (Insect Ecology)
<b>Credit (Theory + practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To familiarize the students with principles and practices of insect pest management (IPM) including their concept, philosophy to develop IPM program for healthy agroecosystem.

### **Theory (Credit 3.0)**

**Ecological concepts of Pests and IPM:** define pests and its importance, categorize the pest based on level of occurrence and nature of damage, understand basics of insect pest management (IPM).

**History and principles of IPM:** overview the history and approaches in different era of pest management in reference to Mullers' DDT discovery and the book 'Silent Spring' by Rachel Carson, determine the factors that led to the development of IPM, learn the basic principles of IPM.

**Computation of EIL and ET:** define the Economic Injury Level (EIL) and Economic threshold (ET) and their utility, know the relationship and utility of EIL and ET, estimate EIL and ET in different conditions of pest attack.

**IPM Tools and tactics - an overview of pest management:** get idea about the building blocks/ component/tools of IPM, list down all tactics and tools of every component of IPM, achieve comprehensive knowledge about individual IPM practices.

**Cultural, physical, mechanical and legal methods of pest management:** define and discuss importance of individual pest management practices, explain the procedures/approaches/ component of the method in details with possibilities and drawbacks of the component, learn practical use of these methods.

**Host plant resistance and biological control strategies of pest management:** describe the importance host plant resistance for IPM and distinguish the mechanism and types of resistance, classify and describe different biocontrol strategies with instances, problems and possibilities of different biocontrol strategies, learn practical use of these approaches.

**Chemical control pests; classification and mode of action pesticides:** define and discuss the pesticides and its importance, classify and categorizes the pesticides, explain the mode of action of pesticides and its prescription for the target pests.

**Formulations and compatibility of pesticides:** learn formulation of pesticides and its usages, define and discuss the pesticide compatibility with other pesticide or fertilizers, test the pesticides whether it is compatible or incompatible.

**Pesticide poisoning and treatment:** explore the ways of pesticide poisoning and their possible sources, assess the impact pesticide poisoning to human health, aquatic life, wild animals and the environment, identify the symptoms and syndromes of pesticide poisoning, and acquire knowledge first-hand information about treatment and therapy of pesticide poisoning.

### **Practical (Credit 1.0)**

1. Diagnosis of pest damage and application of basic principles of IPM to the farmers
2. Estimation of EIL and ET on agroecosystem
3. Practicing of various cultural/ mechanical control of insect pests
4. Study on the biological control agents used against insect pests
5. Study on chemical control: formulations, label information, methods of application and safety information
6. Prescription of pesticides and determination of their PHI and Half-life.
7. Preparation and calculation of spray fluids using EC, WP botanicals for field application
8. Practicing the use of various pesticide appliances
9. Understanding pesticide registration and registered pesticides in Bangladesh with their recommended dose and their target pests and crops

## 21.9.6 Faculty members of the department

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## 21.10 Department of Environmental Science

List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course Code	Course Title	Credit	Offering Year	Term
01.	ENS 355	Environmental Degradation and Management	2+0	3 <sup>rd</sup> year	Autumn

### 21.10.1 ENS 355: Environmental Degradation and Management

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory)</b>	: 2.0
<b>Contact Hour (Theory)</b>	: 24 hours
<b>Total Marks</b>	:100

### Course Objectives

To provide knowledge to the students for understanding scientific, technical and socio-economic factors involved in the environmental degradation as well as national and international environmental problems and efficient management techniques for protecting and managing natural resources and environmental sustainability.

### Theory (Credit 2.0)

**Concept of environmental degradation and management:** know the concept of environment, different environmental terminologies, environmental degradation and management.

**Environmental issues:** describe environmental issues such as-, soil, air and water pollution, waste generation, global warming, climate change and ozone layer depletion, biodiversity and ecosystem services.

**Environmental impact assessment (EIA):** study the concept, procedure and tools of EIA.

**Management of environmental degradation:** describe the management of environmental degradation, climate-smart environmental management: agricultural management, bioremediation, micro-climate modification, biodiversity conservation strategies in situ and ex situ conservation, green climate adaptation technologies.

**Natural hazards and disaster management:** describe common hazards and disasters occurring in Bangladesh, their management strategies, risk and vulnerability analysis, disaster preparedness, response and rehabilitation.

**Environmental ethics, law and policy:** describe the concept of environment ethics, ethical theories, environmental laws, policies and governance in Bangladesh.

### 21.10.2 Faculty members of the department

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### 21.11 Department of Genetics and Plant Breeding

The Department offers courses for Undergraduate program and Postgraduate studies leading to MS and PhD degree. The Genetics and Plant Breeding Department has major research program on the improvement of vegetables, oil seeds and cereal crops through conventional breeding, tissue culture and molecular approaches. The laboratories are fully equipped with modern instruments. List of the courses offered from the department in undergraduate program are as follows-

Sl. No	Course Code	Course title	Credit	Offering year	Term
1	GPB 195	Cytology	2+1	1 <sup>st</sup> year	Winter
2	GPB 235	Elementary Genetics, Evolution and Biodiversity	3+1	2 <sup>nd</sup> Year	Autumn
3	GPB 310	Introductory Cytogenetics	2+1	3 <sup>rd</sup> Year	Summer
4	GPB 355	Principles of Plant Breeding	3+1	3 <sup>rd</sup> Year	Autumn
5	GPB 460	Methods of Plant Breeding	3+1	4 <sup>th</sup> year	Autumn

### 21.11.1 GPB 195: Cytology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To provide the students with theoretical and practical knowledge about the development, structure and function of cells, cell communication, and different aspects of the cell cycle in relation to cell signaling and programmed cell death.

### Theory (Credit 3.0)

**Characteristics of a living being levels of the organization:** explain, describe, and discuss the theoretical knowledge about the history of the cell, and modern cell theory, differentiate different regulatory environments of organisms at the cellular level, interpret the language of organisms to pass genetic information on to offspring.

**Membrane trafficking mechanism:** discuss principles of membrane trafficking, clarify different genes regulating membrane trafficking, examine different gateways of membranous systems of cellular structure.

**Cell signaling:** classify various contexts within which intracellular communication occurs, assess the signaling molecules relating to cell communications.

**Extra-nuclear hereditary materials:** define the extra-nuclear hereditary materials, illustrate the principles of heredity in different cytoplasmic organelles.

**Introduction to cell cycle:** discuss the key roles of a cell cycle, interpret continuity of life based on the reproduction of cells.

**Cell cycle regulators:** distinguish the check points of the cell cycle, predict possible regulatory mechanisms of a cell cycle under special circumstances.

**Cell cycle phases:** explore the imperativeness of cell cycle mechanisms, identify different stages of cell division.

**DNA damage and repair mechanism:** assess the cell function difficulties in a stress environment, explore the possible solutions relating to the repair mechanism of cell damage.

**Pathways of apoptosis:** explain cell death possible causes, interpret different protein activities in relation to cell death, compile DNA damage and characteristics changes of cell morphology during apoptosis.

### Practical (Credit 1.0)

1. Basics of cell biology - plant and animal cell

2. Fixatives and its utilization in cytology
3. Stains in cell studies
4. Compound microscope and exploitation in studies on mitotic cell division
5. Determination of meiotic stages and permanent slide preparation
6. Problems related to cytology

### 21.11.2 GPB 235: Elementary Genetics, Evolution and Biodiversity

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

To provide the students with theoretical and practical knowledge about the field of genetics, its scope and application along with the understanding of genetic principles governing the inheritance of the traits and its molecular basis including recombinant DNA technology.

#### Theory (Credit 3.0)

**Introduction to genetics:** define genetics and related terms, describe scope and applications of genetics.

**Mendelian genetic:** interpret and make predictions of monohybrid, dihybrid, trihybrid and test crosses, analyze and solve different genetically problems.

**Multiple alleles and quantitative inheritance:** Elucidate the inheritance pattern of multiple allele and multiple factor hypothesis.

**Linkage, crossing over and genetic map:** become familiar with the process of gene recombination, understand the role of chromosomal and exchange and how genetic maps are constructed.

**Gene and the genetic material:** describe physical and chemical nature of genes, differentiate between genetic materials.

**DNA structure and organization:** explain DNA structure and replication.

**Genetic code, gene regulation and mutation:** elucidate RNA processing, genetic code, transcription and translation, explain the role of mutations in evolutionary process .

**Recombinant DNA technology:** understand and explain the recent advances in the field of genetics.

**Evolution and biodiversity:** describe the process of evolution and biodiversity.

## Practical (Credit 1.0)

1. Problems related to mono, di and trihybrid cross
2. Problems related Gene interaction
3. Problems related Chi square test
4. Measurement of linkage from  $F_2$ , back cross data, construction of genetic map using linkage test
5. Problems related to multiple allele

### 21.11.3 GPB 310: Introductory Cytogenetics

<b>Course Type (Core/Elective)</b>	: Core course
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

## Course Objectives

To describe and discuss the chromosome ultra-structure, compositions, types, sex chromosomes and its inheritance, extra-nuclear inheritance, and mutation.

To provide a working knowledge of chromosomal variations in structure and number.

To demonstrate laboratory techniques for chromosomes identification with its types, bing, problems of structural changes and induction of polyploidy.

## Theory (Credit 2.0)

**Introduction and historical events of cytogenetics:** familiar with basic elementary knowledge in cytogenetics, discuss historical events in cytogenetics.

**Ultrastructure of chromosome and physical basis of heredity:** define chromonemata, chromomeres, kinetochore, secondary constriction, and satellite, discuss number, shape, karyotype and ideogram, Provide insight into euchromatin, heterochromatin, its important features, functions, and occurrence.

**Chemical composition of chromosome and chemical basis of heredity:** provide insight into the structure and compositions of DNA and RNA, Describe the functions of genetic and nongenetic RNA, histone and nonhistone proteins, Compare DNA and RNA, Illustrate the chemical basis of heredity.

**Special types of chromosome:** understand different special chromosomes, describe polytene, lampbrush, B chromosome, isochromosome, holokinetic chromosome, elucidate the structure, occurrence, and functions of such chromosomes.

**Sex chromosome and sex-linked inheritance:** define sex chromosome and sex-linked inheritance, discuss X and Y linked traits, Explain X and Y linked traits (clinical disorders), Study color blindness, haemophilia, sex-limited and sex-influenced traits.

**Structural changes of chromosomes:** acquainted with chromosomal variations in the structure, describe different alterations, explain meiotic irregularities, discuss the utilization of structural changes in crop improvement.

**Numerical changes of chromosome and its evolutionary significance and uses:** describe chromosomal variations in the number, explain its alterations, elucidate meiotic irregularities, provide understanding regarding their utilization in crop improvement, demonstrate practical induction of polyploidy.

**Cytoplasmic inheritance- plastid and mitochondrial DNA, maternal effect:** define cytoplasmic inheritance, prove regarding cytoplasmic inheritance, explain plastid and mitochondrial DNA, maternal effect, illustrate its utilization in hybrid crops.

**Mutation:** define mutation, its types, explain its implications in crop improvement.

### **Practical (Credit 1.0)**

1. Identification of chromosomes
2. Slide preparation and demonstration of the polytene chromosome
3. Slide preparation and demonstration of the lampbrush chromosome
4. C bing techniques in barley chromosomes
5. N bing techniques in barley chromosomes
6. Solution of the structural changes related problems: deletion duplication
7. The solution of the structural changes related problems: paracentric inversion
8. The solution of the structural changes related problems: pericentric inversion
9. The solution of the structural changes related problems: translocation heterozygote
10. Induction of polyploidy in onion

### **21.11.4 GPB 355: Principles of Plant Breeding**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

The course provides comprehensive knowledge on principles, rudiments, and mechanisms of plant breeding towards the development of superior plant varieties with desired characteristics for the wellbeing of the human being.

### **Theory (Credit 3.0)**

**Introduction and plant breeding history:** tabulate major contribution of the eminent plant breeders, describe the scope and goal of plant breeding, formulate different breeding objectives



**Crop evolution and domestication:** centre of origin of crop plants, describe pattern of evolution of plants, explain the pathway of crop domestication.

**Plant genetic resources and gene pool, genetic variation:** describe the concept of gene pool and their classification, describe causes of genetic erosion and its remedy, plan to utilize PGR in crop improvement.

**Plant Reproduction:** discuss the types of plant life cycles and their implication in breeding, differentiate different reproduction methods, explain the mechanism of apomixes and its use in crop improvement.

**Mode of pollination and mating systems:** discuss the mechanisms/ causes of pollination and fertilization, discuss the breeding implications of self- and cross-pollination, explain effect of selfing and hybridization in population genetic architecture.

**Continuous variation, heritability gene and genotypic frequencies and population structure:** describe concept of heritability and genetic advance under selection, describe gene and genotypic frequencies in population, understand various population structure.

**Pollination control mechanism:** explain self-incompatibility and overcoming its barrier, discuss the genetics and applications of male sterility in breeding, describe procedure of hybrid seed production.

**Heterosis/ hybrid breeding and inbreeding depression:** demonstrate fixation of heterosis, explain biochemical, physiological, plasmatic or organelle, molecular and biometrical aspects of heterosis, explain the development procedure of inbred and finally hybrid.

### **Practical (Credit 1.0)**

1. Reproduction: Life cycle of crop plants
2. Floral biology of plant
3. Mode of pollination
4. Mating systems
5. Genetic variability and continuous variation
6. Heritability and Genetic advance under selection
7. Heterosis/ Hybrid breeding and inbreeding depression

### **21.11.5 GPB 460: Methods of Plant Breeding**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Autumn
<b>Pre-requisite (if any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

## Course Objectives

To acquaint student with the practical breeding methods of field and horticultural crops. Also enable the students to impart theoretical knowledge and practical skills for crop improvement through plant breeding objectives, principles and methods.

### Theory (Credit 3.0)

**Variability and crop improvement:** define genetic variation, estimate components of variation, describe the importance in crop improvement.

**Biometrical approach in plant breeding:** estimate gene action, heritability, genetic advance, heterosis, inbreeding depression,  $G \times E$ , illustrate basic genetic principles of crop improvement.

**Breeding methods for self-pollinated crops:** describe mechanism of self-pollination, elucidate and design different methods of breeding self-pollinated crops.

**Breeding methods for cross pollinated crops:** describe mechanism of cross-pollination, explain and design different methods of breeding cross-pollinated crops.

**Breeding methods for clonally propagated crops:** describe means and mechanism of clonal propagation, explain and design different methods of breeding clonally propagated crops.

**Special breeding methods:** describe mechanism of mutation, polyploidy, double haploid and distant hybridization, employ different special breeding methods for crop improvement.

**Hybrid variety development:** explain genetic principles of  $F_1$  hybrid development, make breeding plan for hybrid development.

**Breeding techniques in economic crops:** design breeding techniques of different economic crops

**Variety release and registration system:** understand notified and non-notified crops, describe variety release system, apply for variety registration.

### Practical (Credit 1.0)

1. Assessment of variability
2. Hybridization techniques of self-pollinated crops
3. Hybridization techniques of cross pollinated crops
4. Recording data on qualitative and quantitative traits
5. Visit to breeding institute and seed companies

### 21.11.6 Faculty members of the department

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## 21.12 Department of Horticulture

The Department offers courses for Undergraduate (BS) program and Postgraduate studies leading to MS and PhD degree. The Department of Horticulture offers 05 undergraduate courses and 16 postgraduate courses along with practical oriented laboratory classes. The department has a well facilitated undergraduate laboratory and two post graduate laboratories (1 general + 1 tissue culture laboratory). The department has also a well-developed research field in which teachers and students conduct their researches. The department has major research programs on improvement of horticultural crops, production technology, post-harvest technology and processing, seed production, biotechnology and marker aided selection of horticultural crops. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course Code	Course Title	Credit	Offering Year	Term
01	HRT 105	Fundamentals of Horticulture	2+0	1 <sup>st</sup> year	Summer
02	HRT 255	Vegetable and Spices Production	3+1	2 <sup>nd</sup> year	Autumn
03	HRT 280	Fruits and Plantation Crop Production	3 +1	2 <sup>nd</sup> year	Winter
04	HRT 370	Floriculture and Landscape Horticulture	3+1	3 <sup>rd</sup> year	Winter
05	HRT 415	Propagation and Nursery Management	3+1	4 <sup>th</sup> year	Summer

### 21.12.1 HRT105: Fundamentals of Horticulture

<b>Course Type</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory)</b>	: 2.0
<b>Contact Hours (Theory)</b>	: 24 hours
<b>Total Marks</b>	: 100

### Course Objectives

To explore the fundamental aspects of horticulture, its branches, importance in the daily meal and national economy, factors involved in growth, development, physiological process, postharvest management of horticultural crops and most importantly, the contribution of horticulture in sustainable development goals (SDGs).

## Theory (Credit 2.0)

**Basic concepts, origin, branches, importance and scope of horticulture:** define horticulture, its branches, area and production, classification of horticultural crops, describe the nutritional value, export potential, contribution to the national economy.

**Principles and management techniques for the improvement of horticultural crops:** introduce a garden, orchard, kitchen garden and other types of gardens, illustrate the planning, layout and management of the orchard, justify the importance of weed management, water management, nutrient management and insect and disease management of an orchard.

**Growth and development and breeding of horticultural crops:** understand the bearing habit, principles and methods of pruning and training of horticultural crops, illustrate the factors influencing fruitfulness and unfruitfulness in major horticultural crops, know about the breeding techniques of horticultural crops.

**Protected cultivation, postharvest management and safety food:** illustrate the principles of organic horticulture and protected cultivation techniques, describe harvest indices and postharvest handling of horticultural crops, discuss the value addition, marketing and quality assurance of horticultural produces.

**Agencies and organization involved in the horticulture sector and contribution to SDGs:** discuss national and international agencies involved in horticultural development, illustrate government and NGO's interest in the establishments of the horticulture industry, explore the role of horticultural sectors in SDGs.

### 21.12.2 HRT 255: Vegetable and Spices Production

<b>Course Type</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To discuss about production practices of vegetables and spices.

To describe the climatic and soil requirements need for raising quality vegetables and spices.

To explain alternate cultural techniques of vegetables, including protective cultivation.

To motivate the students to establish themselves as commercial producer or entrepreneur.

### Theory (Credit 3.0)

**Introduction to vegetables:** define and classify vegetable crops, know present status, scope, nutritional and economic importance, opportunities, and challenges of vegetable production.

**Climatic and edaphic requirements of vegetables:** explain the effect of temperature on

determining climatic zones and controls plant distribution, growth cycles, growth rates and ultimately yield, know the influence of temperature, light and water on all aspects of growth and development of vegetable crops, know the role of soil and air in maintaining the different physiological process of vegetables.

**Cropping systems and vegetable farming:** acquire knowledge about different cropping and farming system; and evaluate the sustainability of farming operations, describe the principles, concepts and techniques of organic, hydroponic and protective vegetable production.

**Production techniques of major vegetables:** explain production practices for vegetable crops and compare the various cultural systems, discuss about production regions, climatic factors, soils, nutrition, types of vegetables, site selection and planting, harvesting, vegetable quality factors, propagation, pruning, flowering, pollination, fruiting and yield of vegetables.

**Vegetable seed production:** understand mode of reproduction in vegetable crops, explain seed production techniques of self and cross pollinated vegetable crops, discuss postharvest processing of vegetable seeds.

**Post-harvest handling of vegetables:** know the nature and causes of postharvest losses, determine the pre harvest and postharvest treatment for minimizing post-harvest loss, develop marketing strategies for different vegetables.

**Spices:** Introduction and production techniques of major spices: know the present status, scope, nutritional and economic importance, opportunities and challenges of spices production, describe production practices of major spices.

### **Practical (Credit 1.0)**

1. Raising of vegetable crop in field and report writing
2. Identification of vegetables, spices and seeds
3. Calculation of seed rate of vegetables and spices
4. Estimation of required fertilizer for vegetables and spices
5. Seed extraction techniques of some important vegetables
6. Purity test of vegetable seeds
7. Ideal seed bed preparation, vegetable seedling raising and pit preparation
8. Estimate cost of production of vegetables and spices cultivation
9. Preparation of crop calendar
10. Visit to vegetable growing area or commercial vegetable production farm

### **21.12.3 HRT 280: Fruits and Plantation Crop Production**

<b>Course Type</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required

<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

## Course Objectives

This course aims to fully understand the fruits and plantation crops status, including importance, production technology, and cultivation scope. To help the students gather knowledge about different fruits and plantation crop features from practice and classroom teaching.

### Theory (Credit 3.0)

**Introduction to pomology (present status and importance of fruit):** define fruits and plantation crop, present status, scope, importance, prospect and limitation of pomology, identify different fruits and plantation crop, identify different implements needed for gardening, apprise with color scheme and grouping.

**Orchard planning, design and execution:** describe preparation and basic principles for laying orchard, describe different planting system for orchard establishment.

**Production technology of major and minor fruits of Bangladesh:** learn production technology of different major and minor fruits, obtain knowledge about management and postharvest techniques of important major and minor fruits, be able to select appropriate climatic requirements of different major and minor fruits.

**Production technology of plantation crop of Bangladesh:** learn production technology of different plantation crops in Bangladesh, obtain knowledge about management and processing techniques of plantation crops, be able select appropriate climatic requirements of different plantation crop, identify different insects and diseases and their management.

**Production technology of exotic fruits:** learn production technology of different exotic fruits, be able to select appropriate climatic requirements of different exotic fruits.

**Fruit crop management:** know fertilizer and organic manure application methods in fruit plants, identify different insects and diseases and their management, make understand about different training and pruning practice for young plant to fruit bearing tree and aged tree.

**Maturity symptom, harvesting index and brix %:** make understand about maturity symptom, harvesting index for major fruits, know Brix meter operation and data taking from some available fruits.

### Practical (Credit 1.0)

1. Identification of different fruits and plantation crops in Bangladesh
2. Planting system, demarcation and layout of land for orchard
3. Manure and fertilizer application methods in fruit tree
4. Maturity symptom, harvesting index and brix %
5. Preparation of an ideal pit and seedbed for fruits and plantation crops
6. Practice of different training and pruning system for young plant to fruit bearing tree and aged tree

## 21.12.4 HRT 370: Floriculture and Landscape Horticulture

<b>Course Type</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory+ Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To acquaint the students with different flower and ornamental plants practically with production, management, post-harvest handling, packaging and marketing of those plants theoretically. To enable the students for gathering knowledge about different aspects of FOP with landscaping from practice/visit and classroom teaching, so that they can make them as an entrepreneur in future.

### Theory (Credit 3.0)

**Introduction to floriculture:** define floriculture, history, present status, scope, importance, prospect and limitation of floriculture, classify ornamentals, importance and use of different types of FOP along with acquainting color scheme and grouping.

**Propagation and pruning/ training:** describe different methods of propagation for FOP, differentiate pruning and training.

**Cultivation techniques of important flowers and ornamentals:** learn production technology of different FOP along with their management and postharvest techniques, be able to select appropriate climatic requirements of FOP, estimate cost of production of different flower crops.

**Pest management:** identify different insects and diseases, management of different diseases and insects.

**Growing plants in pots:** explain methods and management of growing plants in pots, inform about house plants and indoor gardening, know about potting, de-potting and re-potting.

**Orchids, cactus, bonsai and ikebana:** explain different aspects of bonsai and ikebana, explain types and procedures of growing orchids and cactus.

**Landscaping and gardening:** different aspects of landscaping, know about different types of gardening, garden features and styles.

### Practical (Credit 1.0)

1. Identification of flowering plants, ornamental trees, shrubs, climbers and foliage plants
2. Identification of garden tools and implements
3. Propagation of rose by T-budding
4. Propagation by cutting
5. Pruning and training of ornamentals

6. Potting, de-potting and repotting of ornamental plants
7. Study on growing technique of orchid
8. Study on growing technique of bonsai
9. Study on growing technique of cactus
10. Design of a water garden, rock garden and a park
11. Estimation of cost of production
12. Visit to a nursery

### 21.12.5 HRT 415: Propagation and Nursery Management

<b>Course Type</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

This course aims to develop a basic understanding of the principles of plant propagation, an overview of propagation techniques, a general knowledge of the methods of propagation of the more commonly cultivated plants. To impart skill-oriented knowledge of different propagation techniques of high value crops nursery structures.

#### Theory (Credit 3.0)

**Outline and importance of the course:** introduce plant propagation and nursery course, describe importance of propagation and nursery business.

**Basics of plant propagation:** describe the need and potentialities of plant propagation, discuss the scope and opportunities of sexual and asexual propagation.

**Basics of nursery activities:** define plant nursery and establishment of a nursery, illustrate different propagation structures, describe different nursery techniques and daily activities of a nursery.

**Sexual propagation:** illustrate seed propagation and system of propagation, describe the quality of seeds for quality rootstocks and seedling, justify seed treatment for breaking dormancy and vigorous seedling production.

**Asexual propagation (cutting and layering):** illustrate different methods of cutting and layering, describe anatomical and physiological basis for rooting, justify use of growth regulators in cutting and layering.

**Asexual propagation (grafting and budding):** discuss different grafting methods and techniques, illustrate factors influencing the stock-scion relationship, demonstrate anatomical and physiological basis of bud and graft union.



**Asexual through modified structures:** introduce the importance of modified structures in propagation, describe the uses of modified structures in horticulture.

**Basics of micro-propagation:** discuss the scope and importance of micro propagation/plant tissue culture, introduce a tissue culture laboratory, explain media preparation and use of plant growth regulators.

**Types of micro propagation:** illustrate different micro propagation techniques of high value crops, demonstrate application of plant tissue culture in plant breeding, show disease-free plant production procedure.

### Practical (Credit 1.0)

1. Design and layout of a typical commercial nursery
2. Preparation of an ideal seedbed for horticultural crops
3. Practices of cottage, layerage and graftage in fruit plants
4. Visit to private nurseries and commercial tissue culture units
5. Propagation techniques by some specialized vegetative structures
6. Introduction to plant tissue culture laboratory, media preparation and micro propagation technique of strawberry

### 21.12.6 Faculty members of the department

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### 21.13 Department of Plant Pathology

The department of Plant Pathology offers courses for Undergraduate studies and Graduate program leading to MS and PhD degrees. The department has major programs on disease management, mycology, nematology, virology, bacteriology and general plant pathology. It has well developed laboratories with modern facilities. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course code	Course Title	Credit	Offering year	Term
01	PLP 212	Fundamentals of Plant Pathology	3+1	2 <sup>nd</sup> year	Summer
02	PLP 290	Principles of Plant Pathology	2+1	2 <sup>nd</sup> year	Winter
03	PLP 340	Diseases of Field Crops	3+1	3 <sup>rd</sup> Year	Autumn
04	PLP 390	Diseases of Horticultural and Plantation Crops	3+1	3 <sup>rd</sup> year	Winter
05	PLP 450	Post-Harvest Pathology	2+1	4 <sup>th</sup> Year	Autumn

### 21.13.1 PLP 212: Fundamentals of Plant Pathology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To acquaint the students with fundamental aspects viz., scope and objectives, importance of plant pathology, general concepts and classification of plant diseases; and causal agents of plant diseases. At the end of the course, students will be able to identify and characterize various plant pathogens.

### Theory (Credit 3.0)

**Introduction of plant pathology, definition/terminologies of plant pathology:** Define the history, scope, importance and limitation of plant pathology, describe the theories of plant diseases.

**Causes of plant diseases:** describe the sources of plant pathogens, clarify the definition of fungi, bacteria, nematode, virus, phytoplasma, oomycetes, viroids and phanerogamic plant parasites, differentiate between biotic and abiotic factors, define the sign and symptoms of plant diseases.

**Identification and classification of phanerogamic plant parasites:** classify Phanerogamic plant parasites, describe the ways of identification of plant parasites, differentiate different plant parasites.

**Classification of plant pathogens:** classify plant pathogens, know about the latest fungal and bacterial taxonomy based on traditional and molecular characteristics.

**Growth and reproduction of plant pathogens:** illustrate the principles of plant pathogen's growth and reproduction, differentiate between asexual and sexual reproduction, explain the sexual and asexual reproduction of fungi belongs to Ascomycota, Basidiomycota, Zygomycota and Oomycota.

**Diagnosis and characterization of different plant pathogens:** recognize disease symptoms, identify the plant pathogens using light and stereomicroscopes, inoculate the causal agent on plants; establish Koch's postulates; understand the most important diseases in plants.

## Practical (Credit 1.0)

1. Study on microscopy and preparation of microscopic slides
2. Study on flowering plant parasites
3. Study on morphology of lower fungi under Zygomycota: Genus Rhizopus, Mucor
4. Study on morphology of higher fungi under Ascomycota: Genus Peziza
5. Study on morphology of higher fungi under Basidiomycota: Justicia rust and Mushroom
6. Study on morphology of higher fungi under Deuteromycota: (a) Class: Hyphomycetes and (b) Class: Coelomycetes
7. Study on morphological characters of Straminopila {Oomycota (Phytophthora/Pythium)}
8. Study on plant pathogenic nematodes (isolation from soil)
9. Study on plant pathogenic bacteria (isolation and identification of bacterial colony)
10. Study on plant pathogenic virus

### 21.13.2 PLP 290: Principles of Plant Pathology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

## Course Objectives

To teach the students about basic principles and concepts of plant pathology as a biological science, and control strategy of plant diseases.

## Theory (Credit 2.0)

**Ecology and dispersal of plant pathogens:** describe the ecology, survival and mode of spread of plant pathogens.

**Plant disease epidemiology and loss assessment:** illuminate factors affecting plant disease epidemics – host, pathogen environment and time factor, classify disease incidence, disease severity, disease forecasting and yield loss assessment.

**Pathogenesis:** illustrate the parasitism, pathogenicity and disease development.

**Virulence factors of pathogens in disease development:** explain the role of toxins, enzymes and hormones in disease development, describe the effect of pathogens on plant physiology such as photosynthesis, transpiration, respiration.

**Host defence against pathogens:** focus on structural and biochemical defence of host against pathogens, defence through hypersensitive reaction.

**General principles of plant diseases management:** discuss about avoidance, exclusion, eradication, protection and therapy, immunization and resistance.

**Plant disease control methods:** describe different disease control methods such as cultural, physical, biological and and host plant resistance for plant disease control.

**Plant quarantine and inspection:** explain plant quarantine and inspection; quarantine rules and regulations.

**Introduction to molecular plant pathology:** illustrate about modern plant pathology and their application in detection of plant pathogens and diseases.

### **Practical (Credit 1.0)**

1. Preparation of culture media
2. Study on isolation of microorganism
3. Study on host inoculation methods
4. Demonstration of Koch's postulates by using plant fungi
5. Demonstration of Koch's postulates by using plant bacteria
6. Study on fungicide formulation and preparation of Bordeaux Mixture and Paste
7. Appliances for application of fungicides and nematicides
8. Fungicide and nematicide's rate and dosage calculations
9. Study on seed treatment for plant disease control
10. Study on soil treatment for plant disease control

### **21.13.3 PLP 340: Diseases of Field Crops**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To enable the students to identify the diseases of field crops and their proper management.

### **Theory (Credit 3.0)**

**Diseases of rice, wheat, maize, sorghum, barley and millets:** describe the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management of cereal crops.

**Diseases of jute and cotton:** illustrate the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management of fiber crops.

**Diseases of sugarcane and sugar beet:** classify the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management of sugar crops.

**Diseases of mustard, groundnut, soybean, sesame and sunflower:** explain the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management of oil seed crops.

**Diseases of blackgram and mungbean, lentil and chickpea, green gram, peas and cowpea:** discuss the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management of pulse crops.

### **Practical (Credit 1.0)**

1. Collection and preservation of diseased plant specimen
2. Study on blast and bakanae disease of rice
3. Study on leaf spot or blight disease of wheat
4. Study on stem rust disease of wheat
5. Study on anthracnose disease of jute
6. Study on stem rot and black b disease of jute
7. Study on red rot disease of sugarcane
8. Study on Alternaria leaf blight/ grey leaf spot of mustard
9. Study on Cercospora leaf spot / tikka disease of groundnut
10. Study on foot root rot disease of lentil/grass pea/gram

### **21.13.4 PLP 390: Diseases of Horticultural and Plantation Crops**

<b>Course Type (Core/Elective)</b>	: Core Course
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 48 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To enable the students to identify the diseases of horticultural and plantation crops and recommend proper management strategies.

### **Theory (Credit 3.0)**

**Introduction to diseases of horticultural and plantation crops:** discuss the importance of diseases of horticultural and plantation crops.

**Diseases of potato, tomato, cucurbits, brinjal, colecrops, root crops, leafy vegetables, okra, colocasia, etc. :** describe the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management.

**Diseases of mango, banana, papaya, guava, jackfruit, citrus, etc.:** illustrate the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management.

**Diseases of garlic, onion, chilli, ginger, turmeric, corier, etc.:** illustrate the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management.

**Diseases of tea, coffee, rubber, coconut, betel leaves and nuts, rose, tuberose, marigold, etc.:** illustrate the etiology, symptoms, mode of spread, survival of pathogen, epidemiology, disease cycle and management.

### **Practical (Credit 1.0)**

1. Study on important diseases of fruit and vegetable crops
2. Study on Alternaria leaf spot of cabbage
3. Study on Cercospora leaf spot of Okra
4. Study on Fusarium dry rot of Potato
5. Study on soft rot of Potato
6. Study on black Cigatoka of banana
7. Study on Scab of Guava
8. Study on Phyllosticta leaf spot of Jackfruit
9. Study on Anthracnose of Chilli
10. Study on Black mould of Onion
11. Study on coconut diseases

### **21.13.5 PLP 450: Post Harvest Pathology**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 48 (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To provide knowledge and logistics to make the students more efficient in assessing post-harvest losses, determining cause and effect of post-harvest diseases of perishables and seeds, and developing strategies to control diseases of post-harvest products.

### **Theory (Credit 2.0)**

**Introduction of post-harvest diseases of perishables:** importance of postharvest diseases, the ecology of postharvest microbial pathogens, disease development and symptom expression.

**Factors influencing disease development in storage:** influence of cultivation practices and harvesting methods, influence of postharvest handling and storage conditions.

**Principles and practices of diseases management of perishables:** preventive and physical methods for controlling diseases of perishables, chemicals for controlling diseases of perishables,

biocontrol agents for disease management of perishables.

**Introduction of seed pathology:** definition, concepts and history of seed pathology, seed-borne diseases and its importance.

**Transmission of seed-borne pathogens:** significance of seed transmitted pathogens, entry and infection site of pathogens in seed, seed-plant-seed transmission of important seed-borne pathogens.

**Seed health test:** routine seed health test and its objectives, different seed health testing methods.

**Deterioration of seeds in storage:** storage fungi and their ecology, harmful effect of storage fungi, regulation of storage management.

**Control of seed-borne diseases:** production of healthy seeds by proper field management, seed treatment: physical, chemical and biological method, quarantine and seed certification.

### Practical (Credit 1.0)

1. Study on postharvest disease symptoms of fruits
2. Study on postharvest disease symptoms of vegetables
3. Detection and identification of postharvest microbial pathogens from fruit and vegetables
4. Study on disease symptom caused by seed borne pathogens
5. Study on seed health test by dry inspection method
6. Study on seed health test by blotter method
7. Study on seed health test by agar plate method
8. Detection and identification of seed borne pathogens

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## 21.14 Department of Soil Science

The department offers courses for Undergraduate program as well as graduate programs leading to M. S. and PhD. degrees. Soil Science department has major programs in physical, chemical and biological aspects of soil management. The laboratories are enriched with sophisticated analytical instruments such as atomic absorption spectrophotometer, gas-chromatograph, aggregate analyzer, pressure plate apparatus etc. for advanced research works and practical classes. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course code	Course Title	Credit	Offering year	Term
01	SSC 101	Introductory Soil Science	2+1	1 <sup>st</sup> Year	Summer
02	SSC 225	Soil Survey, Classification and Conservation	2+1	2 <sup>nd</sup> Year	Summer
03	SSC 355	Soil Physics	3+1	3 <sup>rd</sup> Year	Autumn
04	SSC 365	Soil Chemistry and Fertility	3+1	3 <sup>rd</sup> Year	Winter
05	SSC 425	Agricultural and Agro-Industrial Chemistry	2+1	4 <sup>th</sup> Year	Summer
06	SSC 440	Soil Microbiology	3+1	4 <sup>th</sup> Year	Autumn

### 21.14.1 SSC 101: Introductory Soil Science

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To familiarize students with the concept of soil, its components, rocks and minerals, soil formation and basic ideas about various physical, chemical and biological properties of soil. Moreover, to acquaint students with the basic knowledge on soil survey, classification and conservation, agro-ecological zones (AEZ) and broad physiographic units of Bangladesh.

### Theory (Credit 2.0)

**Soil, its components, rocks and minerals and formation of soil:** define and describe concepts of soil and branches and importance of soil science, describe components, rocks and minerals and formation of soil.

**Soil physical properties:** describe basic soil physical properties such as soil texture, soil structure, soil density, soil porosity.

**Soil chemical properties:** discuss important soil chemical properties such as soil pH, CEC and EC.



**Soil biological properties:** provide preliminary knowledge on soil bacteria, fungi, blue-green algae, actinomycetes, protozoa etc.

**Soil fertility, productivity, organic matter and essential plant nutrients:** differentiate soil fertility from that of soil productivity, explain soil organic matter and its importance in agriculture, and describe essential plant nutrients, their available forms, functions and sources.

**Concept of soil survey, classification and conservation:** explain the concept of soil survey, classification and conservation.

**Agro-ecological zones (AEZ) and broad physiographic units:** provide basic ideas on agro-ecological zones and broad physiographic units of Bangladesh.

### **Practical (Credit 1.0)**

1. Precautions to be taken while working in the laboratory
2. Collection preparation of soil samples
3. Identification of rocks minerals
4. Determination of soil moisture
5. Determination of soil pH
6. Determination of electrical conductivity of soil and water

### **21.14.2 SSC 225: Soil Survey, Classification and Conservation**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 2 <sup>nd</sup> Year, Summer
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To enable students in understanding of soils and lands of Bangladesh, soil formation and classification, linking our soil to international classification, and finding ways to conserve soil for sustainable agriculture.

### **Theory (Credit 2.0)**

**Soil survey and mapping:** define soil survey, purposes, types, methods and soils maps, study and identify suitable base materials for conducting soil survey, interpret soil maps.

**Land capability and crop suitability classification:** explain land capability and crop suitability classification, identify land capability and crop suitability based on land and soils characteristics.

**Soil taxonomy:** classify soils, soil categories, description of soil characteristics for USDA soil classification systems, classify soil moisture and temperature regimes in order to identify soils, identify new soils (soil series) conducting soil profile study, correlating and comparing with the properties of identified soils.

**Soil erosion and conservation:** classify soil erosion caused by water and wind, harmful effects of erosion on soil fertility, soil loss tolerance limit, universal soil loss equation, identify principles of soil and water conservation, best management practices (BMPs) and resource conservation technologies (RCTs), apply BMPs and RCTs to conserve soil.

**Soils of Bangladesh:** compare characteristics of rocks and sediments and their formation (geology and geomorphology), classify soil physiographic units, agro-ecological zones (AEZs), based on soil and land characteristics.

**Problem soils:** identify problems soils of Bangladesh, characteristics of acid soils, saline soils, submerged soils, hill soils and find their reclamation measures, planning for agricultural development through crop selections, soil amendments and soil conservation.

### **Practical (Credit 1.0)**

1. Determination of soil texture
2. Determination of aggregate stability of soil
3. Determination of soil color
4. Determination of organic carbon of soil
5. Determination of infiltration characteristics of soil
6. Study on soil profile

#### **21.14.3 SSC 355: Soil Physics**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To provide knowledge on the physical properties of soil, their character and behavior that influence soil and crop productivity.

To provide knowledge to improve and manage the physical properties of soil as well as physical condition of soil for sustainable crop production.

### **Theory (Credit 3.0)**

**Soil physical properties and three phases:** define and describe the course and different soil physical properties, their importance and interrelationship with crop production.

**Soil texture, structure and consistency:** describe soil texture, textural classes, importance, define and describe soil consistency relating to soil mechanics, clarify the soil structure and its influence on crop production.

**Soil water measurement, constants and potentials:** classify different water constants and match these constants with crop cultivation, define water potentials and relate them with water behavior in soil and crop uptake.

**Soil water movement (Infiltration and hydraulic conductivity):** define, describe and measure the water infiltration, percolation, hydraulic conductivity, drainage characteristics for crop water availability.

**Evapotranspiration and irrigation scheduling:** define and discuss ET dem of crop, PET, measuring crop water requirement and irrigation schedule.

**Soil aeration:** define and explain the importance, mechanism of soil aeration for crop's comfort and root respiration.

**Soil temperature:** define and describe the importance of soil temperature and different thermal properties.

### **Practical (Credit 1.0)**

1. Determination of soil moisture by gravimetric method
2. Determination of bulk density of soil by core sampling method
3. Determination of particle density of soil by pycnometer method
4. Determination of soil porosity
5. Determination of particle size distribution of soil by hydrometer method and textural class of soil using Marshall's triangle
6. Determination of saturated hydraulic conductivity of soil by falling head method
7. Determination of maximum water holding capacity of soil
8. Determination of Atterberg Limits

### **21.14.4 SSC 365: Soil Chemistry and Fertility**

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 3 <sup>rd</sup> Year, Winter
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### **Course Objectives**

To acquaint students with theoretical and practical knowledge on soil chemical properties, weathering, chemistry of soil pollutants, plant nutrients, their functions and cycles, soil fertility evaluation and fertilizer recommendation for crops and soil fertility management.

### **Theory (Credit 3.0)**

**Weathering processes and soil genesis:** describe weathering, (physical, chemical, biological) processes. Make the relationship between weathering process and soil formation, describe

soil genesis and illustrate soil forming factors and processes (laterization, podzolization calcification), soil profile.

**Soil pH, buffering capacity and EC:** describe concept of soil pH and grouping of soils according to pH values, explain the types and causes of soil reactions and their effects on nutrient availability, soil microbial activity and soil health, discuss buffering capacity of soil.

**Liming:** discuss liming and liming materials, effects on soil properties, mechanism of correction of soil acidity with lime.

**Soil colloid, ion exchange and silicate clays:** describe classification and properties of soil colloids, charges development in soil colloids, mechanism of cation exchange mechanisms, anion exchange and base saturation, illustrate classification and basic structure of clays, characteristics of kaolinite, mica, smectite, vermiculite and interstratified minerals.

**Soil environmental pollution chemistry:** explain concept of pollution, soil pollution and its hazards, describe heavy metals source and hazards pollutants, arsenic pollution in Bangladesh, illustrate soil degradation, pesticides residue, hazards and degradation.

**Soil fertility and plant nutrients:** define soil fertility and productivity and discuss objectives of soil fertility management, factors affecting soil fertility and productivity, introduce essential elements, criteria of essentiality, types of essential elements, nutrient mobility, available forms, physiological roles and deficiency symptoms of plant nutrients, describe N P K S fertility and management for crop production.

**Organic matter:** describe the sources and functions of soil organic matter, C:N ratio and chelate, discuss the causes of soil organic matter depletion and buildup of soil organic matter.

**Manure and fertilizer:** define, classify and discuss the manure and fertilizers, prepare different manure and compost and express the time method of fertilizer application, fertilizer use efficiency, explain the concept, elements and benefits of integrated nutrient management.

**Soil fertility evaluation and fertilizer recommendation:** appraise the techniques of soil fertility evaluation, interpret soil fertility and calculate fertilizer recommendation, determine nutrient content in soil and plant samples.

### **Practical (Credit 1.0)**

1. Determination of CEC of soil
2. Determination of total N content in soil and plant
3. Determination of available phosphorus in soil
4. Determination of total phosphorus in plant sample
5. Determination of exchangeable potassium in soil
6. Determination of total potassium in plant sample
7. Determination of available sulfur in soil
8. Determination of total sulfur in plant sample

### 21.14.5 SSC 425: Agricultural and Agro-Industrial Chemistry

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Summer
<b>Pre-requisite</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 3.0 (2.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 48 hours (24 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

#### Course Objectives

To acquaint students with the chemistry, manufacturing technologies, properties transformation of fertilizers, mode of action of pesticides, fertilizer and agro-chemicals as ecosystem pollutants, processing, quality control, storage and use of different industrial crops and attain analytical skills on fertilizer quality, agrochemicals and their residue.

#### Theory (Credit 2.0)

**Concept and classification of fertilizer:** define and describe manure and fertilizer along with classification, describe commonly used manure and fertilizers, control/slow release fertilizer, discuss nano fertilizer formulation and their effectiveness.

**Fertilizer properties and quality control:** explain physico-chemical properties fertilizer, describe fertilizer specifications and compatibility, discuss required quality control analysis of imported fertilizer.

**Production technology and fate of fertilizer in soil:** enumerate and elaborate manufacturing technology of urea, single super phosphate (SSP) and triple super phosphate (TSP) and muriate of potash (MoP), fate of nitrogenous, phosphatic and potassic fertilizers in soil.

**Chemistry technology of agro industrial products:** describe the rubber production processing technology, tapping system tapping system, composition coagulation of latex, classification properties of synthetic rubber, explain the sugar production processing, condition quality of sugarcane, manufacture of plantation white sugar, industrial utilization of sugar mill byproducts, explicate the tea processing technology, tea cultivation, manufacturing process change of chemical composition in tea-leaves, aroma, tea infusion. liquoring quality tea.

**Pesticide chemistry:** describe classification, properties of pesticides, and illustrate mode of action of commonly used pesticides: organochlorinated, organophosphorus, organocarbamate.

**Agrochemicals ecotoxicology:** describe environmental fate of pesticides in soil, plant and aquatic systems, adverse effect of pesticide their remediation, illustrate detrimental impact of imbalanced fertilization application on environment.

#### Practical (Credit 1.0)

1. Manure and fertilizer identification
2. Nutrients analysis of manure and fertilizers

### 21.14.6 SSC 440: Soil Microbiology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

The course is designed to explain the abundance and functions of soil microorganisms including bacteria, fungi, BGA, mycorrhiza for sustainable soil health, biodegradation of hazardous materials, isolate and characterize N<sub>2</sub>-fixing microorganisms for bio fertilizer preparation.

### Theory (Credit 3.0)

**Concept and classification of microorganisms:** define microorganisms, microbiology and describe the branches of microbiology, discuss the occurrence, diversity and classification of microorganisms, differentiate prokaryotes from that of eukaryotes.

**Microbial diversity and soil fertility:** discuss the major biogeochemical cycles in soil regulated by the soil microbes, infer the role of microorganisms in soil fertility with special reference to phosphate solubilizing bacteria, microbial decomposition of soil organic matter, humus, breakdown of protein, mycorrhiza, rhizosphere organisms.

**Biological N<sub>2</sub> fixation:** describe different types of biological nitrogen fixation (BNF) including symbiotic nitrogen fixation with legumes particularly cross inoculation group, nodulation process, factors affecting BNF, fate of nitrogen fixation by legume bacteria, symbiotic nitrogen fixation with nodule forming non-legumes, symbiotic nitrogen fixation without nodules, non-symbiotic nitrogen fixation with nodule forming non-legumes, blue-green algae, azolla-Anabaena symbiosis lichens.

**Hazardous materials and their biodegradation:** discuss the impact of hazardous materials in soil, describe the biodegradation process of pesticides and organic compounds in soil.

**Bio fertilizers:** describe different types of bio fertilizers and their importance in agriculture.

### Practical (Credit 1.0)

1. Isolation and characterization of soil microorganisms
2. Preparation and use of bio fertilizers

### 21.14.7 Faculty members of the department

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## 21.15 Institute of Biotechnology and Genetic Engineering

The Department of Biotechnology was established in 2003 with a view to disseminating knowledge and train students at undergraduate and graduate levels at BSMRAU. The primary goal of this department is to deliver high class teaching and conduct both basic and applied research in the field of biotechnology. List of the courses offered from the department in undergraduate program are as follows-

Sl. No.	Course Code	Course Title	Credit	Offering year	Term
01	BTL 410	Introductory Biotechnology	3+1	4 <sup>th</sup> Year	Summer

### 21.15.1 BTL 410: Introductory Biotechnology

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Summer
<b>Pre-requisite</b>	: Not required
<b>Credit (Theory + Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hours (Theory + Practical)</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

This course is designed to provide knowledge and skills to students on classical and frontier biotechnological methods or tools and to offer hands on training for practical and application of these tools in agriculture and industry.

### Theory (Credit 3.0)

**Introduce biotechnology and genetic engineering:** introduction: concept, definition, history, branches, scope, limitations, importance and entrepreneurship of biotechnology, and genetic engineering, application of biotechnology in agriculture, environment and industry.

**Describe the structure and functions of DNA, RNA and genes illustrate DNA replication, repair mechanisms and autophagy:** DNA and RNA: structure and functions, concept of central dogma and DNA replication, modern concept of gene and its structure, mechanism of DNA repair and autophagy. Explain the different techniques on detection of biomolecules. illustrate gel electrophoresis technique and separate DNA, RNA and protein. Explain the techniques the DNA and RNA isolation. analyze principle and roles of PCR in molecular biology describe DNA finger printing Perform DNA sequencing. Molecular techniques and Methods: tissue culture, blotting methods such as Southern, Northern and Western, enzyme/ protein purification, DNA and RNA isolation, purification, gel electrophoresis, describe about PCR and its utilization, DNA finger printing, DNA sequencing, GMO and gene edited organism detection.

**Describe and perform gene cloning explain recombinant DNA technology for transgenic plant development recombinant DNA technology/GE:** restriction endonuclease, vectors, plasmids ligases and other enzymes useful in genetic engineering, steps in gene cloning.

**Perform gene transfer:** methods of gene delivery, Agrobacterium-mediated and other genetic transformation techniques.

**Explain and apply genome editing:** principles, methods and applications of CRISPR-Cas genome editing in basic research and improvement of organisms including plants.

**Define and explain frontier terminology of biotechnology and genetic engineering:** provide understanding concepts and application of genomics, metagenomics, transcriptomics, proteomics, metabolomics, bioinformatics and nanobiotechnology.

**Get acquainted with the application and advancement of microbial biotechnology and genetic engineering:** microbes and their derivatives (e.g., plant probiotics, antibiotics, enzyme etc.) in agriculture, energy, environment and human health.

**Regulatory approaches in biotechnology and genetic engineering:** principles application of biosafety and biosecurity guideline for GMO and gene edited organisms, explain the implications of biosafety and biosecurity on biotechnology and genetic engineering.

### **Practical (Credit 1.0)**

1. Gather knowledge on safety symbols and rules in biotechnology and genetic engineering
2. Design a standard biotechnology and genetic engineering laboratory
3. Operate and demonstrate equipment used in biotechnology and genetic engineering laboratory
4. Demonstrate media for tissue culture
5. Sterilize tissue culture media using different technique
6. Demonstrate preparation of explant and in vitro regeneration.
7. Isolate probiotic bacteria from plants
8. Develop skill on screening isolated microorganisms on plant growth promotion
9. Develop skills on genetic transformation and detection of a known gene.
10. Extract DNA, RNA from different organism
11. Use PCR and separate DNA, and RNA using gel electrophoresis



12. Apply bioinformatics tools for analysis of the sequenced data.
13. Get acquainted with biotechnology and genetic engineering laboratories in Bangladesh

### 21.15.2 Faculties of the department

Name	Designation	Mobile	E-mail
Dr. Md. Tofazzal Islam	Professor	01714-001414	<a href="mailto:tofazzalislam@bsmrau.edu.bd">tofazzalislam@bsmrau.edu.bd</a>
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Dr. Dipali Rani Gupta	Associate Professor	01763-144766	<a href="mailto:dr Gupta80@bsmrau.edu.bd">dr Gupta80@bsmrau.edu.bd</a>
Musrat Jahan Surovy	Assistant Professor	01712-283114	<a href="mailto:mz_surovy@bsmrau.edu.bd">mz_surovy@bsmrau.edu.bd</a>

### 21.16 Department of Agricultural Economics, Faculty of Agril. Economics and Rural Development

Sl. No.	Course Code	Course Title	Credit	Offering Year	Term
01	AEC 155	Agricultural Economics	3+0	1 <sup>st</sup> year	Autumn

#### 21.16.1 AEC 155: Agricultural Economics

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 1 <sup>st</sup> Year, Autumn
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory)</b>	: 3.0
<b>Contact Hour (Theory)</b>	: 36 hours
<b>Total Marks</b>	: 100

#### Course Objectives

The objectives of this course is to impart knowledge on different economic tools and concepts to the students of agriculture to build up their capability for analyzing different problems and policies in agricultural sector.

#### Theory (Credit 3.0)

**Introduction:** define, scope and subject matter of economics, know the history of economic thoughts, explain different branches of economics, and importance of agricultural economics

**Utility and indifference curve analysis:** define utility, total utility, marginal utility, analyze the relationship between total and marginal utility, consumer's and producer's surplus, analyze the law of diminishing marginal utility and law of Equi-marginal utility. define the concept of indifference curve, marginal rate of substitution (MRS), indifference map, characteristics of indifference curve, budget line, consumer's equilibrium.

**Demand, supply and elasticity:** deliberate demand and law of demand, change in demand and change in quantity demanded, know the determinants and factors affecting demand, describe the concept of supply, law of supply, causes of change in supply, exceptions to the law of supply, shifting of supply curve, explain the concepts and classifications of elasticity and measure elasticity by using different methods.

**Theory of production:** define production and discuss four factors of production, explain the characteristics of four factors of production, understand the tabular analysis of total, average and marginal product, explain the production function, describe the theory of production and three stages of production function and analyze how a farmer maximizes production.

**Market:** define market and discuss the characteristics of market, classify different types of market, analyze the market equilibrium condition.

**Cost and revenue:** deliberate the concepts of cost and revenue of production, explain the relationship of average and marginal revenue, analyze farms optimization behavior under different market structure.

**Money and banking:** define money and functions of money and inflation, bank and banking, explain functions of different banks.

**National income:** deliberate the concepts of national income (NI), explain the measurement method of national income and the associated challenges.

## 21.17 Department of Statistics, Faculty of Agril. Economics and Rural Development

Sl. No.	Course Code	Course Title	Credit	Offering Year	Term
01	STT 270	Basic Statistics	3+1	2 <sup>nd</sup> year	Winter

### 21.17.1 STT 270: Basic Statistics

<b>Year and Term</b>	: 2 <sup>nd</sup> year, Winter
<b>Course Type (Core/Elective)</b>	: Core
<b>Pre-requisite (If any)</b>	: Not required
<b>Credit (Theory and Practical)</b>	: 4.0 (3.0 + 1.0)
<b>Contact Hour</b>	: 60 hours (36 hours + 24 hours)
<b>Total Marks</b>	: 150 (100 + 50)

### Course Objectives

To gain knowledge about the basic statistical methods and their application in different fields of agriculture.

### Theory (Credit 3.0)

**Introduction to statistics:** describe the different introductory terms/concepts of statistics and limitation of Statistics as well as its application in agriculture.

**Presentation of data:** describe statistical methods to present data, organize observation into table or graph, differentiate tabular and graphical presentation of data.

**Measures of central tendency:** central tendency and its application, classify measures of central tendency, estimate central values for different data set, estimate quartiles, deciles and percentiles, interpret summary statistics of measures of central tendency.

**Measures of dispersion:** measures of dispersion and its application, classify measures of dispersion, illustrate measures of variability, figure-out the shape and structure of the datasets, compare and interpret the structure of the datasets.

**Theory of probability:** define and discuss importance of probability in agriculture, apply probability theories and laws for agricultural data, interpret probability distributions and their properties.

**Correlation and regression:** explain the scope and importance of correlation and regression analysis in the field of agriculture, measure and interpret the relationship among variables, explain the dependence of the variable on the independent variables and estimation linear regression equation, forecast and interpretation of fitted linear regression line application of correlation and regression analysis for agricultural sciences.

**Test of hypothesis:** basic concepts of test of hypothesis, identify appropriate statistical test for mean, variance etc., calculate and interpret p-value, draw inference on the basis of sample from hypothesis test about the phenomena.

**Analysis of variance:** concept of design an agricultural experiment, application of basic experiential design on agriculture, analysis of data from basic experimental design and interpretation of the results.

### Practical (Credit 1.0)

1. Laboratory exercise on data presentation
2. Laboratory exercise on measures of central tendency
3. Laboratory exercise on measures of dispersion
4. Laboratory exercise on probability theories
5. Laboratory exercise on correlation and regression analysis
6. Laboratory exercise on test of hypothesis
7. Laboratory exercise on analysis of variance

## 21.18 General Education Unit

Sl. No.	Course Code	Course Title	Credit	Offering Year	Term
01	GEU 110	Communicative English	2+0	1 <sup>st</sup> year	Summer
02	GEU 171	বাংলাদেশের অভ্যুদয়ের ইতিহাস	2+0	1 <sup>st</sup> Year	Winter
03	GEU 410	Career Planning and Development	2+0	4 <sup>th</sup> Year	Summer

### 21.18.1 GEU 110: Communicative English

Course Type (Core/Elective)	: Core
Year and Term	: 1 <sup>st</sup> Year, Summer
Pre-requisite (If any)	: Not required
Credit (Theory)	: 2.0
Contact Hour	: 24 hours
Total Marks	: 100

#### Theory (Credit 2.0)

**Basic grammar and sentence kills:** verbs and tenses; subject verb agreement; phrases and clauses; various sentence-construction problems (run-ons, comma splices, fragments, parallelism errors etc.); punctuation marks; Reading Skills: skimming and scanning; predicting, inferring, analyzing and interpreting variety of texts; speed reading.

**Listening skills:** comprehensive and constructive listening; critical and critical constructive listening, empathetic listening.

**Writing skills:** prewriting techniques, cohesion and linking ideas together; descriptive, narrative and argumentative writing styles; writing paragraphs using topic sentence; writing essays using thesis statement; writing abstract and summary; writing research papers and proposals; writing application and letter.

**Speaking and presentation skills:** techniques of avoiding stage fear. impromptu speaking, memorized presentation, manuscript-reading and extemporaneous presentation. seminar presentation; methodological steps toward proper public speaking; informative and persuasive speeches; speeches of special occasions; general interview and job interview techniques.

### 21.18.2 GEU 171: বাংলাদেশের অভ্যুদয়ের ইতিহাস

Course Type (Core/Elective)	: Core
Year and Term	: 1 <sup>st</sup> Year, Winter
Pre-requisite (If any)	: Not required
Credit (Theory)	: 2.0
Contact Hour	: 24 hours
Total Marks	: 100

#### Theory (Credit 2.0)

To be developed later

### 21.18.3 GEU 410: Career Planning and Development

Course Type (Core/Elective)	: Core
Year and Term	: 4 <sup>th</sup> Year, Summer
Pre-requisite (If any)	: Not required
Credit (Theory)	: 4.0
Contact Hour	: 24 hours
Total Marks	: 100

## Course Objectives

At the end of this course, the students will be able to:

- i. develop a deeper knowledge of career development and planning;
- ii. demonstrate how such knowledge is pertinent for the effective management of their career;
- iii. develop an in-depth comprehension of career issues to be a successful employee and/or entrepreneur;
- iv. identify their long-term career goals and aspirations.

### Theory (Credit 2.0)

**Career planning: an overview:** concepts and importance, career resources and job market information, career evaluation and SWOT analysis, factors affecting occupational choice: psychological, social, economic, and cultural.

**Planning career goals:** career decision: employee vs. entrepreneur, steps in career planning process, what to do when their major and career choice don't match.

**Landing the Job:** preparing a great resume and cover letter, common job application mistakes, prepare for job interview, job interview pitfalls.

**Road to success in career:** job commitment, time management, job stress: an overview, career stages: establishment, advancement, maintenance and withdrawal, interpersonal communication in the workplace: examples and importance, workplace ethics, law and conflict resolution, opportunities to grow career, career shifting: smart ways to choose a new career.

**Career management and development:** career management and development- definition and purpose, career management and development model, job satisfaction and dissatisfaction: definition, causes and factors , workplace satisfaction issues: problems and solutions, career management and development training.

### 21.19 Internship

<b>Course Type (Core/Elective)</b>	: Core
<b>Year and Term</b>	: 4 <sup>th</sup> Year, Winter
<b>Credit</b>	: 7.0

Methods and procedures are under way

