Undergraduate Courses offered by Prof. Dr. M. S. Islam

B. Sc. (Hons) Part-1 (Course: Zool. E. 131)

Course Title: English for Communication and Science		
Course Code: Zool.E.131	**Course Type:** Theory (Core Course, non-credit)	**Credits:** 2
Full Marks: 50	**Total Lecture hours:** 30	**Exam Hours:** 3

Course Description

English for Science (Prof. M. S. Islam): Part 2 of the course is concerned with improving English of the students for biological science, Zoology in particular. It introduces English as the universal language of science along with its opportunities and challenges. Then such pre-writing activities as describing zoological specimens, text book, tables and graphs are included, which help the students with more advanced skills like writing field reports, and knowing about research papers and thesis or dissertations. Finally, the learners will be introduced with topics like proofreading and editing, and criteria for good oral and poster presentations.

Course Learning Outcomes (CLOs)

After completion of **English for Science** course, learners will be able to:

1. Explain that English as the universal language of science: its opportunities and challenges
2. Apply rules of pre-writing activities-1; Describing specimens and books
3. Apply rules of pre-writing activities-2; Describing tables and graphs
4. Write field reports, for example, on habitat-faunal relationship and Rajshahi weather station
5. Define and describe briefly structures of research papers and theses/dissertations
6. Apply rules of proofreading and editing
7. Describe criteria for good oral and poster presentations

Course contents, subject to the lecture and alignment of lectures with CLOs

Course contents	**Subject to the lecture**	**Alignment of topic with CLOs**	**LH**
English for Science			
English as the universal language of science: Opportunities and challenges; use of English in biological science	**Lecture 1:** English as the universal language of science: its opportunities and challenges	CLO 1	2
Writing for science: Pre-writing activities; describing specimens, books, tables, graphs	**Lecture 2:** Pre-writing activity-1; Describing specimens	CLO 2	2
Writing for science: Pre-writing activities; describing specimens, books, tables, graphs	**Lecture 3:** Pre-writing activity-2; Describing books	CLO 2	2
Writing for science: Pre-writing activities; describing specimens, books, tables, graphs	**Lecture 4:** Pre-writing activity-3; Describing tables and graphs	CLO 3	2
Writing reports: Structure of a report; essential stages and features of a good report	**Lecture 5:** Writing field reports	CLO 4	2
Writing theses (or dissertation): Structure of a thesis; references and appendices	**Lecture 6:** Structures of research papers and theses or dissertations	CLO 5	2
Writing a research paper: Structure of a research paper; editing and proof reading	**Lecture 7:** Proofreading and editing	CLO 6	2
Presentations: oral, poster and lecturing	**Lecture 8:** Criteria for good oral and poster presentations	CLO 7	1

Assessment Strategy			
Type of Assessment	**Components**	**Marks**	**Methods of Assessment**
Final Written Examination	Broad Questions	20	As mentioned in Zool.H.101
	Short Questions	15	
Continuous Assessment	Attendance	5	
	Tutorial	10	

Learning Resources

Ahmed, S. 2010. Learning English, The Easy Way

Dev, A. T. 1976. Student's Favourite Dictionary.

Drubin, D. G. & Kellogg, D. R. 2012. English as the universal language of science: Opportunities and challenges. Mol. Biol. Cells 23: 1399.

Drubin, D.G. and Kellogg, D.R. 2012 English as the universal language of science: Opportunities and challenges.

English Communication for Scientists. http://www.nature.com/scitable/ebooks/english-communication-for-scientists

English Communications for Scientists. http://www.nature.com/scitable/ebooks/English-communication-for-scientists

Essay Builder (2016) http://www.essaybuilder.net/BarCharts2.html

Essay Builder (2016) http://www.essaybuilder.net/Table.html

Essay Builder (2016) http://www.essaybuilder.net/Table.html

Hefferman, J.A.W and Lincoln, J.E. 1997: Writing. WWNorton and Company, London.

IELTS 2013. http://www.ieltsbuddy.com/ielts-table.html

IELTS 2013. http://www.ieltsbuddy.com/ielts-table.html

Mazyad, S.S. 2004: English for Science. University of Durham, UK.

Pearson, I. 1978. English in Biological Science. Oxford University Press.

Pearsons, I. 1978: English in Biological Science. Oxford University Press, UK.

Rashid, MH. 2001. English for Bengali Learners

Swales, J. 2003. Writing Scientific English. Nelson, England.

Swales, J.M. and Feak, C.B. 2012: Academic writing for Graduate Students (3rd edn). Michigan Publishing, USA.

Thomson, AJ and Martinet, AV. 1986. A Practical English Grammar

Tips for Teachers: Twenty Ways to Make Lectures More Participatory

University of Leicester, 2009. Learning Development. www.le.ac.uk/suceedyourstudies

Vallins, GH. 1951. Good English

Vallins, GH. 1953. Better English

Zimmerman, F. 2007. English for Science. Prentice Hall, UK.

http://www.learnnc.org/lp/editions/writing-process/5812

http://www.preservearticles.com/201107149097/what-are-the-relationship-between-animals-climatic-conditions-and-vegetation-in-an-ecosystem.html

http://www.tageo.com/index-e-bg-weather-bg.htm

http://www4.caes.hku.hk/epc/presentation/

https://cft.vanderbilt.edu/guides-sub-pages/lecturing/

https://en.wikipedia.org/wiki/Ecological_relationship

https://en.wikipedia.org/wiki/Meteorology

https://en.wikipedia.org/wiki/Weather_station

https://www.acurite.com/learn/weather-stations/what-is-a-weather-station

https://www.google.com.bd/?gws_rd=ssl#q=fauna+definition

https://www.google.com.bd/?gws_rd=ssl#q=habitat+definition

B. Sc. (Hons) Part-II (Practical: Course Zool. HP. 211)

Course Title: Zoology Practical II		
Course Code: Zool.HP.211	**Course Type:** Practical (Core Course, Mandatory)	**Credits:** 6
Full Marks: 150	**Total Lecture hours:** 90	**Exam Hours:** 18 (6 hours daily)

Course Learning Objectives

To provide practical experience on the topics covered by theoretical courses so that the learner can apply their knowledge in lab, workplace and in practical life.

Course Learning Outcomes (CLOs)

After completion of this course, learners will be able to:

1. Identify integumentary derivatives and skeleton (bones) of the representative animals of different taxa.
2. Demonstrate and describe the procedures for detection of albumen and glucose in given samples.
3. Measure blood pressure and its implications.

Course contents, teaching strategies and alignment of topic with CLOs

Contents	**Alignment of topic with CLOs**	**LH**
Identification of integumentary derivatives and skeletal systems of chordates.	CLO 5	10
Detection of albumen and glucose in given samples; measurement of blood pressure.	CLO 6	10

Assessment Strategy

Type of Assessment	**Marks**	**Methods of Assessment**
Practical Examination	105	18-hr practical exam on the above topics (6 hrs daily)
Continuous Assessment	15	As mentioned in Zool.H.201
	15	Practical class records
	15	Laboratory assessment

Learning Resources:

Barrington, EJW. 1979. Invertebrate Structure and Function (2nd edn). John Wiley and Sons, New York

Beklemishev. Comparative Anatomy of Invertebrates. Vol. I Promorphology; Vol. II Organology

Dales, RP. 1981. Practical Invertebrate Zoology. Blackwell Scientific Publications. London.

Eckert R. and Randall D. 1978. Animal Physiology. WH Freeman and Co., New York.

Eddy, S. 1949. Atlas of Drawings for Chordate Anatomy. John Wiley and Sons Inc., New York.

Goodrich, ES. Comparative Anatomy of Vertebrates.

Griffin, DR and Novick, A. 1962. Animal Structure and Function. Holt, Rinehart and Winston, Inc., New York.

Guyton, AC and Hall, JE. 2000. Textbook of Medical Physiology (10th edn). W.B. Saunders, Philadelphia.

Kent, G and Carr, R. 2000. Comparative Anatomy of the Vertebrates (9th edn). McGraw-Hill Science, London.

Hildebraand, M. 1988. Analysis of Vertebrate Structure. John Wiley and Sons. Inc., New York.

Marshall DT. 1967. The Physiology of Mammals and other Vertebrates. Cambridge Univ. Press. London.

Parker, TJ and Haswell, WA. 1962. A Text-Book of Zoology (7th edn). McMillan and Co. Ltd. London.

Pearson, R and Ball, JN. 1981. Lecture Notes on Vertebrate Zoology. Blackwell Scientific Publications. Oxford, London.

Pechenik, JA. 1985. Biology of the Invertebrates. PWS Publishers, Boston.

Pfeiffer, P. (ed) 1985. Predators and Predation: The Struggle for life in the Animal World: Facts on file. New York. Oxford

Rugh, R. 1968. The Mouse - its reproduction and development. Burgess Publishing Co., Minneapolis, Minn.

Walker, WF Jr. 1987. Functional Anatomy of the Vertebrates: An Evolutionary Perspective. Sander's College Publishing, USA.

Walker, WF. 1975. Vertebrate Dissection. W.B. Sander's Co., London.

Walker, WF. 1980. Vertebrate Dissection. Sanders Co., Philadelphia.

Webster, D and Webster, M. 1974. Comparative Vertebrate Morphology. Academic Press, New York, London.

Weickert, CK. 1965. Anatomy of the Chordates (3rd edn). McGraw-Hill, New York.

Wigglesworth, VB. 1965. The Principles of Insect Physiology. ELBS and Methuen and Co.

Williams, P, Stone, G and Johnston, I. 2005. Environmental Physiology of Animals (2nd edn). Blackwell Scientific Publications, Oxford. London.

B. Sc. (Hons) Part-III (Course Zool. H. 301)

Course Title: Cell Biology, Genetics & Animal Breeding		
Course Code: Zool.H.301	**Course Type:** Theory (Core Course, Mandatory)	**Credits:** 4
Full Marks: 100	**Total Lecture hours:** 60	**Exam Hours:** 4

Course Description:

Genetics and Animal Breeding (Prof. M. S. Islam): The course is designed to fortify the knowledge and understanding of the learners about various aspects of Genetics and Animal Breeding. The course will also help enrich the existing ideas of the students on the basic work of Mendel, his laws of inheritance and their deviations. In addition, types and mechanisms of linkage and crossing-over, sex-linked inheritance in man and *Drosophila*, gene and chromosomal mutations, ABO blood groups and their inheritance, various mechanisms of sex determination in animals, Hardy-Weinberg law and its uses in population genetic studies, extra-nuclear inheritance and types and applications of animal breeding for farm animals.

Course Learning Objectives:

1. To fortify the knowledge and understanding of the learners about various aspects of Genetics and Animal Breeding.

Course Learning Outcomes (CLOs):

After completion of **Genetics and Animal Breeding** course, learners will be able to**:**

1. Describe the work of Johann Mendel, the father of Genetics, explain Mendelism, and define the common terminologies used in Genetics
2. Describe and explain with examples the Mendelian crosses and ratios in garden peas and animals
3. Explain allelic and non-allelic interactions, and deviations from Mendel's laws
4. Explain with examples deviations from Mendelian monohybrid and dihybrid ratios
5. Classify, explain and compare linkage and crossing-over along with their significance
6. Describe and compare sex-linked, sex-limited and sex-influenced traits particularly in man and *Drosophila*
7. Define, compare and explain multiple and pseudoalleles with special reference to the inheritance of ABO blood groups in man and their medico-legal applications
8. Describe and understand various mechanisms of sex determination in animals and their abnormalities
9. Describe types, mechanisms and detection of gene mutations
10. Describe types of chromosomal mutations along with their practical applications
11. Classify and explain chromosomal aberrations, their origin and frequencies in man
12. Interpret extra-nuclear inheritance in animals and compare it with nuclear inheritance
13. Define population genetics and describe Hardy-Weinberg law and its derivation
14. Describe inbreeding, outbreeding and cross breeding and their genetic effects
15. Apply animal breeding principles for improving farm animals

Course contents, subject to the lectures and alignment of topics with CLOs

Course contents	**Subject to the lectures**	**Alignment of the topic with CLOs**	**LH**
Genetics			
A short life-sketch of Mendel; Common terminologies used in Genetics	**Lecture 1:** Introduction to Genetics; work of Mendel and common terminologies used in Genetics (2 LH)	CLO-1	2
Mendel's laws of inheritance	**Lecture 2:** Mendelian crosses and ratios in experimental organisms	CLO-2	2
Deviations from monohybrid and dihybrid cross ratios	**Lecture 3:** Deviations from Mendel's laws of inheritance and their explanations	CLO-3	2
Deviations from monohybrid and dihybrid cross ratios	**Lecture 4:** Allelic and non-allelic interactions; Deviations from monohybrid and dihybrid cross ratios	CLO-4	2

Linkage and crossing-over	**Lecture 5:** Linkage and crossing-over, their types, theories and significance	CLO-5	2
Sex-linked inheritance in *Drosophila* and man; Sex-limited and sex-influenced traits	**Lecture 6:** Sex-linked, sex-limited and sex-influences traits in man and other animals	CLO-6	2
Multiple alleles and inheritance of ABO blood groups in man; Pseudoalleles and Rh antigen	**Lecture 7:** Multiple and pseudoalleles in animals; inheritance of ABO blood groups in man and their medico-legal applications	CLO-7	2
Genetic mechanisms and chromosomal mutations			
Determination of sex in animals	**Lecture 8:** Various mechanisms of sex determination in animals and their abnormalities such as gynandromorphs, hermaphrodites and sex mosaics	CLO-8	2
Gene *versus* chromosomal mutations; Classification of gene mutations; Detection of mutations by ClB and Muller-5 methods	**Lecture 9:** Mutation-1: Gene mutations, their types, mechanisms and detection by ClB and Muller-5 methods	CLO-9	2
Variations in chromosome number and structure	**Lecture 10:** Mutation-2: Structural and numerical chromosomal mutations, their origin and practical applications	CLO-10	2
Chromosomal abnormalities in man	**Lecture 11:** Chromosomal aberrations, their causal factors, origin and frequencies in man	CLO-11	2
Extra-chromosomal inheritance in *Paramecium* and *Drosophila*.	**Lecture 12:** Cytoplasmic or extra-nuclear inheritance in *Paramecium* and *Drosophila*; Differences between nuclear and extra-nuclear inheritance	CLO-12	2
Hardy-Weinberg law and its limiting factors	**Lecture 13:** Population genetics; Hardy-Weinberg law and its derivation, limiting factors and calculations of gene and genotype frequencies in a population	CLO-13	2
Animal Breeding			
Types of breeding and their genetic effects	**Lecture 14:** Animal breeding: Brief history, types of breeding and their genetic effects	CLO-14	2
Practical applications of breeding principles	**Lecture 15:** Applications of inbreeding, outbreeding and crossbreeding for improvement of farm animals like chicken, cattle, sheep and goat	CLO-15	2

Assessment Strategy

Type of Assessment	**Components**	**Marks**	**Methods of Assessment**
Final Written Examination	Broad Questions	35	Year-end final exam will be taken.
	Short Questions	35	
Continuous Assessment	Attendance	10	% of the assessment marks for attendance will be given as follows

Attendance	Marks	Attendance	Marks	Attendance	Marks
95 -100%	20%	90 -<95%	18%	85 -<90%	16%
80 -<85%	14%	75 -<80%	12%	70 -<75%	10%
65 -<70%	8%	60 -<65%	6%	<60%	0%

	Tutorial	20	Class test, presentation in group, assignment

Learning Resources:

Anderson, RC, Drauty, VE, Faust, G and Guthric, JT. 1969. Population Genetics. Silver Burdett Co., New Jersey.

Burns, WG. 1981. The Science of Genetics (5th edn). MacMillan Publ. Co. Inc., New York.

Gardner, EJ, Simmons, MJ. and Snustad, DP. 1991. Principles of Genetics (8th edn). John Wiley and Sons Inc., New York.

Islam, MS. 2018. Selected Lectures in Genetics. LAP Lambert Academic Publishing, Germany.

Jarman M. 1970. Examples in Quantitative Zoology. Edward Arnold (Publ.) Ltd.

Sinnot, EW, Dunn, LC. and Dobzhansky, T. 1967. Principles of Genetics (5th edn). Tata McGraw-Hill Publ. Co. Ltd. New Delhi.

Stansfield, WD. 1991. Theory and Problems of Genetics (3rd edn). Schaum's Outline Series. McGraw-Hill Inc., Singapore.

Winchester, AM. 1966. Genetics: A survey of the Principles of Heredity (3rd edn). Oxford and IBH Publ. Co. New Delhi.

ইসলাম, এম.সা, খান, হা.সা. ও রানা, মো. হা.তা. ২০১৭। জেনেটিক্স: মিল ও অমিলের বিজ্ঞান। অন্যপ্রকাশ, বাংলাবাজার, ঢাকা।

MSI: June 2021

Masters Courses offered by Prof. Dr. M. S. Islam

Special Branch: MS in Genetics & Molecular Biology
Course: Zool. M. 631
Chromosomal & Extra-Chromosomal Inheritance

Sub-units	Contents	LH
III	**Mutation:** Classification of mutation, molecular mechanism of mutation, kinds of mutagens, detection of sex-linked recessive and dominant mutations, sex-linked recessive lethal mutation, autosomal recessive and dominant mutations, and autosomal recessive lethal mutations, practical application of mutations.	**10**
IV	**Extra-Chromosomal inheritance**: Cytoplasmic inheritance in *Paramacium*, extra-chromosomal inheritance in *Drosophila* and milk factor in mice.	**12**
V	**Determination of sex**: Mechanism of sex-determination, Chromosomal theory of sex determination, balance concept of sex determination, Y-chromosome in sex determination, hormonal theory of sex determination, external environment and sex-determination, Gynandromorph, sex-differentiation, dosage compensation.	**14**

Special Branch: MS in Genetics & Molecular Biology
Course: Zool. M. 632
Quantitative, Population & Human Genetics and Animal Breeding

Sub-units	Contents	LH
I	**Quantitative Genetics:** Polygenes and their inheritance, estimation of the number of polygenes, transgressive variations; Biological variations, their sources of origin and significance.	**16**
III	**Population and Ecological genetics:** Hardy-Weinberg law of genetic equilibrium; Changes in allelic frequencies due to (a) selection against recessives, (b) dominants, (c) selection favouring heterozygotes, (d) mutations, (e) migration and (f) genetic drift; Estimation of genetic variation in natural populations using electrophoresis and PCR; Genetic differentiation during speciation; Polymorphism in *Drosophila* and snail.	**18**
IV	**Human Genetics:** Human chromosome complements; human disorders associated with autosomal and sex- chromosomal abnormalities and polygenes; some common metabolic diseases; genetics of haemoglobin; human twins and their significance in genetic studies; Human Genome Project (HGP) and its relevance to human welfare; eugenics, euphenics and euthenics; Genomics and proteomics.	**20**

Special Branch: MS in Genetics & Molecular Biology
Course: Zool. M. 636
Genetics & Molecular Biology Practical (General/Non-thesis Group)

[Distribution of marks: Lab Assessment **30** marks (15 for lab attendance + 15 for records of practical works) + **120** marks for practical examination]

Sub-units	Contents	LH
I	**Chromosomes & chromosomal inheritance:** Preparation and study of giant chromosomes from the salivary glands of *Drosophila;* Preparation and identification of different stages of meiosis from grasshopper testes; Study of the simple Mendelian and sex-linked inheritance in *Drosophila;* Study of *Drosophila* mutants; Construction of chromosome maps in *Drosophila*	
II	**Quantitative genetics:** Identification of autosomal and sex-chromosomal mutants in *Drosophila*; Studies and identification of human karyotypes; Studies and estimation of such quantitative traits as sternopleural bristles in *Drosophila*, and heterosis and correlation for cocoons in *Bombyx mori*; Studies on the effects of mutagens and aging on *Drosophila* and methods of estimating such effects.	
III	**Recombinant DNA technology & genetic engineering:** Extraction of plasmid DNA from *Escherichia coli* and its demonstration by gel electrophoresis; Separation and identification of amino acids by paper chromatography.	
IV	**Immunogenetics & microbiology:** Studies on culturing, isolation and purification of bacteria; Procedures of antibiotic sensitivity test for bacteria.	

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Learning Resources

Ahlusalia, K.B. : Genetics
Altenberg, E. : Genetics
Auerbach, C. : Mutation Research
Ayala, F.J & Kiger, Jr. : Modern Genetics
Benjamin, H. : Gene VI
Burns, G.W. : The Science of Genetics
Darke, J.W. : The molecular basis of mutation
Darlington, C.D. & Lacour, L.F. :The handling of chromosomes
Desmond, S.T.N. : An Introduction to genetic Engineering
Dupraw, T.E.J. : DNA and chromosome
Falconer, D.S. : Introduction of quantitative Genetics
Freifelder, D. : Molecular Biology
Gloner, D.M. : Principles of gene cloning
Islam, M. S. 2018 : Selected Lectures on Genetics
Kingsman, S.M. & Kingsman, A.J.: Genetic Engineering.
Klung, S.W. & Cummings, R.M. : Essentials of Genetics
Kumar, S.D. : Molecular Biology and Biotechnology
Lowey, A.C. & Siekevitz, P. : Cell Structure and Function.
Novitski, E. : Human genetics
Prave, P. *et al*. : Basic Biotechnology.
Primrose, S.B. : Principles of gene manipulation.
Rashid, K. M. *et al.* : Text book of community medicine and public health.
Singleton, W.R. : Elementary Genetics
Sinnott, *et al*. : Principles of Genetics
Smith, J.B. : Biotechnology Principles.
Snyder, A.L. *et al.* : General Genetics
Stern, E. : Principles of Human Genetics
Strickberger, M.W. : Genetics
Sutton, H.E. : An introduction to human Genetics
Suzuki, D.T. & Griffiths, A.J.F. : An introduction to Genetic analysis
Swanson, C.P. : The Cell Structure.
Szkeley, M. : From DNA to protein
Verma, P.S. & Agarwala, V.K. : Genetics / Cytology
Walker, J.M. & Gingold, E.B. : Molecular Biology and Biotechnology
Watson, *et al.* : Recombinant of gene cloning
Watson, J. *et al.* : Modern biology of the gene
Watson, J.D. *et al.* : Molecular Biology of the Gene.
Watson, J.D. : The molecular biology of the gene
Winchester, A.M. : Genetics.
ইসলাম, এম.সা. ও অন্যান্য (২০১৭) : জেনেটিক্স: মিল ও অমিলের বিজ্ঞান।
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MSI: June 2021