



UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: academicsectionju14@gmail.com

NOTIFICATION

(23/April/Adp./11)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Courses of Studies in the subject of **Zoology** of Semester IIIrd and IVth for **Four Year Under Graduate Programme (FYUGP)** under the **Choice Based Credit System** as per **NEP-2020** (as given in the annexure) for the examinations to be held in the years as per the details given below:

Subject	Semester	For the examinations to be held in the year
Zoology	Semester-III Semester-IV	December 2023, 2024 and 2025 May 2024, 2025 and 2026

The Syllabi of the courses is also available on the University website: www.jammuuniversity.ac.in.

Sd/-

DEAN ACADEMIC AFFAIRS

No. F. Acd/II/23/1537-1567

Dated: 03/5/23

Copy for information and necessary action to:

1. Dean Faculty of Life-Science
2. HOD/Convener, Board of Studies Zoology/ Sy. P.A to C.O.E.
3. All members of the Board of Studies
4. C.A. to the Controller of Examinations
5. Director, Computer Centre, University of Jammu
6. Deputy Registrar/Asst. Registrar (Conf. /Exams. UG)
7. Incharge University Website for necessary action please

Sumitashamo
Deputy Registrar (Academic) 24/5/23

18
11/5/23

17/5

7/20/4/23

University of Jammu

Syllabi of Zoology for FYUP under CBCS as per NEP-2020

SEMESTER-III

(Examination to be held in 2023, 2024, 2025)

Major Course

Course Code: UMJZOT301

Course Title: Evolutionary Biology

Credits: 04 {03(Theory) + 01(Practical)}

Total no. of lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Major Course

Course Code: UMJZOT302

Course Title: Environmental Biology

Credits: 04 {03(Theory) + 01(Practical)}

Total no. of lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Minor Course

Course Code: UMIZOT303

Course Title: Ecology and Environment

Credits: 04 {03(Theory) + 01(Practical)}

Total no. of lectures: Theory: 45 hours

Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Multidisciplinary Course

Course Code: UMDZOT304

Course Title: Economic Zoology

Credits: 03

Total no. of lectures: Theory: 45 hours

Maximum Marks: 75

Theory: 75

Skill Enhancement Course

Course Code: USEZOT305

Course Title: Medical Genetics

Credits: 02

Total no. of lectures: Theory/Practical: 45 hours
(15 hours)/(30 hours)

Maximum Marks: 50

Theory/Practical: 50

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN ZOOLOGY UNDER CBCS AS
PER NEP - 2020
(For the Examination to be held in Year 2023, 2024 & 2025)
(MAJOR COURSE)
UGSEMESTER-III

MAJOR CORE COURSE NO.	:	UMJZOT301
MAJOR CORE COURSE TITLE	:	EVOLUTIONARY BIOLOGY
CREDITS	:	04{03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous assessment	:	10
II) Final examination	:	15

Objectives and Expected Learning Outcomes

The course provides an introduction to the evolution and covers the basic aspects of evolutionary biology. After successfully completing this course, the students will be able to understand how the life originated on the Earth and will come to know about the various evidences related to the evolution.

UNIT I: Introduction to Evolution

(13 Hrs.)

- 1.1 Origin of life
 - 1.1.1 Biogenesis
 - 1.1.2 Abiogenesis
 - 1.1.3 Theory of Special Creation
 - 1.1.4 Biochemical Origin of Life
- 1.2 Evidences of Evolution
 - 1.2.1 Morphological Evidences
 - 1.2.2 Anatomical Evidences
 - 1.2.3 Embryological Evidences
 - 1.2.4 Paleontological Evidences

UNIT 2: Theories of Evolution

(13 Hrs.)

- 2.1 Lamarckism
- 2.2 Neo-Lamarckism
- 2.3 Darwinism



- 2.4 Neo-Darwinism
2.5 Mutation Theory

UNIT 3: Natural Selection (10 Hrs.)

- 3.1 Natural Selection-Definition and Types
3.2 Variation
3.3 Elemental Forces of Evolution
 3.3.1 Mutation
 3.3.2 Recombination
 3.3.3 Hybridisation
 3.3.4 Isolation
 3.3.5 Founder's Principle
 3.3.6 Genetic Drift
3.4 Hardy-Weinberg Law

UNIT 4: Patterns of Evolution (10 Hrs.)

- 4.1 Sequential and Divergent Evolution
4.2 Evolution of Horse
4.3 Evolution of Man
4.4 Animal Distribution- Classification and Pattern
4.5 Zoogeography

Practicum (30 Hrs.)

1. Study of Lamarckism from chart
2. Study of Darwin's finches from chart/model
3. Study of Human Evolution from chart
4. Study of Horse Evolution from chart
5. Study of *Archaeopteryx* from model
6. Study of different types of dinosaurs from models
7. Study of *Latimeri*/*Sphenodon*/any other fossil
8. Zoogeographic study through maps

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr and 30 Min	15
External Theory End Semester	100%	3 Hrs	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final examination	-	-	15



External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A : Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Recommended Readings

1. VB Rastogi. Organic Evolution (Evolutionary Biology).
2. Stephen C Stearns and Rolf F Hoekstra. Evolution-An Introduction.
3. John Gribbin and Mary Gribbin. On the Origin of Evolution.
4. Bernard Wood. Human Evolution-A Very Short Introduction.
5. Balwan WK and Saba N. Genetics and Evolution.
6. Singh and Tomar. Evolutionary Biology.
7. Mandal F B. Introduction to Evolutionary Biology



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN ZOOLOGY
For the Examination to be held in 2023, 2024 & 2025
(MAJOR COURSE)
UG SEMESTER-III
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJZOT302
MAJOR CORE COURSE TITLE	:	ENVIRONMENTAL BIOLOGY
CREDITS	:	04 {03 (THEORY) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous Assessment	:	10
II) Final Examination	:	15

Objectives and Expected Learning Outcomes

The course provides an introduction to the environmental biology and covers basic aspects of ecology. After successfully completing this course, the students will be able to understand about the importance and scope of ecology.

UNIT I: Introduction to Ecology

(10 Hrs.)

- 1.1 Ecology
 - 1.1.1 Definition and Types
 - 1.1.2 Branches and Scope
- 1.2 Environmental Studies: Definition, Aim and Need
- 1.3 Environment: Definition, Parts and Uses
- 1.4 Medium
 - 1.4.1 Water: Forms, Types and Hydrological Cycle
 - 1.4.2 Soil and its types

UNIT 2: Population Ecology

(10 Hrs.)

- 2.1 Population Interaction
 - 2.1.1 Mutualism
 - 2.1.2 Commensalism
 - 2.1.3 Parasitism
- 2.2 Population Characteristics
 - 2.2.1 Density
 - 2.2.2 Natality
 - 2.2.3 Mortality
 - 2.2.4 Age distribution

- 2.2.5 Population Growth
- 2.2.6 Population Fluctuation & Equilibrium
- 2.2.7 Biotic Potential & Dispersal

UNIT 3: Community Ecology

(12 Hrs.)

- 3.1 Characteristics of Community
- 3.2 Ecological succession
- 3.3 Dynamics of Ecosystem
 - 3.3.1 Energy Flow
 - 3.3.2 Primary & Secondary Production
 - 3.3.3 Food Chain
 - 3.3.4 Food Web
 - 3.3.5 Ecological Pyramids
- 3.4 Role of Producers in the Ecosystem

UNIT 4: Environmental Pollution

(13 Hrs.)

- 4.1 Air Pollution
- 4.2 Water Pollution
- 4.3 Soil Pollution
- 4.4 Noise Pollution
- 4.5 Thermal Pollution
- 4.6 Plastic Pollution

PRACTICUM

(30 Hrs.)

1. To measure the pH of a given sample of water.
2. To determine the amount of dissolved oxygen in a sample of water.
3. To determine amount of free Carbon dioxide in a sample of water.
4. To determine total alkalinity of a sample of water.
5. To measure the total hardness of a given sample of water.
6. To study interaction between hermit crab and sea anemone.
7. To study depth and turbidity of local water body using Sacchi disc.
8. To study noise pollution levels in different localities in your surroundings.
9. To study mutualism between *Trichonympha* and termite.



NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr and 30 Min	15
External Theory End Semester	100%	3 Hrs	60
Continuous assessment	-	-	10 (Based on daily Performance only)
Final Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) (Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Recommended Readings

1. Eugene P Odum and Gary W Baret . Fundamentals of Ecology.
2. Jaboury Gazole. Ecology : A very short Introduction
3. Balwan WK and Saba N. Animal Science & Environmental Issues, Random Publication, Delhi.
4. Michael Bigon, Robert Howarth, Colin Townsend. Essentials of Ecology.
5. Arvind Kumar & L K Singh. Advanced Ecology
6. Shivesh P Singh and Balwan WK. Fish Genetic & Aquatic Environment. Amiga Press Inc.
7. Rasool N and Balwan WK. Environmental studies.
8. Bhatia AL. Text book of Environmental Biology.
9. Neeraj N. Environment and Ecology: A dynamic approach.
10. Dash and Dash. Fundamentals of Ecology
11. Singh, J.S., S.P & Gupta, S.R. 2006. Ecology, Environment and Resource conservation. Anamaya Publ., New Delhi, 688 pp.



UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN ZOOLOGY

For the Examination to be held in Year 2023, 2024 & 2025

(MINOR COURSE)

UG SEMESTER-III

UNDER NEP-2020

MINOR CORE COURSE NO.	:	UMIZOT303
MINOR CORE COURSE TITLE	:	ECOLOGY AND ENVIRONMENT
CREDITS	:	04 {03 (THEORY) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous Assessment	:	10
II) Final Examination	:	15

Objectives and Expected Learning Outcomes

The course provides an introduction to the environmental biology and covers basic aspects of ecology. After successfully completing this course, the students will be able to understand about the importance and scope of ecology.

UNIT I: Introduction to Ecology

(10 Hrs.)

- 1.1 Ecology
 - 1.1.1 Definition and Types
 - 1.1.2 Branches and Scope
- 1.2 Environmental Studies: Definition, Aim and Need
- 1.3 Environment: Definition, Parts and Uses
- 1.4 Medium
 - 1.4.1 Water: Forms, Types and Hydrological Cycle
 - 1.4.2 Soil and its types

UNIT 2: Population Ecology

(10 Hrs.)

- 2.1 Population Interaction
 - 2.1.1 Mutualism
 - 2.1.2 Commensalism
 - 2.1.3 Parasitism
- 2.2 Population Characteristics
 - 2.2.1 Density
 - 2.2.2 Natality
 - 2.2.3 Mortality
 - 2.2.4 Age distribution
 - 2.2.5 Population Growth

- 2.2.6 Population Fluctuation & Equilibrium
- 2.2.7 Biotic Potential & Dispersal

UNIT 3: Community Ecology

(12 Hrs.)

- 3.1 Characteristics of Community
- 3.2 Ecological succession
- 3.3 Dynamics of Ecosystem
 - 3.3.1 Energy Flow
 - 3.3.2 Primary & Secondary Production
 - 3.3.3 Food Chain
 - 3.3.4 Food Web
 - 3.3.5 Ecological Pyramids
- 3.4 Role of Producers in the Ecosystem

UNIT 4: Environmental Pollution

(13 Hrs.)

- 4.1 Air Pollution
- 4.2 Water Pollution
- 4.3 Soil Pollution
- 4.4 Noise Pollution
- 4.5 Thermal Pollution
- 4.6 Plastic Pollution

PRACTICUM

(30 Hrs.)

1. To measure the pH of a given sample of water.
2. To determine the amount of dissolved oxygen in a sample of water.
3. To determine amount of free Carbon dioxide in a sample of water.
4. To determine total alkalinity of a sample of water.
5. To measure the total hardness of a given sample of water.
6. To study interaction between hermit crab and sea anemone.
7. To study interaction between hermit crab and sea anemone.
8. To study depth and turbidity of local water body using Sacchi disc.
9. To study noise pollution levels in different localities in your surroundings.
10. To study mutualism between *Trichonympha* and termite.



NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr and 30 Min	15
External Theory End Semester	100%	3 Hrs	60
Continuous assessment	-	-	10 (Based on daily Performance only)
Final Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) (Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Recommended Readings

1. Eugene P Odum and Gary W Baret . Fundamentals of Ecology.
2. Jaboury Gazole. Ecology : A very short Introduction
3. Balwan WK and Saba N. Animal Science & Environmental Issues, Random Publication, Delhi.
4. Michael Bigon, Robert Howarth, Colin Townsend. Essentials of Ecology.
5. Arvind Kumar & L K Singh. Advanced Ecology
6. Shivesh P Singh and Balwan WK. Fish Genetic & Aquatic Environment. Amiga Press Inc.
7. Rasool N and Balwan WK. Environmental studies.
8. Bhatia AL. Text book of Environmental Biology.
9. Neeraj N. Environment and Ecology: A dynamic approach.
10. Dash and Dash. Fundamentals of Ecology
11. Singh, J.S., S.P & Gupta, S.R. 2006. Ecology, Environment and Resource conservation. Anamaya Publ., New Delhi, 688 pp.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN ZOOLOGY UNDER CBCS AS
PER NEP - 2020

(For the Examination to be held in Year 2023, 2024 & 2025)

(MULTIDISCIPLINARY COURSE)

UG SEMESTER-III

MULTIDISCIPLINARY COURSE NO.	: UMDZOT304
MULTIDISCIPLINARY COURSE TITLE	: ECONOMIC ZOOLOGY
CREDIT	: 03
MAXIMUM MARKS	: 75
I) External (University Exam)	: 60
II) Internal Assessment	: 15
DURATION OF UNIVERSITY EXAM	: 03 Hours

Objectives and Expected Learning Outcomes

The course will acquaint the students with basic understanding of the epidemiology, economic zoology and parasitology. Upon successful completion of this course, the student should be able to have some knowledge of epidemiology of common infectious diseases, management of poultry & Cattle breeds and about the immunity.

Unit 1: Epidemiology

(12 Hrs.)

- 1.1 Epidemiology: Definition, Scope and Applications.
- 1.2 Communicable Diseases: Cause, Mode of transmission, Symptoms, Prevention and Treatment of:
 - 1.2.1 Tuberculosis
 - 1.2.2 AIDS
 - 1.2.3 Covid-19
- 1.3 Non-communicable Diseases: Cause, Mode of transmission, Symptoms, Prevention and Treatment of
 - 1.3.1 Hypertension
 - 1.3.2 Cancer
 - 1.3.3 Diabetes

Unit 2: Economic Zoology

(13 Hrs.)

- 2.1 Apiculture
 - 2.1.1 Apiculture: Definition, Status and Scope
 - 2.1.2 Products of Apiculture and their uses
 - 2.1.3 Life Cycle of Honey bee
- 2.2 Sericulture
 - 2.2.1 Sericulture; Definition, Status and Scope
 - 2.2.2 Life cycle of Silkworm
 - 2.2.3 Silk: Types & Uses

Unit 3: Dairy and Poultry Farming

(10 Hrs.)



- 3.1 Introduction to Dairy
- 3.2 Cattle Breeds: Characters of Red Sindhi, Sahiwal & Jersey
- 3.3 Introduction to Poultry farming
- 3.4 Poultry Breeds: Characters of Rhode Island Red, White Leghorn & Black Minorca

Unit 4: Parasitology

(10 Hrs.)

- 4.1 Immunity: Definition & its types.
- 4.2 Concept and Types of Symbiotic Relationships
- 4.3 Parasite, Vectors and Hosts
 - 4.3.1 Parasites: Definition and Types
 - 4.3.2 Vectors: Definition and Types
 - 4.3.3 Vector borne Diseases: Dengue and Malaria
 - 4.3.4 Host: Definition and Types

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr and 30 Min	15
External Theory End Semester	100%	3 Hrs	60

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A : Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Books Recommended:

- Food ,Nutrition and Health By Shashi Goyal and Pooja
- Food,Nutrition and Health 1st Edition By Linda Tapsell,Oxford
- Principles of Therapeutics Nutrition and Diabetics By A Vantina Sharma,CBS Publishers and Distributors Pvt.Ltd.
- Elia Metal (eds): Clinical Nutrition ,Wiley Blackwell,A John Wiley and Sons Ltd.
- Introduction to human nutrition By Wiley- Blackwell and A John Wiley and Sons.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN ZOOLOGY UNDER CBCS AS
PER NEP - 2020

(For the Examination to be held in Year 2023, 2024 & 2025)

(SKILL ENHANCEMENT COURSE)

UG SEMESTER-III

SKILL ENHANCEMENT COURSE NO.	:	USEZOT305
SKILL ENHANCEMENT COURSE TITLE	:	MEDICAL GENETICS
CREDIT	:	02
MAXIMUM MARKS	:	50
I) External (University Exam)	:	40
II) Internal Assessment	:	10
DURATION OF UNIVERSITY EXAM	:	02 Hours and 30 Minutes

Objectives and Expected Learning Outcomes

The course will acquaint the students with basic understanding of the clinical genetics. The course also gives an account of the genetic disorders, diagnosis of chromosomal disorders and genetic counseling. After completing this course the learners will be able to increase their skill, attitudes and knowledge towards causes of genetic diseases and understand about the importance of karyotype and scope of human clinical genetics.

UNIT-1: Introduction to Medical Genetics

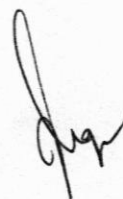
(7 Hrs.)

- 1.1 Medical Genetics: Introduction and its importance in Healthcare
- 1.2 Chromosomal Disorders
 - 1.2.1 Down's syndrome
 - 1.2.2 Klinefelter's syndrome
 - 1.2.3 Turner's syndrome
- 1.3 Genetic Counselling
- 1.4 Gene Therapy

Unit-2: Developmental & Biochemical Genetics

(8 Hrs.)

- 2.1 Genetic Basis of Sex
 - 2.1.1 Mechanism of Sex Determination
 - 2.1.2 Dosage Compensation
 - 2.1.3 Sex Limited and influenced genes
- 2.2 Introduction to Prenatal Diagnosis
- 2.3 Basic concept of Human fertility and Infertility
- 2.4 Sex linked inheritance
 - 2.4.1 Haemophilia
 - 2.4.2 Color Blindness



Unit-3: Practical Genetics

(30 Hrs.)

- 3.1 Sex Chromatin (Barr body)
- 3.2 Human Karyotype
 - 3.2.1 Normal Human Male
 - 3.2.2 Normal Human Female
- 3.3 Introduction to chromosome preparation from peripheral blood
- 3.4 Drawing and Interpreting a Pedigree
- 3.5 Study of clinical features of common human genetic disorders (through photographs)

NOTE FOR PAPER SETTERS:

Total Marks of the USEZOT-305 is 50 of which 20% marks shall be reserved for internal assessment (10 marks). Remaining 80% of the marks (40 marks) shall be reserved for external examination to be conducted by the University/Colleges.

Internal Assessment Test (10 Marks)

Internal Assessment Paper of 10 Marks shall consist of Theory Question/s of 5 Marks from Unit I/II and 5 Marks of Practical Exercise from Unit III.

External End Semester University / College Examination

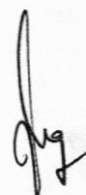
External Theory Exam shall be of 40 Marks and consist of 2 sections:

Section A: Four (4) short answer questions representing all Units/Syllabi i.e., atleast one question from each Unit. Each question shall be of 2.5 marks (All Compulsory)

Section B: Six (6) long answer questions (Three to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 10 marks.

RECOMMENDED READINGS

1. Jorde, Carey, Bamshad and White. Medical Genetics.
2. Gangane SD. Human Genetics, Elsevier Publications.
3. Alice Marcus. Human Genetics: An overview. Narosa Publications.
4. Saba N and Balwan WK. Cytogenetics, Random Publications, New Delhi.
5. Kapur and Suri. Basic Human Genetics. Jaypee Brothers medical publishers, Delhi.
6. Balwan WK. Genetics. Virgo Publishers, New Delhi
7. Lewis. Human Genetics.



University of Jammu
Syllabi of Zoology for FYUP under CBCS as per NEP-2020

SEMESTER-IV
(Examination to be held in 2024, 2025, 2026)

Course Code: UMJZOT401

Major Course

Course Title: Physiology of Controlling and Coordinating Systems

Credits: 04 {03(Theory) + 01(Practical)}

Total no. of lectures: Theory: 45 hours
Practical: 30 hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Course Code: UMJZOT402

Major Course

Course Title: Parasitology

Credits: 04 {03(Theory) + 01(Practical)}

Total no. of lectures: Theory: 45 hours
Practical: 30hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Course Code: UMJZOT403

Major Course

Course Title: Principles of Genetics

Credits: 04 {03(Theory) + 01(Practical)}

Total no. of lectures: Theory: 45 hours
Practical: 30hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Course Code: UMJZOT404

Major Course

Course Title: Wildlife: Conservation and Management

Credits: 04 {03(Theory) + 01(Practical)}

Total no. of lectures: Theory: 45 hours
Practical: 30hours

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 25

Course Code: UMIZOT303

Minor Course

Course Title: Wildlife Biology

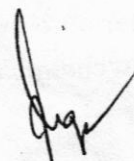
Total no. of lectures: Theory: 45 hours
Practical: 30hours

Credits: 04 {03(Theory) + 01(Practical)}

Maximum Marks: 100

Theory: 75

Practical/Tutorial: 2



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN ZOOLOGY UNDER CBCS
AS PER NEP - 2020
(For the Examination to be held in Year 2024, 2025 & 2026)
(MAJOR COURSE)

UG SEMESTER-IV

MAJOR CORE COURSE NO.	:	UMJZOT401
MAJOR CORE COURSE TITLE:	PHYSIOLOGY OF CONTROLLING AND COORDINATING SYSTEMS	
CREDITS	:	04 {03 (THEORY) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous Assessment	:	10
II) Final Examination	:	15

Objectives and Expected Learning Outcomes

The main objective of this course is to obtain knowledge about the functioning of various systems of organisms and their interrelationship for well-coordinated function. This course will provide an in depth study for better application of mind to further approach towards biology; would make students well equipped with the processes of body and its functioning and would help them in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems.

Unit 1: Neuro-physiology

(9 Hrs)

- 1.1 Neuron: Structure and Classification
- 1.2 Synapses: Types and Functions
- 1.3 Nerve Impulse:
 - 1.3.1 Generation and transmission
 - 1.3.2 Factors affecting nerve impulse transmission
- 1.4 Synaptic Transmission, and neurotransmitters (Common types)

Unit 2: Muscle Physiology

(9 Hrs)

- 2.1 Muscular Tissue: Types, structure and characteristics
- 2.2 Ultrastructure of skeletal muscle and its chemical composition
- 2.3 Neuromuscular junction and Motor Unit
- 2.4 Molecular and chemical basis of muscle contraction

2.5 Red and White Skeletal Muscles

Unit 3: Reproductive Physiology

(12 Hrs)

- 3.1 Histology of mammalian testis and ovary
- 3.2 Spermatogenesis and oogenesis in Mammals
- 3.3 Menstrual Cycle in Primates
- 3.4 Fertilization: Types and Mechanism
- 3.5 Neuroendocrine control of Reproduction

Unit 4: Homeostatic Physiology

(15 Hrs)

- 4.1 Chemical nature of Hormones
- 4.2 Vertebrate Endocrine Glands: Pituitary, Thyroid, Parathyroid, Pancreas, and Adrenal; secretions and their actions, effect of hyposecretion and hypersecretion
- 4.3 Concept of Homeostasis and role of feedback mechanism in regulation of hormonal secretion
- 4.4 Osmoregulatory mechanisms
- 4.5 Thermoregulation

Practicum

(30 Hrs.)

1. Study of histology of Mammalian gonads (Testis and Ovary) using permanent Slides
2. Study of different stages of gametogenesis from permanent slides of mammalian gonads
3. Study of general morphology and histology of endocrine glands from permanent slides: Pituitary, Thyroid, Parathyroid, Pancreas and Adrenals
4. Preparation of permanent stained slide of skeletal muscle to study its structure
5. Recording of simple muscle twitch with electrical stimulation.
6. Study of different disorders of endocrine malfunction using charts / photographs



NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr & 30 Minutes	15
External Theory End Semester	100%	3 Hrs	60
Continuous assessment (Based on Daily Performance only)	-	-	10
Final Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A : Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Recommended Readings

1. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition, McGraw Hill
3. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt.Ltd/W.B. Saunders Company
4. Randal D, Burggren W, French K. (2001) Eckert -Animal physiology: Mechanics and Adaptations. V Edition. W. H. Freeman and Co.
5. Nagabhushnam- A text book of Animal Physiology. Oxford and IBH
6. Arora M. P. (2018). Animal Physiology. VII Edition. Himalayan Publishing House, India
7. Singh, H.R. & Neeraj Kumar (2017) Animal Physiology and Biochemistry, Vishal Publishing Co.



UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN ZOOLOGY
UNDER CBCS AS PER NEP - 2020
(For the Examination to be held in Year 2024, 2025 & 2026)

(MAJOR COURSE)

UG SEMESTER-IV

MAJOR CORE COURSE NO.	:	UMJZOT402
MAJOR CORE COURSE TITLE	:	PARASITOLOGY
CREDITS	:	04 {03 (THEORY) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous Assessment	:	10
II) Final Examination	:	15

Objectives and Expected Learning Outcomes

The course provides introduction to Parasitology and covers the basic aspects of Host parasite relationship. After successfully completing this course students will be able to understand the knowledge of parasites and their ecological relationship with various hosts, their distribution in Animal kingdom and various diseases caused by them.

Unit I: Introduction to Parasitology

(9 Hrs)

- 1.1 Definition and scope of Animal parasitology
- 1.2 Host parasite relationship and specificity
- 1.3 Parasite, Parasitoid and vectors (Mechanical and Biological)
- 1.4 Parasitic adaptations
- 1.5 Degree of Parasitism and Hyperparasitism
- 1.6 Concept of Host and Host types

Unit 2: Parasitic protozoans and platyhelminthes-morphology, life cycle, epidemiology, pathogenicity, prophylaxis and diseases caused

(9 Hrs.)

- 2.1 *Entamoeba histolytica*
- 2.2 *Plasmodium vivax*
- 2.3 *Fasciolopsis buskii*



2.4 *Taenia solium*

2.5 *Schistosoma haematobium*

Unit 3: Parasitic nematodes and arthropods - morphology, life cycle, epidemiology, pathogenicity, prophylaxis and diseases caused (12 Hrs.)

3.1 *Ascaris lumbricoides*

3.2 *Wuchereria bancrofti*

3.3 *Ancylostoma duodenale*

3.4 Importance and Control of

3.4.1 Ticks and Mites

3.4.2 Head and Body louse

3.4.3 Fleas and Bed bug

Unit 4: Parasitic Vertebrates-general description, diet and feeding habits (15 Hrs)

4.1 Remora and Jawless fishes

4.2 Vampire Bat

4.3 Candiru (Toothpick fish)

4.4 Cookicutter shark

4.5 Hood Mocking bird

Practicum

(30 Hrs.)

1. Salient features of *Entamoeba histolytica*, *Giardia intestinalis*, *Plasmodium vivax* through permanent slides/microphotographs
2. Salient features of *Fasciolopsis buskii*, *Schistosoma haematobium*, *Taenia solium* through permanent slides/photomicrographs.
3. Salient features of *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria bancroftii* through permanent slides/photomicrographs.
4. Study of Head and Body louse through permanent slides/photomicrographs.
5. Study of Bed bug (*Cimex*) through permanent slides/photomicrographs.
6. Study of Flea (*Xenopsylla cheopis*) through permanent slides/photomicrographs.
7. Study of parasitic vertebrates through permanent slides/photomicrographs.
8. Study of Ticks and Mites through permanent slides/photomicrographs.
9. Field survey on common communicable disease of respective areas.
10. Project report on common diseases, their causative agent and vectors involved.



NOTE FOR PAPER SETTING:

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr & 30 Minutes	15
External Theory End Semester	100%	3 Hrs	60
Continuous assessment (Based on Daily Performance only)	-	-	10
Final Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

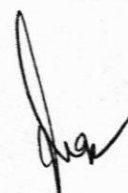
Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Recommended Readings

1. K.D Chatterjee-Parasitology: Protozoology and Helminthology
2. Arora D.R. and Arora B-Medical Parasitology
3. Smith J.D-Introduction to Parasitology
4. Meyer, Olsen and Schimdt's-Essentials of Parasitology
5. H.S Singh, P. Rastogi-Parasitology (Medical Zoology)
6. C.P Baveja, V Baveja-Parasitology
7. CKJ Paniker-Textbook of Medical Parasitology



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(MAJOR COURSE)

UG SEMESTER-IV

MAJOR CORE COURSE NO.	:	UMJZOT403
MAJOR CORE COURSE TITLE	:	PRINCIPLES OF GENETICS
CREDITS	:	04 {03 (THEORY) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous Assessment	:	10
II) Final Examination	:	15

Objectives and Expected Learning Outcomes

The main objective of this course is to provide students with a basic understanding on hereditary. The course provides an introduction to Mendelian genetics, their principles and gene interactions. The paper helps in highlighting the scope and significance of genetics by imbibing the principles of hereditary and genetic transmission and to appreciate the concepts genotype and phenotype. It also includes the application of recombination, changes in chromosome number and structure and physical mapping.

Unit-1 Inheritance Biology

(13 Hrs)

- 1.1 History, Scope and Significance of Genetics
- 1.2 Pre-Mendelian Genetic Concepts: Preformation & Epigenesis; Germplasm Theory
- 1.3 Terminology in Genetics: Alleles or Allelomorphs; Homozygous and Heterozygous; Dominant and Recessive; Genotype and Phenotype
- 1.4 Mendelian Genetics: Mendel's Experiment on Pea Plant and reasons of his success, Monohybrid Cross and Law of Dominance and Law of Segregation, Dihybrid Cross and Law of Independent Assortment
- 1.5 Test Cross, Back Cross, Reciprocal Cross and their Significance
- 1.6 Extensions of Mendelian Principles
- 1.7 Multiple Alleles (ABO Blood Groups and Rh factor in Humans), Incomplete Dominance, Co-dominance, Complementary and Supplementary Interactions, Epistasis and Pleiotropy, Lethal Genes
- 1.8 Chromosomal Theory of Inheritance



Unit-2 Sex-Determination, Extra-Chromosomal Inheritance and Specialized Chromosomes (10 Hrs)

- 2.1 Sex Chromosomes, their functions and mechanism of chromosomal sex determination
- 2.2 Environmental and hormonal sex determination
- 2.3 Sex Chromatin bodies (Barr Bodies) and dosage compensation
- 2.4 Sex-limited genes; Sex-influenced genes; Sex-linked inheritance (eye color in *Drosophila*, Haemophilia in humans)
- 2.5 Extra-chromosomal inheritance: shell coiling in snails and kappa particles in *Paramecium*
- 2.6 Specialized chromosomes
 - 2.6.1 Polytene chromosomes
 - 2.6.2 Lampbrush chromosomes

Unit-3 Linkage and Crossing Over

(10 Hrs)

- 3.1 Linkage
 - 3.1.1 Discovery; Chromosomal Theory of Linkage and Significance of Linkage
 - 3.1.2 Types of Linkage: Complete and Incomplete; Strength of Linkage and factors affecting it
 - 3.1.3 Linkage Groups (*Drosophila*, maize and man)
- 3.2 Crossing Over
 - 3.2.1 Definition, Types, Mechanism and Theories of Crossing Over; Factors influencing Crossing over
 - Cytological evidences of Crossing Over
 - 3.2.2 Genetic Mapping
- 3.3 Linkage Maps and their Construction: Determination of Linkage Group; Determination of Map Distance: Two-Point Test Cross; Determining Order of genes and map distance: Three-point Test Cross
- 3.4 Interference and Coefficient of Coincidence

Unit-4 Chromosomal Aberrations and Mutations

(12 Hrs)

- 4.1 Structural Chromosomal Aberrations
 - 4.1.1 Deletions (Deficiencies)
 - 4.1.2 Duplications
 - 4.1.3 Inversions
 - 4.1.4 Translocations
- 4.2 Numerical Chromosomal Aberrations
 - 4.2.1 Aneuploidy
 - 4.2.2 Euploidy
- 4.3 Karyotyping and its use in detection of chromosomal aberrations in humans.
- 4.4 Mutations
 - 4.4.1 Classification of Mutations and significance of Mutations
 - 4.4.2 Spontaneous Mutations : Mutation rates and Frequencies
 - 4.4.3 Induced Mutations and Mutagens (Physical and Chemical)

Practicum

(30 Hrs)

- Study of Sex Chromatin in Human Buccal Smear and demonstration of dosage compensation.
- Construction of Linkage maps using data from *Drosophila* crosses.
- To study the Mendelian laws and verification of Monohybrid Mendelian Ratio by Chi-square analysis.
- To study the Mendelian laws and verification of Dihybrid Mendelian Ratio by Chi-square analysis.
- Determination of ABO blood groups as an example of multiple allelism.
- Preparation of Human Karyotype for study of chromosomal aberrations with respect to number, translocation, deletion, etc.

7. Preparation and study of Polytene Chromosomes of Midge fly / *Drosophila*.

NOTE FOR PAPER SETTING:

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr & 30 Minutes	15
External Theory End Semester	100%	3 Hrs	60
Continuous assessment (Based on Daily Performance only)	-	-	10
Final Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A : Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Recommended Readings

- Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India
- Snustad, D.P., Simmons, M.J. (2016). Principles of Genetics. VII Edition. John Wiley and Sons Inc
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings
- Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings
- Fletcher H. and Hickey I. (2015). Genetics. IV Edition. GS, Taylor and Francis Group, New York and London.
- Gupta P. K. (2019). Genetics. Rastogi Publications, India
- Rastogi V. B. (2019). Genetics. IV Edition. MEDTECH
- Gupta P. K. (2020). Cytogenetics. II Edition. Rastogi Publications, India
- Pierce B. A. (2020) Genetics: A Conceptual Approach. VII Edition. W.H. Freeman & Co.
- Verma P. S., Agarwal V. K. (2010) Genetics. IX Edition. S. Chand & Co. Ltd., India
- Singh B. D. (2009). Genetics, II Edition. Kalyani Publishers, India

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(MAJOR COURSE)

UG SEMESTER-IV

MAJOR CORE COURSE NO.	:	UMJZOT404
MAJOR CORE COURSE TITLE	:	WILDLIFE: CONSERVATION AND MANAGEMENT
CREDITS	:	04 {03 (THEORY) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous Assessment	:	10
II) Final Examination	:	15

Objectives and Expected Learning Outcomes

The course provides an introduction to the wildlife conservation and management and covers its basic aspects. After successfully completing the course, students will be able to understand the importance of wildlife and the scientific point of view in understanding management of wildlife resources, their conservation and their importance.

Unit 1: Introduction to Wildlife

(10 hrs.)

- 1.1 Definition of Wildlife and importance of its study
- 1.2 Wildlife habitats: Definition, types and importance
- 1.3 Physical and biological parameters
- 1.4 Important Wild animals and their zoological nomenclature (Birds and mammals)
- 1.5 Endangered wild fauna of India
- 1.6 Red Data Book

Unit 2: Wildlife Depletion and management

(10 hrs.)

- 2.1 Causes of depletion of wildlife and its prevention
- 2.2 Management and restoration of degraded habitat
- 2.3 Preservation of General Genetic Diversity of Wild Fauna
- 2.4 Wildlife status in J&K (Jammu and Kashmir as rich resource of wildlife)
- 2.5 Human Wildlife Conflict: Causes and Control measures

Unit 3: Wildlife Conservation

(15 hrs.)

- 3.1 Introduction to Wildlife Conservation: In situ and ex situ conservation
- 3.2 Concept and Types of Protected Areas (National Parks, Sanctuaries, Biosphere Reserves)
- 3.3 Important protected areas of J&K
- 3.4 Wildlife Conservation projects of Government of India: Project Tiger, Project Gir Lion, Project Hangul, Project Musk Deer
- 3.5 Wildlife Protection Act

Unit 4: Wildlife Tourism and Trade

(10 hrs.)

- 4.1 Ecotourism: Concept and types
- 4.2 Wildlife Protected Areas as venue of Ecotourism
- 4.3 Trade in wild animals: Challenges and solutions
- 4.4 Wildlife tourism places in Jammu and Kashmir
- 4.5 Community involvement in wildlife conservation

Practicum

(30hrs.)

1. Study of Endangered wild birds through Models/Photomicrographs
2. Study of Endangered wild mammals through Models/Photomicrographs
3. Study of Types of feet and claws in birds
4. Study of Beaks and Feathers in Birds
5. Identification and Study of Venomous snakes of India
6. Plot the important National Parks of India on a Map
7. Plot the important Wildlife Sanctuaries of India on a Map
8. Demonstration of Basic Equipments needed for wildlife study (compass, binoculars, Cameras and lenses, range finder and GPS)
9. Visit to a Zoological Park/Sanctuary at a nearby place
10. Project report on wildlife in nearby locality/village/jungle



NOTE FOR PAPER SETTING:

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	Marks
Internal Theory Assessment	50%	1 Hr & 30 Minutes	15
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Final Examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) {Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

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Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

Recommended Readings

- 1) S.K. Singh – Textbook of Wildlife Management
- 2) M.V. Reddy – Wildlife Biodiversity Conservation
- 3) Bolton, M – Conservation and The Use of Wildlife Resources
- 4) Singh, M.P Dey, S and Singh, B.S – Conservation of Biodiversity and Natural Resources
- 5) M.G. Chitkara – Wildlife
- 6) Teage R.D. – A Manual of Wildlife Conservation



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(MINOR COURSE)

UG SEMESTER-IV

MINOR CORE COURSE NO.	:	UMIZOT405
MINOR CORE COURSE TITLE	:	WILDLIFE BIOLOGY
CREDITS	:	04 {03 (THEORY) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
I) Continuous Assessment	:	10
II) Final Examination	:	15

Objectives and Expected Learning Outcomes

The course provides an introduction to the wildlife biology and covers its basic aspects. After successfully completing the course, students will be able to understand the importance of wildlife and the scientific point of view in understanding management of Wildlife Resources, their conservation and their importance.

Unit 1: Introduction to Wildlife

(10 hrs.)

- 1.1 Definition of Wildlife and importance of its study
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- 1.5 Endangered wild fauna of India
- 1.6 Red Data Book

Unit 2: Wildlife Depletion and management

(10 hrs.)

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Unit 3: Wildlife Conservation

(15 hrs.)

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Unit 4: Wildlife Tourism and Trade

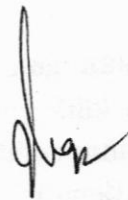
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(30hrs.)

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