SEMESTER IV

UCZOE20 – GENETICS AND EVOLUTION

Year	SEM	Course code		Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II	**IV**	**UCZOE20**		**Genetics and Evolution**	**Theory**	**Core**	**5**	**4**	**100**

Objectives:

- To learn the basics of Genes, heredity and variations.
- To learn the evolution of life and speciation.

Course Outcomes:

On completion of the course the student will be able to…

CO1: DemonstratetheMendelianinheritance.Understandthegeneticinteractions.

CO2:Discuss Linkage,Crossingover,cytoplasmicinheritanceandsexdetermination.

CO3:AnalyzethetypesofGeneMutation,Chromosomalaberrations,syndromesandinbornerrors inmetabolism.

CO4:ExplainPopulationGenetics

CO5: RecallthetheoriesofEvolution,adaptationsandhumanevolution.

CO/PSO	PSO					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	H	H	L	M	M	L
CO2	H	H	L	L	L	L
CO3	H	H	L	M	M	M
CO4	H	H	L	M	L	L
CO5	H	H	L	L	M	L

CO/PO	PO					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	H	H	H	M	H	L
CO2	H	H	H	H	M	L
CO3	H	H	H	M	M	M
CO4	H	H	H	H	M	L
CO5	H	H	H	H	H	M

Unit 1:Genetics:(15 Hours.)

1.1: Mendel's work. (K1, K2, K3)

1.2: Monohybrid cross and modifications of ratio. (K1, K2, K3)

1.3: Law of segregation. Law of independent assortment. (K1, K2, K3)

1.4: Dihybrid cross and modifications of ratio. (K1, K2, K3)

1.5: Genetic interactions- Epistasis, duplicate gene, complementary gene, atavism. (K1, K2, K3,K4)

1.6: Multiple alleles, blood grouping in man. (K1, K2, K3, K4)

Unit 2:(15 Hours)

2.1: Linkage and Crossing over. (K1, K2, K3, K4)

2.2: Sex linkage. (K1, K2, K3, K4)

2.3: Sex limited genes and sex influenced genes in Man. (K1, K2, K3, K4)

2.4: Cytoplasmic inheritance in Snail and Paramecium. (K1, K2, K3)

2.5: Non-disjunction and Gynandromorphs. (K1, K2, K3, K4)

2.6: Sex determination - Genic balance theory, theory of heterogenesis and environmental factors. (K1, K2, K3)

Unit 3:(15 Hours)

3.1: Gene mutation. (K1, K2, K3, K4)
3.2: Chromosomal aberrations. (K1, K2, K3, K4)
3.3: Genetic disorders – Chromosomal – Autosomal – Down Syndrome. (K1, K2, K3, K4)
3.4: Sex chromosomal – Turner's and Klinefelter's Syndrome. (K1, K2, K3, K4)
3.5: Inborn errors in Metabolism - Phenyl alanine metabolism. (K1, K2, K3, K4)
3.6: Genetic counseling. (K1, K2, K3, K4)

Unit 4:(15 Hours)

4.1: Gene Pool. (K1, K2, K3, K4)
4.2: Applied genetics: Population genetics. (K1, K2, K3, K4)
4.3: Hardy Weinberg Law. (K1, K2, K3)
4.4: Gene frequency, Factors affecting gene Frequency. (K1, K2, K3)
4.5: Pedigree Analysis. (K1, K2, K3, K4)
4.6: Eugenics, Euthenics and Euphenics. (K1, K2, K3)

Unit 5: Evolution:(15 Hours)

5.1: Theories of Evolution – Lamark. (K1, K2, K3)
5.2: Theories of Evolution - Darwin. (K1, K2, K3)
5.3: Mimicry. (K1, K2, K3)
5.4: Isolation and Speciation. (K1, K2, K3)
5.5: Evolution of Man. (K1, K2, K3)
5.6: Geological time. (K1, K2, K3)

Books for Study and Reference:

Textbooks:

1. Verma P.S. and V.K.Agarwal – Genetics - Chand and Co., New Delhi, 2006
2. Gopalakrishnan T.S. - Itta Sambasivaiah and A.P.Kamalakara Rao – Introduction to Genetics - Himalaya Publishing House, Bombay, 1996.

Reference Books:

3. Gardner - Principles of Genetics - Wiley Eastern Pvt. Ltd., 8th Edition, 2013.
4. Benjamin Lewin - Genes VII- Oxford University Press, 2000.
5. Philip Sheeler, Donald E. Bianchi - Cell and Molecular Biology - John Wiley and Sons, Inc, 3rd Edition, 1987.
6. E.D.P.De Robertis, E.M.F.De Robertis Jr. - Cell and Molecular Biology - Lea and Febiger, 2005.
7. T.S Gopalakrishnan, Itta Sambasivaiah, A P Kamalakara Rao -Principles of Organic evolution- Pearl Publications, 1983.
8. Kavitha- Organic Evolution - A.I.T.B.S Publishers India, 2009.
9. N. Arumugam - Organic Evolution - Saras Publications, 2005.
10. Bernard Wood- Human Evolution- A very short Introduction, Oxford University Press, 2005.

E-Resources:

https://ghr.nlm.nih.gov
https://www.genetics.org
https://ncse.ngo
http://www.evolutionoftheweb.com
https://evolution.berkeley.edu/evolibrary/home.php

SEMESTER V

UCZOG20 - DEVELOPMENTAL BIOLOGY

Year	SEM	Course code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III	**V**	**UCZOG20**	**Developmental Biology**	**Theory**	**Core**	**5**	**5**	**100**

Objectives:

- To study the process of development from germ cell to individual.
- To study the recent advancements in the reproductive biology.

Course Outcomes:

On completion of the course the student will be able to…

CO1: Discuss gametogenesis and types of eggs and egg membranes.

CO2: Explain the mechanism and physiology of Fertilization, parthenogenesis and cleavage.

CO3: Explain gastrulation and organogenesis in mammals.

CO4: Discuss human reproduction

CO5: Discuss Assisted Reproductive Technologies.

CO/PSO	PSO					
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	L	M	L	L
CO2	H	H	L	M	L	L
CO3	H	H	L	M	L	L
CO4	H	H	L	M	L	L
CO5	H	H	H	H	H	L

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	H	M	L	M
CO2	H	M	H	M	L	M
CO3	H	M	H	M	L	M
CO4	H	M	H	M	L	M
CO5	H	M	H	L	M	M

Unit 1:(15 Hours)

1.1: Introduction and history of Developmental Biology. (K1, K2, K3)

1.2: Spermatogenesis. (K1, K2, K3)

1.3: Oogenesis. (K1, K2, K3)

1.4: Eggs-Types of eggs. (K1, K2, K3)

1.5: Polarity and symmetry of eggs. (K1, K2, K3)

1.6: Egg membranes- Extra embryonic membranes in Chick. (K1, K2, K3)

Unit 2:(15 Hours)

2.1: Fertilization – Mechanism. (K1, K2, K3)

2.2: Physiology of Fertilization. (K1, K2, K3)

2.3: Theories of Fertilization. (K1, K2, K3)
2.4: Experimental works of Spemann and Mangold. (K1, K2, K3)
2.5: Parthenogenesis. (K1, K2, K3)
2.6: Cleavage. (K1, K2, K3)

Unit 3:(15 Hours)

3.1: Fate map. (K1, K2, K3,K4)
3.2: Morphogenetic movements and Gastrulation in Mammals. (K1, K2, K3)
3.3: Organogenesis in Mammal – Development of eye. (K1, K2, K3)
3.4: Development of Ear. (K1, K2, K3)
3.5: Development of Brain. (K1, K2, K3)
3.6: Development of Heart. (K1, K2, K3)

Unit 4:(15 Hours)

4.1: Human reproduction - Puberty, Menstrual cycle and Menopause. (K1, K2, K3)
4.2: Classification of Placenta. (K1, K2, K3)
4.3: Placenta in Mammals. (K1, K2, K3)
4.4: Hormonal changes in pregnancy. (K1, K2, K3)
4.5: Parturition and Lactation. (K1, K2, K3)
4.6: Contraception- Merits- Demerits. (K1, K2, K3)

Unit 5:(15 Hours)

5.1: Assisted Reproductive Technology. (K1, K2, K3, K4)
5.2: Super Ovulation. Artificial insemination. (K1, K2, K3, K4)
5.3: Cryopreservation. (K1, K2, K3, K4)
5.4: In Vitro Fertilization (IVF), Test tube babies, Embryo transfer. (K1, K2, K3, K4)
5.5: Amniocentesis. (K1, K2, K3, K4)
5.6: Bio ethics. (K1, K2, K3, K4)

Books for Reference:

Textbooks:

1. P.S.Verma, V.K. Agarwal and Tyagi - Chordate Embryology, S.Chand and Co.,New Delhi 2007.
2. Arumugam N. - Developmental Biology- Saras Publication-15th edition 2014.

Reference Books:

3. Balinsky B.L - Introduction to Embryology, 5th Edition. First Indian, Reprint 2012.
4. Mohan P.Arora –Embryology- Himalaya Publishing House, 2011.
5. Veer Bala Rastogi, Jayaraj- Developmental Biology,2nd Edition, Kedar Nath Ram Nath. 1994.
6. Robert S. Mcewen- Vertebrate Embryology, 4th Edition, Oxford & IBH Publishing Co. 1949.
7. Bradley M.Patten, Bruce M. Carlson-Foundations of Embryology, 3rd Edition. Tata McGraw Hill Publishing Company Ltd. 1977.

E-Resources:

https://www.sdbonline.org
https://embryology.med.unsw.edu.au
http://www.embryology.ch
https://human-embryology.org