

DEVELOPMENTAL BIOLOGY

Semester	Subject Code	Category	Lecture		Theory		P	C
III	21CPBT3D	Elective III	3 hrs per week	45	3 hrs per week	45	0	3

COURSE OBJECTIVE: In this course, students will

- Understand the concepts of development in modern era, stages of development, embryonic stem cells, cytoplasmic determinants, pattern formation, and early and late development of invertebrate / vertebrate models and implications of developmental biology.

COURSE OUTCOMES: Up on successful completion of course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K1-K6)
CO1	Understand the Overview of modern era of developmental biology, stages of development- differential gene expression, lineages of germ layers, fate map unit of life.	K2
CO2	Understand and evaluate the mechanism of differentiation, Cytoplasmic determinants, embryonic induction and pattern formation.	K2, K6
CO3	Apply their knowledge in the early stages of invertebrate/ vertebrate model development	K3
CO4	Apply their knowledge in the late stages of invertebrate/ vertebrate model development	K3
CO5	Evaluate the medical implications of developmental biology, genetic errors, teratogenesis, stem cell therapy, control of gene expression.	K5 & K6

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- Analyze; K5- Synthesize; K6- Evaluate

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	M	M	M
CO2	S	M	M	M	S	S
CO3	M	M	S	S	M	M
CO4	M	S	M	M	S	M
CO5	M	M	M	M	M	S

S-strong; M- medium; L-low

UNIT I: HISTORY AND CONCEPTS OF DEVELOPMENT**10 Hours**

Overview of modern era of developmental biology, Embryonic Development: Early Development and Later Development. Stages of development- zygote, blastula, gastrula, Cleavage, and neurula. Cell fate and commitment-potency- concept of embryonic stem cells, differential gene expression, lineages of germ layers, fate map

UNIT II: MECHANISM OF DIFFERENTIATION**10 Hours**

Mechanism of differentiation: Cytoplasmic determinants, embryonic induction, concept of morphogen, Pattern formation- axis specification, positional identification (regional specification), morphogenic movements and model organisms in developmental biology.

UNIT III: EARLY DEVELOPMENT IN INVERTEBRATE/VERTEBRATE MODELS**9 Hours**

Early development in invertebrate: Drosophila, C. elegans, Xenopus and mouse models. Metamorphosis, Cleavage: Cleavage Patterns- gastrulation, Axis specification (Dorsoventral, anterior, posterior) and body plan patterning, left right asymmetry in vertebrates.

UNIT IV: LATE DEVELOPMENT IN INVERTEBRATE/VERTEBRATE MODELS**8 Hours**

Organogenesis- development of central nervous system in vertebrates, vulval formation in C. elegans, germ cell specification and migration, overview of plant development.

UNIT V: IMPLICATIONS OF DEVELOPMENTAL BIOLOGY**8 Hours**

Medical implications of developmental biology- genetic errors, teratogenesis, stem cell therapy, control of gene expression, Models of differentiation I and II, Post-embryonic development.

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY

- Class room teaching
- Assignments
- Discussions
- Home work
- PPT presentations
- Seminars
- Models/Charts

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Scott F. Gilbert	Developmental Biology	Sinauer Associates	2010
2.	Subramoniam.T	Developmental Biology	CRC Press	2003
3.	Scott F. Gilbert	Developmental Biology	Sinauer Associates	2014

4.	Murray Brookes and Anthony Zietman	Clinical Embryology	CRC press	1998
5.	Scott F. Gilbert	Developmental Biology (7 th Edition)	Sinauer Associates	2003

REFERENCE BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Frank J. Dye	Dictionary of Developmental Biology and Embryology	John Wiley & Sons	2012
2.	Lewis Wolpert	Principles of Development	Oxford University Press	2015
3	Lewis Wolpert and Cheryll Tickle	Principles of Development	Oxford University Press	2011
4	Sally A. Moody	Principles of Developmental Genetics	Academic Press	2014
5.	Scott F. Gilbert	Developmental Biology	Sinauer Associates	2013

WEB SOURCES

1. https://books.google.co.in/books/about/Developmental_Biology.html?id
2. https://books.google.com/books/about/Developmental_Biology
3. https://books.google.com/books/about/Developmental_biology.html?id
4. https://books.google.com/books/about/Developmental_Biology.html

Syllabus Designer:

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