Subject No. 4
PHARMACOLOGY, PATHOLOGY AND GENETICS

Total Hours: 115 Theory Hours: 105
Lab Hours: 10

SECTION B - PATHOLOGY AND GENETICS
(PART II – GENETICS)

Total Hours: 15 Theory Hours: 15

AIM:

- This course is designed to help the student to develop an understanding of Genetics, its role in causation and management of defects and diseases.

OBJECTIVES:

At the end of course students will be able to develop:

- Understanding of basic concepts of genetics.
- Understanding of maternal, prenatal, and genetic influences on development of defects and diseases.
- Understanding of genetic testing.
- Understanding of genetic disorders in various age groups.
- Understanding of services related to genetics.

COURSE CONTENTS:

Unit I - Introduction

- Practical application of genetics in nursing. Impact of genetic condition on family. Review of cellular division: mitosis and meiosis. Characteristics and structure of genes. Chromosomes – sex determination.
- Chromosomal aberrations, patterns of inheritance: Mandolin theory of inheritance Multiple allots and blood groups. Sex linked inheritance. Mechanism of inheritance. Errors in transmission.

Unit II - Maternal, prenatal and genetic influences on development of defects and diseases:

- Conditions affecting the mother: genetic and infections. Consanguinity atopy. Prenatal nutrition and food allergies. Maternal age. Maternal drug therapy. Prenatal testing and diagnosis. Effects of radiation, drugs and chemicals. Infertility. Spontaneous abortion. Neural tube defects and the role of folic acid in lowering the risks. Down syndrome (Trisomy 21)

Unit III - Genetic testing in neonates and children:

- Screening for: Congenital abnormalities, Developmental delay, Dysmorphism.

Unit IV - Genetic conditions of adolescents and adults:

- Cancer genetics – Familial cancer. Inborn errors of metabolism. Blood group alleles and haemochromatosis. Huntington’s disease. Mental illness.

Unit V - Services related to Genetics:

- Genetic testing. Human genome project. Gene therapy. The eugenics movement. Genetic counseling. Legal and ethical issues. Role of Nurse.

GENETICS

Total hours: 15

Unit No. & Hrs.	*Objectives*	*Contents with distributed hours*		
		Must Know	*Desirable to Know*	*Nice to Know*
I (3 Hrs)	At the end of unit students are able to **Knowledge:** Understand and describe the cellular division, chromosomes and sex determination. **Skill:** Analyze the genetic impact for different disease conditions in clinical practice. **Attitude:** Incorporate the knowledge of chromosomes in identifying genetic impact for various disease conditions.	**Introduction:** • Practical application of genetics in nursing. • Impact of genetic condition on family. • Review of cellular division: mitosis and meiosis. • Chromosomes – sex determination. • Chromosomal aberrations, patterns of inheritance: • Multiple allots and blood groups. • Sex linked inheritance. (2 Hrs)	• Characteristics and structure of genes. • Mendalian theory of inheritance. • Mechanism of inheritance Errors in transmission. (1 Hr)	I (3 Hrs)

Unit I

Course outcome	**Programme outcome**						
Students should be able to- .	**Nurse/Clinician**	**Professional**	**Communicator**	**Leader & Member**	**Lifelong learner**	**Critical thinker**	**Researcher**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO-1: Describe practical application of genetics in nursing	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-2: Explain Impact of genetic condition on family.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-3: Differentiate between mitosis and meiosis	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-4: Define sex determination.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-5: Explain Chromosomal aberrations and patterns of	**3**	**3**	**2**	**3**	**3**	**2**	**0**

inheritance.							
CO-6: Describe multiple allots and blood groups	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-7: Explain Sex linked inheritance	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-8: Enlist the characteristics and draw the structure of genes	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-9: Explain Mendalian theory of inheritance.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-10: Describe the Mechanism of inheritance.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO11: Enumerate the errors in transmission	**3**	**3**	**2**	**3**	**3**	**2**	**0**

II (3 Hrs)	At the end of unit students are able to **Knowledge:** Describe the mode of transmission of genetic diseases. **Skill:** Counsels regarding role of consanguineous marriages in inheritance of diseases. **Attitude:** Motivates individuals for genetic testing and thereby contribute in preventing hereditary diseases.	**Maternal, prenatal and genetic influences on development of defects and diseases:** • Conditions affecting the mother: genetic and infections. • Consanguinity atrophy. • Prenatal nutrition and food allergies. • Maternal age. • Maternal drug therapy. • Infertility • **Prenatal testing and diagnosis.** • **Effects of radiation, drugs and chemicals.** • **Down syndrome (Trisomy 21)** **(2 hours)**	• **Spontaneous abortion.** • **Neural tube defects and the role of folic acid in lowering the risks.** (1 Hr)	II (3 Hrs)

Unit II

Course outcome	Programme outcome

Students should be able to-	Nurse/Clinician	Professional	Communicator	Leader & Member	Lifelong learner	Critical thinker	Researcher
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO-1: List out the genetic and infections conditions affecting the mother at the time f pregnancy.	3	3	2	3	3	2	1
CO-2: Explain Consanguinity atrophy.	3	3	2	3	3	2	2
CO-3: Explain prenatal nutrition and food allergies.	3	3	2	3	3	2	1
CO-4: Explain the maternal age and maternal drug therapy that influence on development of defects and disease in maternal.	3	3	2	3	3	2	1
CO-5: Explain Infertility.	3	3	2	3	3	2	1
CO-6: Describe prenatal testing and its diagnostic evaluation.	3	3	2	3	3	2	1
CO-7: Explain effects of radiation, drugs and chemicals on development of defects and disease in maternal.	3	3	2	3	3	2	1
CO-8: Describe Down syndrome (Trisomy 21)	3	3	2	3	3	2	1
CO-9: Explain Spontaneous abortion.	3	3	2	3	3	2	2

CO-10: Describe the Neural tube defects and enlist role of folic acid in lowering the risks.	**3**	**3**	**2**	**3**	**3**	**2**	**2**

III (2 Hrs)	At the end of unit students are able to **Knowledge:** Understand and explain congenital abnormalities. **Skill:** Identify congenital abnormalities. **Attitude:** Provide comprehensive nursing care to client having congenital abnormalities.	**Genetic testing in neonates and children:** • **Screening for:** Congenital abnormalities, Developmental delay, **(1 Hr)**		• **Dysmorphism** **(1 hour)**

Unit III

Course outcome	**Programme outcome**						
Students should be able to- .	**Nurse/Clinician**	**Professional**	**Communicator**	**Leader & Member**	**Lifelong learner**	**Critical thinker**	**Researcher**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO-1: Define Congenital abnormalities and list out the screening test used for detection of congenital abnormalities in neonates and children.	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO-2: Explain screening procedure for detection of developmental delay.	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO-3: Explain dysmorphism	**3**	**3**	**2**	**3**	**3**	**2**	**0**

IV (2 Hrs)	At the end of unit students are able to **Knowledge:** Understand and explain the genetic abnormalities, their causes and signs &	**Genetic conditions of adolescents and adults:** • Cancer genetics – Familial cancer. • Inborn errors of metabolism.	• Blood group alleles and haemochromatosis • Huntington's	

	symptoms. **Skill:** Identify the client with genetic disorders. **Attitude:** Provide effective nursing care to such clients.	• Mental illness. (1 Hr)	disease. (1 Hr)	

Unit IV

Course outcome	**Programme outcome**						
Students should be able to- .	**Nurse/Clinician**	**Professional**	**Communicator**	**Leader & Member**	**Lifelong learner**	**Critical thinker**	**Researcher**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO-1: Define Cancer genetics and Familial cancer. Enlist its causes.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-2: Explain Inborn errors of metabolism with its cause transmission.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-3: Define mental illness and list out the causes, sign and symptoms, complication and prevention.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-4: Define haemochromatosis; explain its causes and types.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO5: Explain blood group alleles**.**	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO6: Define Huntington's disease. Enlist its symptoms	**3**	**3**	**2**	**3**	**3**	**2**	**0**

V (5 Hrs)	At the end of unit students are able to **Knowledge:** Understand the Gene therapy. **Skill:** Provide genetic counseling for genetic testing and assist in gene therapy. **Attitude:** Perform nurses' role effectively.	**Services related to Genetics:** • Genetic testing. • Genetic counseling. • Role of Nurse (3 Hrs)	• Legal and ethical issues • Gene therapy (1 Hr)	• **The eugenics movement .** • **Human genome project.** **(1 hour)**

Unit V

Course outcome	**Programme outcome**						
Students should be able to-	**Nurse/Clinician**	**Professional**	**Communicator**	**Leader & Member**	**Lifelong learner**	**Critical thinker**	**Researcher**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO-1: Define Genetic testing and genetics counseling.	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO-2: Explain the services related to genetic counseling.	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO-3: Describe the legal and ethical issues in genetic testing.	**3**	**3**	**2**	**3**	**3**	**2**	**1**
CO-4: Explain gene therapy.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-5: Explain eugenics.	**3**	**3**	**2**	**3**	**3**	**2**	**0**
CO-6: Define Human genome project and list out its importance.	**3**	**3**	**2**	**3**	**3**	**2**	**0**

TEACHING STRATEGY:

Total Teaching Hours: 15 Lectures: 15

ASSIGNMENTS:

A. Section 'C': Genetics

Theory

Sr. No	Assignments	No./Quantity	Marks Per Assignment	Total Marks
1	Home assignment	One	20	20

While calculating Internal Assessment –Marks obtained in the assignments of Pharmacology and Pathology and Genetics shall be amalgamated as one subject, 'Pharmacology, Pathology and Genetics'.

TEACHING METHODS:

- Lectures, Laboratory Demonstration, Group Discussion, Clinical Observation and **Tutorial**

A.V. AIDS:

- Over head projector, L.C.D. Computer Assisted Instruction, Black Board.

LIST OF RECOMMENDED BOOKS:

- S. Mandal : Fundamentals of Human Genetics
- S. D. Gangane : Human Genetics
- Jordey carey Roberts : An Introduction to Medical Genetics
- Elizabeth F. Lanzl : Medical Genetics
- J. Ben Hill, Helen Hill : Medical Genetics and Human Heredity
- Edmund W. Sinnott : Principles of Genetics
- P. C. Winter, G. I. Hickey : Instant Notes in Genetics
- Ching Chun L : Human Genetics – Principles and methods
- Mary B. Mahowald, et al : Genetics In Clinic
- Robert F. Muller et al :Emery's Elements of Medical Genetics
- Moore Keith L : Developing Human clinically Oriented Embryology
- Pansky Ban : Review of Medical Embryology
- Smell Richard S : Clinical Embryology for Medical Students
- Lnagman Jan : Medical Embryology