

Lecture #	Lecture Title	Length of Lecture and Associated Readings/Practice Questions (in minutes)	Contact Hours	CEUs	Lecturer	Behavioral Objectives Participants will:
Lecture 1	Introduction to course/ Basic human biology/Molecular Genetics	90	1.5	0.15	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Discuss basic concepts of genetics, including the cell cycle, trait inheritance, mitosis/meiosis, and crossing over. 2. List the types of human tissue. 3. List the human organ system and basic properties of each. 4. Recite terms used to describe human anatomy
Lecture 2	Weeks 1 and 2 of Development	90	1.5	0.15	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe the three germ layers of the embryo. 2. Explain gametogenesis and fertilization. 3. Describe the first week of human development. 4. Identify chromosomal anomalies and the techniques of assisted reproduction. 5. Describe early components of the embryo/placenta, including the amniotic cavity, the yolk sac, mesoderm, and the trophoblasts.
Lecture 3	Weeks 3 and 4 of Development/Teratology	105	1.75	0.175	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe gastrulation. 2. Describe differentiation of intraembryonic mesoderm. 3. Describe the process and regulation of cell migration. 4. Describe the process of neurulation. 5. Explain somite differentiation. 6. List the steps involved in embryonic folding. 7. Describe the embryologic basis of neural tube defects.
Lecture 4	Molecular Mechanism of Limb Development	90	1.5	0.15	William Scott, PhD	<ol style="list-style-type: none"> 1. List genes that control limb development and describe their effects. 2. Describe different types of limb defects and associated syndromes.
Lecture 5	Neural Tube Defects	90	1.5	0.15	Susan Wiley, MD/Brayden Sellet	<ol style="list-style-type: none"> 1. Explain the embryologic basis of neural tube defects. 2. Describe the epidemiological and clinical features of spina bifida. 3. Describe prenatal testing and prenatal intervention for spina bifida. 4. Describe psychosocial aspects of spina bifida.
Lecture 6	Preimplantation Diagnosis	75	1.25	0.125	Diana Smith, MS, CGC	<ol style="list-style-type: none"> 1. Describe basic laboratory techniques used in traditional prenatal diagnosis. 2. Describe the process of in vitro fertilization.

						<ol style="list-style-type: none"> Describe common methods of preimplantation genetic diagnosis, including embryo biopsy and polar body analysis. List the benefits and limitations of PGD, including counseling issues and ethical concerns.
Lecture 7	Embryonic folding Begin Vasculature	90	1.5	0.15	DJ Lowrie, PhD	<ol style="list-style-type: none"> Explain embryonic folding. Describe the development of intraembryonic coelom and the lungs. Explain the embryologic basis of lung and diaphragm abnormalities.
Lecture 8	Vasculature Begin heart development	90	1.5	0.15	DJ Lowrie, PhD	<ol style="list-style-type: none"> Describe the process of vasculogenesis and early vessel formation. Describe the development of arterial, venous, and lymphatic systems. Describe the initial development of the heart. Describe the remodeling of the venous return to the heart. Describe the embryological basis of vasculature malformations.
Lecture 9	Finish Heart Development	90	1.5	0.15	DJ Lowrie, PhD	<ol style="list-style-type: none"> Describe the division of the atrioventricular canal. Describe the formation and remodeling of the atria, ventricles, and outflow tracts. Describe embryonic circulation and how circulation changes at birth. Describe heart defects that are due to abnormal heart development.
Lecture 10	Clinical Aspects of Congenital Heart Anomalies	90	1.5	0.15	Timothy Knilans, MD	<ol style="list-style-type: none"> Describe the anatomic basis of specific heart defects. Describe the embryologic basis of heart defects. Describe the clinical symptoms and manifestations of heart defects. Describe surgical or other treatments for heart defects.
Lecture 11	Urogenital System	90	1.5	0.15	DJ Lowrie, PhD	<ol style="list-style-type: none"> Describe the basic anatomy of the urogenital system. Describe the formation of the kidneys. Describe the maturation of the cloaca. Describe the development of the internal and external reproductive structures. List disorders that result when urogenital system does not develop properly.
Lecture 12	Sex Determination	90	1.5	0.15	David Repaske, MD	<ol style="list-style-type: none"> Consider the societal aspects of gender differentiation/identification. Describe the processes of sex determination and sex differentiation. List the genes that control sex determination/differentiation.

						4. Describe disorders of sex determination/differentiation.
Lecture 13	Gastrointestinal Development/Head and Neck I	105	1.75	0.175	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe the basic anatomy of the gastrointestinal system. 2. Describe the development of the GI tract. 3. Describe the normal development of the central nervous system. 4. Describe abnormalities of the central nervous system. 5. Describe the structure and development of the pharyngeal arches. 6. Describe the development of the cranial nerves, face, and nasal cavity. 7. Describe the remodeling of the pharyngeal clefts.
Lecture 14	Developmental Field Defects/Gastrointestinal Anomalies	75	1.25	0.125	Robert Hopkin, MD Elizabeth Schorry, MD	<ol style="list-style-type: none"> 1. Describe developmental field theory. 2. Compare the relationship of developmental field defects to the stages of embryonic development. 3. Give examples of developmental field defects. 4. Describe anomalies of the GI tract that can occur due to abnormal development.
Lecture 15	Head and Neck II	90	1.5	0.15	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe the development of the tongue, thyroid gland, and pharyngeal pouches. 2. Describe anomalies of the oral cavity and its derivatives. 3. Describe the development of the ear. 4. Describe the cause and characteristics of congenital anomalies of the ear. 5. Describe the development of the eye. 6. Describe congenital eye anomalies and their causes.
Lecture 16	Head & Neck Anomalies Molecular genetics of human deafness	90	1.5	0.15	John Greinwald, MD	<ol style="list-style-type: none"> 1. Describe the anatomy and appearance of the normal ear. 2. Describe the symptoms and causes of craniofacial structural and functional abnormalities. 3. Describe the etiology and epidemiology of hearing loss. 4. List genes associated with hearing loss and their characteristics.
Lecture 17	Craniofacial Syndromes	90	1.5	0.15	Howard Saal, MD	<ol style="list-style-type: none"> 1. Describe the embryologic basis of, syndromes that are associated with, and treatment for cleft lip and/or palate. 2. Describe syndromes that result in craniofacial anomalies. 3. Describe the embryologic basis of and syndromes that are associated with craniosynostosis.