

CLINICAL EMBRYOLOGY ONLINE

Lecture #	Lecture Title	Lecturer	Learning Objectives
1	Introduction to course basic human biology/ molecular genetics	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 systems and basic properties of each. 4. Recite terms used to describe human anatomy.
2	Weeks 1 & 2 of development	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.
3	Weeks 3 & 4 of development	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe gastrulation. 2. Describe the differentiation of the 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.
4	Molecular mechanisms of limb development	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.
5	Neural tube defects	Susan Wiley, MD	<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.

6	Preimplantation diagnosis	Martha Walker, 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 3. Describe common methods of preimplantation genetic diagnosis, including embryo biopsy and polar body analysis. 4. List the benefits and limitations of PGD, including counseling issues and ethical concerns.
7	Embryonic folding Begin vasculature	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Explain embryonic folding. 2. Describe the development of the intraembryonic coelom and the lungs. 3. Explain the embryologic basis of lung and diaphragm abnormalities.
8	Vasculature Begin heart development	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe the process of vasculogenesis and early vessel formation. 2. Describe the development of the arterial, venous, and lymphatic systems. 3. Describe the initial development of the heart. 4. Describe the remodeling of the venous return to the heart. 5. Describe the embryological basis of vasculature malformations.
9	Finish heart development	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe the division of the atrioventricular canal. 2. Describe the formation and remodeling of the atria, ventricles, and outflow tracts. 3. Describe embryonic circulation and how circulation changes at birth. 4. Describe heart defects that are due to abnormal heart development.
10	Urogenital system	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe the basic anatomy of the urogenital system. 2. Describe the formation of the kidneys. 3. Describe the maturation of the cloaca. 4. Describe the development of internal and external reproductive structures. 5. List disorders that result when the urogenital system does not develop properly.

11	Clinical aspects of congenital heart anomalies	Timothy Knilans, MD	<ol style="list-style-type: none"> 1. Describe the anatomic basis of specific heart defects. 2. Describe the embryologic basis of heart defects. 3. Describe the clinical symptoms and manifestations of heart defects. 4. Describe surgical or other treatments for heart defects.
12	Sex determination	David Repaske, MD, PhD	<ol style="list-style-type: none"> 1. Consider the societal aspects of gender differentiation/identification. 2. Describe the processes of sex determination and sex differentiation. 3. List genes that control sex determination/differentiation. 4. Describe disorders of sex determination/differentiation.
13	Gastrointestinal system	DJ Lowrie, PhD Elizabeth Schorry, MD	<ol style="list-style-type: none"> 1. Describe the basic anatomy of the gastrointestinal syndrome. 2. Describe the development of the GI tract. 3. Describe anomalies of the GI tract that can occur due to abnormal development.
14	Head and neck I	DJ Lowrie, PhD	<ol style="list-style-type: none"> 1. Describe the normal development of the central nervous system. 2. Describe abnormalities of the central nervous system. 3. Describe the structure and development of the pharyngeal arches. 4. Describe the development of the cranial nerves, face and nasal cavity. 5. Describe the remodeling of the pharyngeal clefts. 6. List human disorders that result from malformations of the CNS, pharyngeal arches, or abnormal development of the face.
15	Head and neck II Developmental field defects	DJ Lowrie, PhD Robert Hopkin, MD	<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. 7. Describe developmental field theory.

			<ol style="list-style-type: none"> 8. Compare the relationship of developmental field defects to the stages of embryonic development. 9. Give examples of developmental field defects.
16	Craniofacial syndromes	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.
17	Head & neck anomalies Molecular genetics of human deafness	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.