<table>
<thead>
<tr>
<th>Lecture #</th>
<th>Lecture Title</th>
<th>Length of Lecture and Associated Readings/Practice Questions (in minutes)</th>
<th>Contact Hours</th>
<th>CEUs</th>
<th>Lecturer</th>
<th>Behavioral Objectives</th>
</tr>
</thead>
</table>
| Lecture 1| Introduction to course/Basic human biology/Molecular Genetics                | 90                                                                       | 1.5           | 0.15 | DJ Lowrie, PhD      | 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  
5. Describe early components of the embryo/placenta, including the amniotic cavity, the yolk sac, mesoderm, and the trophoblasts. |
| Lecture 2| Weeks 1 and 2 of Development                                                   | 90                                                                       | 1.5           | 0.15 | DJ Lowrie, PhD      | 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      | 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  | 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 | 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 | 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.

| Lecture 7 | Embryonic folding  
Begin Vasculature | 90 | 1.5 | 0.15 | DJ Lowrie, PhD |
|-----------|-------------------------------------------------|------|-----|--------|----------------|
|  | 1. Explain embryonic folding.  
2. Describe the development of intraembryonic coelom and the lungs.  
3. Explain the embryologic basis of lung and diaphragm abnormalities. | | | | |

| Lecture 8 | Vasculature  
Begin heart development | 90 | 1.5 | 0.15 | DJ Lowrie, PhD |
|-----------|-------------------------------------------------|------|-----|--------|----------------|
|  | 1. Describe the process of vasculogenesis and early vessel formation.  
2. Describe the development of 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. | | | | |

<table>
<thead>
<tr>
<th>Lecture 9</th>
<th>Finish Heart Development</th>
<th>90</th>
<th>1.5</th>
<th>0.15</th>
<th>DJ Lowrie, PhD</th>
</tr>
</thead>
</table>
|  | 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. | | | | |

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<tr>
<th>Lecture 10</th>
<th>Clinical Aspects of Congenital Heart Anomalies</th>
<th>90</th>
<th>1.5</th>
<th>0.15</th>
<th>Timothy Knilans, MD</th>
</tr>
</thead>
</table>
|  | 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. | | | | |

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<tr>
<th>Lecture 11</th>
<th>Urogenital System</th>
<th>90</th>
<th>1.5</th>
<th>0.15</th>
<th>DJ Lowrie, PhD</th>
</tr>
</thead>
</table>
|  | 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 the internal and external reproductive structures.  
5. List disorders that result when urogenital system does not develop properly. | | | | |

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<tr>
<th>Lecture 12</th>
<th>Sex Determination</th>
<th>90</th>
<th>1.5</th>
<th>0.15</th>
<th>David Repaske, MD</th>
</tr>
</thead>
</table>
|  | 1. Consider the societal aspects of gender differentiation/identification.  
2. Describe the processes of sex determination and sex differentiation.  
3. List the genes that control sex determination/differentiation. | | | | |
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<thead>
<tr>
<th>Lecture 13</th>
<th>Gastrointestinal Development/Head and Neck I</th>
<th>105</th>
<th>1.75</th>
<th>0.175</th>
<th>DJ Lowrie, PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture 14</td>
<td>Developmental Field Defects/Gastrointestinal Anomalies</td>
<td>75</td>
<td>1.25</td>
<td>0.125</td>
<td>Robert Hopkin, MD</td>
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<td>Elizabeth Schorry, MD</td>
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<tr>
<td>Lecture 15</td>
<td>Head and Neck II</td>
<td>90</td>
<td>1.5</td>
<td>0.15</td>
<td>DJ Lowrie, PhD</td>
</tr>
<tr>
<td>Lecture 16</td>
<td>Head &amp; Neck Anomalies Molecular genetics of human deafness</td>
<td>90</td>
<td>1.5</td>
<td>0.15</td>
<td>John Greinwald, MD</td>
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<tr>
<td>Lecture 17</td>
<td>Craniofacial Syndromes</td>
<td>90</td>
<td>1.5</td>
<td>0.15</td>
<td>Howard Saal, MD</td>
</tr>
</tbody>
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1. Describe disorders of sex determination/differentiation.
2. Describe the basic anatomy of the gastrointestinal system.
3. Describe the development of the GI tract.
4. Describe the normal development of the central nervous system.
5. Describe abnormalities of the central nervous system.
6. Describe the structure and development of the pharyngeal arches.
7. Describe the development of the cranial nerves, face, and nasal cavity.
8. Describe the remodeling of the pharyngeal clefts.
9. Describe the cause and characteristics of congenital anomalies of the ear.
10. Describe congenital eye anomalies and their causes.
11. List genes associated with hearing loss and their characteristics.