This is a listing of the major topics covered during the first three exams this semester. This list is designed to help you in your review of your notes and highlights what are some of the most important, “big picture” items that I hope you will be sure to retain from our work. This should give you a reasonable idea as to the breadth of material. My suggestion is to use this list as a way to help you organize your notes and your reading.

Exam #1 Topics

- meiosis overview
- embryonic germ layers (ectoderm, mesoderm, endoderm)
- similarities seen across various stages of development in different vertebrates
- techniques used to study development
- environmental exposure and developmental effects
- thalidamide and DES exposure and development
- morphogenesis
- dynes/centimeter and ideas on surface tension
- how surface tension dynamics may explain aggregation in development
- apoptosis, role and function in development
- discovery of sperm
- fertilization and associated events
- overview of sperm formation
- the role and development of the acrosome
- the role and development of the flagellum
- capacitation of sperm, what occurs, where found
- oocyte versus ovum
- the constituents of cytoplasm that make it especially valuable in the egg
- oocyte development and time of sperm entry
- stages of gametogenesis
- surface components of the egg
- cortical granule design and use
- the acrosome reaction
- the fertilization cone formation
- monospermy vs. polyspermy
- “Fast Block” physiology in the ova
- “Slow Block” physiology in the ova
- capacitation of sperm in internal fertilization
- steps and stages of the cell cycle
- variations on the cell cycle
- cleavage, morula, blastula, gastrula, embryo
- vocabulary of cleavage

Examination #2 Topics

- the vocabulary of cleavage
- specifics of holoblastic cleavage
- specifics of meroblastic cleavage
- invagination
- ingestion
- delamination
- epiboly
- orientation terms utilized in urchin development (oral & aboral)
- the archenteron - formation and function
- syncytial development processes as is seen in the fly
- processes of egg activation in the fly
- egg & sperm structure and design in the fly
- fruit fly life cycle
- stages of amphibian development
- grey crescent - development and function
- animal and vegetal pole differences in very early cleavage
- epiboly - meaning and function
- the nuclear constriction experiments in amphibians - design, results, significance
- specific fates for the ectoderm, mesoderm, and endoderm... what each layer has the specific potential to become in later development
- characteristics of the amniotic egg
- allantois, function and use
- terminology associated with the very early blastodisc
- transplantation studies involving Hensens’s Node
- anatomical aspects of mammalian reproductive system
- cellular aspects of how the mammalian blastula may implant into the uterine lining
- terms and definitions used in the description of implantation
- variations of twinning in humans related to implantation and placenta formation

Exam #3 Topics

- neural crest ectodermal endpoints
- neural tube ectodermal endpoints
- neural plate and notochord definitions
- anencephaly & spina bifida
- mammalian brain development
- primary and secondary vesicles of the brain
- adult derivatives of the secondary vesicles
- derivatives of the neural crest
- neural crest cell lineages
- differential outcomes for the neural crest based upon position along the length of the embryo
- bone and cartilage cells - their relationship to each other and the formation of the skeleton
- Meckel’s Cartilage endpoints & Reichert’s Cartilage endpoints
- neural crest cell, cardiac portion potential abnormalities in later development
- major lineages and endpoints of the mesoderm
- conversion of myoblasts into muscles
- skeleton formation, cell types
- shelled eggs and their role in skeletal formation
- heart development in birds and mammals
- heart field formation - types and end points
- lateral plate mesoderm endpoints
- endocardium & endothelium - locations and functions
- looping and chamber formation in the heart
- chamber and valve formation in the heart
- heart related developmental defects
- vitelline vens, allantoic arteries - function
- placental arteries and veins - function
- protein levels of analysis - helping to understand hemoglobin differences.
- fetal versus adult hemoglobin