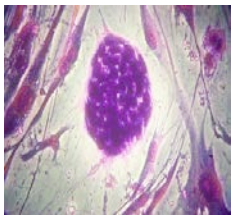
Stem Cells in Reproduction, Development, and Regeneration



ANS 490/890, Fall 2019
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Contemporary topics will be covered on stem cell research and applications, focusing on pluripotent stem cells and several types of adult stem cells during mammalian reproduction, development, and tissue regeneration. Through individualized lectures, critical literature review, instructed presentations, and essay writing, students will learn: basic concepts and classification of stem cells; regulatory mechanisms of stem cell self-renewal and differentiation; applications of stem cells in farm animals and biomedical research, as well as how to critically evaluate, understand, and appreciate the latest scientific literatures on stem cell research. This course will help prepare students for future careers in biomedical or agricultural studies.

- The mother of all stem cells: totipotent state
- The first fate diversion from embryo: trophectoderm
- Pluripotency: Naïve *vs.* primed
- Hierarchy of stem cell differentiation
- Hematopoietic stem cells in blood regeneration

- Neural stem cells in regeneration
- Mesenchymal stem cells: beyond regeneration
- The cycle of life: spermatogonial stem cells
- Two-way tickets for life: iPSCs and reprogramming
- Fate determination: self-renewal *vs* differentiation
- Beyond genetic regulation: epigenetics in stem cells
- Metabolic power in stem cell fate specification
- Stem cell applications in biomedicine and agriculture

Note: open to both graduate students (800 level) and senior/junior undergraduate students (400 level) with a GPA of 3.0 or higher. Undergraduate students will be evaluated differently and separately from graduate students. Students with adequate knowledge in developmental biology and cell biology will be expected to do well in this class.