It is important that you know the anatomy and the histology BEFORE the physiology can be covered in lecture.

- Study the anatomy of the reproductive system using this handout in conjunction with Text Chapter 28 and Reproductive Lab.

I. General Functions of the Reproductive System

A. Perpetuate species

B. Gametes (germ cells)
   1. Germ cells—“sperm and egg”
   2. Have half the number of chromosomes (haploid number) compared to normal body cells—why?
   3. Normal body cells have 46 chromosomes (or 23 pairs of homologous chromosomes) that include one pair of sex chromosomes
      female = xx  male = xy

C. Gonads (testes and ovaries)
   1. Produce gametes
   2. Secrete sex hormones
   3. Explain how these may be considered both exocrine and endocrine glands?

D. Male
   1. Sperm cells
   2. Delivers sperm cells to female

E. Female
   1. Secondary oocytes (“eggs”)
   2. Receives sperm and provides place for fertilization
   3. Provides nurturing and protective environment for developing embryo/fetus until birth

F. Fertilization
   1. Union of sperm and egg
   2. Chromosome number (haploid to diploid)—explain this and why is it significant?

II. Male Reproductive Organs

A. Gross Anatomy—Locate and describe the function of each structure. Use your lab studies and your text.

   Trace the path of sperm from formation to ejaculation.

   1. Scrotum (scrotal sac)
      a. Temperature regulation (Lecture)
      b. Dartos muscle
      c. Cremaster muscle and cremaster reflex (Lecture)
   2. Testes (testis)
   3. Epididymis (epididyimides)
4. Vas deferens (ductus deferens)
   a. Spermatic cord = ductus deferens + spermatic artery & vein
   b. Vasectomy

5. Ampulla

6. Accessory glands—give % contribution to semen, composition, general pH, and describe functions of each secretion
   a. Seminal vesicles (human only)—60%
   b. Prostate gland (note: this is NOT prostate)—25%
   c. Bulbourethral glands (Cowper’s glands)

7. Ejaculatory duct

8. Urethra
   a. Prostatic urethra (2-3 cm)
   b. Membranous urethra (1 cm)
   d. Spongy (penile) urethra (15-20 cm)

9. Penis
   a. Glans penis
   b. Bulb
   c. Body
   d. Prepuce (foreskin)
   e. Circumcision--describe
   f. Corpora cavernosa
   g. Corpus spongiosum
   h. Penile (spongy) urethra
   i. Smegma

10. Seminal fluid (semen)
    a. Mix of sperm cells and products from seminal vesicles, prostate gland, and bulbourethral glands.
    b. Normal sperm count = 50million-150 million/ml
    c. Infertility = , 20 million/ml
    c. Seminal plasmin—antibiotic that destroys bacteria
    d. pH of semen = 7.2-7.7

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B. Microscopic anatomy of the testis (testes, testicles) and seminiferous tubules—expand on lab study—use your text, too.
1. Connective tissue capsule (tunica vaginalis and tunica albuginea)
2. Lobules
3. Seminiferous tubules
   a. Basement membrane
   b. Germinal epithelium
   c. Spermatogonial cells
   d. Lumen (what might be found here?)
   e. Sertoli cells (sustentacular cells)—more in lecture
      1) Blood testis barrier—immunologic function?
      2) Support and protect developing spermatogenic cells
      3) Provide nourishment (sustenance) for spermatocytes, spermatids, and sperm
      4) Phagocytosis of extra spermatid cytoplasmic material
      5) Control release of sperm into lumen of seminiferous tubules
      6) Produce inhibin & androgen binding protein (ABP)
4. Interstitial cells of Leydig (interstitial endocrinocytes)—what do they produce?
5. Seminiferous tubule → straight tubule → rete testis → efferent ductules → ductus epididymis → ductus (vas) deferens → etc…

C. Spermatogenesis & spermiogenesis & spermiation (Lab and Text—Fig. 28.4 and 28.9)
1. Spermatogenesis
   a. Process of developing 4 haploid (n) spermatids from 1 spermatogonium (2n) through several steps including mitosis and meiosis (reduction division)
   b. Occurs in the seminiferous tubules
   c. Spermatogonia (2n) → primary spermatocyte (2n) → (meiosis= reduction division) secondary spermatocyte (n) → spermatids
   d. Cytoplasmic division incomplete (spermatids remain attached to each other via cytoplasmic bridges (important for synchronization and for survival)
2. Spermiogenesis—maturation of spermatids into sperm cells
3. Spermiation

D. Sperm—Fig. 28.6—expand on lab studies; & use text.
1. Head (what’s in here?)
2. Acrosome (what’s found in here?)
3. Midpiece (what’s found in here?)
4. Tail (function?)

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E. Microscopic anatomy of the Epididymis— (lab and text)
   1. Ductus epididymis
   2. Pseudostratified columnar epithelium
   3. Stercocilia on epithelium (function?)
   4. Smooth muscle (function?)
   5. Lumen

F. Microscopic anatomy of the Penis—(lab and text)
   1. Corpora cavernosa
   2. Corpus spongiosum
   3. Penile (spongy) urethra
   4. Deep artery of penis
   5. Deep dorsal vein
   6. Tunica albuginea
   7. What is meant by erectile tissue? Relate these structures to their erectile function/physiology of erection (lecture).
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III. Female Reproductive Organs

A. **Gross anatomy**: Locate each structure and describe the function of each structure (refer to Lab). Trace the path a secondary oocyte takes from ovulation until it leaves the body (with or without fertilization, implantation, pregnancy, and delivery)—Lab and lecture, use your text too.

1. Ovaries

2. Fallopian tubes (uterine tubes)
   a. Infundibulum
   b. Fimbriae
   c. Ampulla
   d. Isthmus of uterine tube
   e. (Uterine horns & oviducts=cat only names)

3. Uterus
   a. Fundus
   b. Body
   c. Isthmus of uterus
   d. Cervix
   e. Uterine cavity
   f. Internal os
   g. Cervical canal
   h. External os

4. Vagina
   a. Function—note histology here and describe its purpose.
   b. Mucosa
      1) Non-keratinized stratified squamous epithelium—why?
      2) acid secretions (why?)
      3) antigen presenting cells—what is the immunological significance?
   b. Muscularis—function?
   c. Adventitia
   d. Vaginal orifice
   e. Hymen (and what is an imperforate hymen?)

5. External genitalia (vulva)
   f. Mons pubis
   g. Perineum vs. vestibule
   h. Labia majora
   i. Labia minora
   j. Clitoris and prepuce of clitoris
   k. Bulb of vestibule, Skene’s glands, Bartholin’s glands

6. Define and identify *homologous structures* & identify homologous structures of male & female reproductive systems. Table 28.2 and Fig. 28.28.
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7. Mammary glands
   a. Identify the layers of tissues (pectoralis major muscle, adipose tissue, skin)
   b. Areola
   c. Nipple
   d. Mammary gland
      1) Lobes and lobules
      2) Alveoli clusters surrounded by contractile myoepithelial cells
      3) Mammary ducts, lactiferous sinus, and lactiferous duct.
      4) Lactiferous sinus
   e. Lactation (*lecture*)

B. Microscopic anatomy of the ovary—and corpus luteum—Refer to Lab studies and use your text.
1. Germinal epithelium
2. Tunica albuginea
3. Ovarian cortex
4. Ovarian medulla (stroma)
5. Growing ovarian follicles
   a. Primary and secondary follicles
   b. Follicular cells
   c. Granulosa cells and follicular fluid—what is this?
   d. Antrum/follicular fluid (mainly estrogens)
   e. Zona pellucida
   f. Corona radiata
   g. Theca folliculi (theca interna and externa)—vascular, secretive, and connective tissue cells
   h. Oocyte
6. Graafian follicle (mature follicle)
   a. See similar structures as in secondary follicles listed above
   b. Secondary oocyte
   c. Ovulation
7. Corpus hemorrhagicum with blood clot (early corpus luteum)
8. Corpus luteum (mainly progesterone)
9. Corpus albicans

C. Oogenesis, ovulation, fertilization, and changes that happen during a trip to the uterus, then implantation. Connect Text Figs. 28.15 & 29.2
1. oogonium
2. primary oocyte
3. secondary oocyte (with 1st polar bodies—what’s their function?)
4. ovulation of secondary oocyte and fertilization
5. ovum → zygote and cleavage → morula → blastocyst (where are we?)—*Figure 29.2 sums this up*
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D. Microscopic anatomy of the uterus— (Lab and Text.)
1. Perimetrium—outermost serous layer
2. Myometrium—smooth muscle—function?
3. Endometrium—simple columnar epithelium, very vascular, and glandular
   a. Stratum basalis (basal layer)
      1) function ?
      2) straight arterioles
   b. Stratum functionalis (functional layer)
      1) vascular, glandular, and variable (we’ll talk about menstrual/ovarian influences in lecture)
      2) functions in implantation and pregnancy?
      3) what happens during menses?
      3) spiral arterioles
   c. Cervical mucus—function?

Be sure you know male and female reproductive structures so you’ll understand male and female reproductive physiology covered in lecture!