

# Biology 3201

## Unit Two : Reproduction and Development Learning Outcomes

### Section One :Cell Division

- describe mitosis...describe the events of interphase, mitosis and cytokinesis (the cell cycle)
  - explain the importance of maintaining a constant number of chromosomes through the processes of cell and organism reproduction
- observe, identify and describe (using prepared slides of plant and animal cells) the events of the cell cycle. Include: (i) growth, (ii) cytokinesis, and (iii) chromosome behaviour

**Core Lab #3:** *“Observing the Cell Cycle in Plant and Animal Cells”*, pp. 466-467

- evaluate the physiological and ethical consequences of radiation therapy and chemotherapy in cell division...describe their use and effectiveness – describe positive and negative aspects of these treatments
- describe meiosis...describe the events of meiosis (reduction-division) and cytokinesis
  - explain the necessity of chromosome reduction during the production of sex cells
  - describe the crossing-over process and explain its role in helping randomize the gene combinations for sex cells
- describe the function of spermatogenesis and oogenesis...explain why there is only one functional egg produced during oogenesis, and describe and compare the structure of sperm and egg cells. Include: (i) relative sizes, (ii) energy reserves, (iii) mitochondria, (iv) numbers produced, (v) motility, (vi) enzyme cap (acrosome)
- identify and describe examples of technologies that were developed based on cell division. Include: (i) stem cell research, (ii) cell transplant, (iii) cancer treatment, (iv) spinal cord injury, (v) therapeutic cloning, (vi) reproductive cloning,

**CORE STSE,** *Stem Cell Research*

### Section Two :Reproductive Systems: Strategies

- distinguish between asexual and sexual reproduction...define various types of asexual reproduction. Include: (i) budding, (ii) binary fission, (iii) spore production, (iv) fragmentation, (v) parthenogenesis

*Reproductive Structures in Flowers* **CORE LAB #4.**

- observe, identify and give the function of the basic structures of sexual reproduction in angiosperms (flowering plants). Include: (i) pistil, (ii) stamen, (iii) pollen, (iv) ovules, (v) seed, (vi) fruit
- describe the process of sexual reproduction in flowering plants

### Section Three :Reproductive Systems: Regulation

- describe the structure and function of the human male reproductive system. Include: (i) testis, (ii) scrotum, (iii) seminiferous tubules, (iv) epididymis, (v) sperm duct (vas deferens), (vi) Cowpers (bulbourethral) gland, (vii) seminal vesicle, (viii) prostate, (ix) urethra,
- identify and state the functions of the principal reproductive hormones of the human male. Include: (i) inhibin, (ii) follicle stimulating hormone (FSH), (iii) luteinizing hormone (LH), (iv) testosterone

- analyze and describe the structure and function of the human female reproductive system. Include: (i) ovary, (ii) follicles, (iii) oviduct (fallopian tube), (iv) fimbriae, (v) uterus, (vi) endometrium, (vii) cervix, (viii) vagina
- explain the human female reproductive cycle...identify and state the functions of the principal reproductive hormones of the human female. Include: (i) estrogen, (ii) progesterone, (iii) luteinizing hormone (LH), (iv) follicle stimulating hormone (FSH),
- explain the function and interactions among these hormones in the menstrual cycle
- evaluate the uses and effects of estrogen/ progesterone treatment on the health of women. Include hormone therapy among menopausal women and the use of birth control pills
- describe the potential health risks on individuals and society associated with exposure to sexually transmitted infections. Include: (i) HIV and AIDS, (ii) chlamydia, (iii) hepatitis B, (iv) genital herpes, (v) syphilis, (vi) gonorrhea

*The Menstrual Cycle* **CORE LAB #5, pp. 494-495**

- distinguish between the scientific causes of infertility and technological solutions. Identify the causes of human infertility. Include: (i) blocked oviducts, (ii) failure to ovulate, (iii) endometriosis, (iv) damaged egg, (v) obstruction in the vas deferens or epididymis, (vi) low sperm count, (vii) abnormal sperm. Identify the technological solutions to human infertility. Include: (i) artificial insemination, (AI), (ii) *in vitro* fertilization (IVF), (iii) *in vitro* maturation (IVM), (iv) surrogate motherhood, (v) superovulation using fertility drugs, (vi) embryo storage (cryopreservation)

**Section Four :Reproductive Technologies**

- evaluate the design of birth control technologies and the way they function. Include: (i) abstinence, (ii) birth control pills, (iii) Norplant™ (implant), (iv) morning after pill, (v) Depo-Provera™, (needle), (vi) IUD (interuterine device), (vii) tubal ligation, (viii) diaphragm, (ix) spermicidal jellies and foams, (x) condom, (xi) vasectomy, (xii) rhythm method

**Section Five :Embryonic Differentiation and Development**

- explain the processes of fertilization and development in human reproduction...trace the journey of sperm and egg from their origin until fertilization and implantation. Explain how fraternal and identical offspring are produced.
- describe the following basic stages of embryonic development. (i) cleavage, (ii) morula, (iii) blastocyst (blastula), (iv) gastrula, (v) germ layers, (vi) neural development
- describe the functions of primary membranes during the embryonic development of animals. Include: (i) yolk, (ii) allantois, (iii) amnion, (iv) chorion. Students should know the structure that each primary membrane eventually forms.
- explain the processes of development and birth in human reproduction. Describe the roles of the placenta and umbilical cord during pregnancy, and examine the effects of teratogens on the development of the embryo. Include: (i) cigarette smoke, (ii) alcohol, (iii) prescription drugs
- describe the process of childbirth. Include: (i) dilation stage, (ii) expulsion stage, (iii) placental stage, And identify chemical control hormones associated with implantation, birth and lactation. Include: (i) progesterone, (ii) estrogen, (iii) oxytocin, (iv) prolactin, (v) human chorionic gonadotropin (HCG)
- describe techniques used to monitor various stages of embryonic or fetal development. Include: (i) ultrasound, (ii) amniocentesis, (iii) fetoscopy, (vi) CVS (chorionic villi sampling)