# BIO B33 H3F COURSE SYLLABUS
# HUMAN DEVELOPMENT AND ANATOMY
# FALL 2019

## COURSE DESCRIPTION:

A lecture and laboratory course which deals with the functional morphology of the human organism. The subject matter extends from early embryo-genesis through puberty to late adult life.

**Prerequisite:** BIOA01H3 and BIOA02H3

**Exclusion:** ANA300Y, ANA301H, PMDB33H3

## INSTRUCTOR:

Dr. Hossein Noyan
Email Address: hossein.noyan@utoronto.ca
Phone Number: 416-208-5130
Office: SW542
Office Hours: 1:00-2:00pm on Wednesdays ***By appointment*** via email communication. Please use your UofT email address and include **BIO B33 Student** in the subject line.

## LAB COORDINATOR:

Daniel Yi
email: danielyi@utsc.utoronto.ca
phone: 416-208-4710
room: sw249

**TEACHING ASSISTANTS:** TA's names and emails with their lab times will be posted separately.

## MEETING TIMES:

**Labs:** Mondays 10:00am-1:00pm, 2:00-5:00pm, 7:00-10:00pm, Tuesdays 10:00-1:00, 1:00-4:00, Rms: SW 321 and 323
**Lecture:** Wednesdays 11:00am-1:00pm, Rm. AA112

| Meeting Section | Day(s) | Start(s) | End | Location |
|---|---|---|---|---|
| LEC01 | WE | 11:00 | 13:00 | AA 112 |
| PRA0001 | MO | 10:00 | 13:00 | SW 321 |
| PRA0002 | MO | 10:00 | 13:00 | SW 323 |
| PRA0003 | MO | 14:00 | 17:00 | SW 321 |
| PRA0004 | MO | 14:00 | 17:00 | SW 323 |
| PRA0005 | MO | 19:00 | 22:00 | SW 321 |
| PRA0006 | MO | 19:00 | 22:00 | SW 323 |
| PRA0007 | TU | 10:00 | 13:00 | SW 321 |
| PRA0008 | TU | 10:00 | 13:00 | SW 323 |
| PRA0009 | TU | 13:00 | 16:00 | SW 321 |
| PRA0010 | TU | 13:00 | 16:00 | SW 323 |

## LEARNING OUTCOMES:

By the end of the course a successful student should:
1. Understand the basic anatomy of the human body
2. Understand principles of human early embryology
3. Describe basic tissues of human body
4. Explain how anatomical structures interact in the human body
5. Identify anatomical structures visually and descriptively
6. Develop a mastery of the material such that students can communicate with their peers in an effective and professional manner

## TEXTS: All available at the UTSC bookstore.

**Required Textbook:** Frederic H. Martini, Robert B. Tallitsch & Judi L. Nath, **Human Anatomy**, 9th edition, Pearson Publishing.

**Required Laboratory Manual**: James S. Miller, **Fetal Pig Dissection Guide**, 3rd ed.

## ASSESSMENTS, ASSIGNMENTS AND TESTS:

**Distribution of Marks:**

| | |
|---|---|
| Laboratory Quizzes and Assignments | 15% |
| Midterm I (theory) Examination | 30% |
| Midterm II (Final Laboratory Examination-On labs 1-7) | 20% |
| Final Written Examination (During final exam period) | 35% |

***NOTE:*** Lecture notes, reading sections in the textbook, and content of selected videos are sources of exam question.
***Exam Formats:*** The exact format of a particular exam will be announced ahead in class.

***Midterm exams*** will be scheduled by the registrar and the class will be notified as soon as the date and time are set.

***Final Exam (Cumulative):*** Will be held during final exam period (December 6 – December 21).

**Missed Exams** – students who miss an exam due to medical illness, must submit to Dr. Noyan a detailed UTSC Medical Certificate filled out by the physician you saw on the day of the test itself. You MUST contact Dr. Noyan within 48 hours of missing the exam. The date and format of the makeup test will be communicated via email. We will not accept any other medical certificate/note, and if the note is not filled out to our satisfaction, we do reserve the right to refuse it.

The UTSC Medical Certificate can be found here for your convenience:
http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf

**Laboratory examination:** This exam will focus on all materials covered in the labs. This exam also includes slide show with questions in addition to a written portion.

***Missed Lab Quizzes:*** Students who miss a lab quiz for reasons entirely beyond their control may, within **48 hrs** of the missed quiz, contact your TA and bring a written request for special consideration explaining the reason for missing the quiz and attaching appropriate documentation (UTSC medical note (the only acceptable medical note) which must be completed by a doctor). Your TA will discuss the date and format of the makeup quiz with you.

## LECTURE SCHEDULE **(subject to change at discretion of instructor)**

The lecture notes and related materials will be posted on Quercus weekly as well as any course information and exam details.

***Note: Reading sections marked with a * will be discussed in classroom. Start studying early even before each lecture.***

## WEEK 1 (Sept. 4): INTRODUCTION TO THE COURSE & BASIC TISSUES

Reading: Martini Chapter 1 (Sections 1.1-1.4 & 1.6); Chapter 3 (Sections 3.1-2 & 3.4-3.7)

### Learning Outcomes:

**1.** Define the limits of microscopic anatomy and compare and contrast cytology and histology. p. 2
**2.** Compare and contrast the various ways to approach gross anatomy. p. 2
**3.** Define the various subspecialties of anatomy. p. 2
**4.** Explain the major levels of organization in a living organism. p. 5
**5.** Identify the organ systems of the human body and compare and contrast their functions. p. 7
**6.** Understand and correctly apply descriptive anatomical and directional terminology. p. 14
**7.** List the functions of epithelial tissues, the criteria used to classify epithelial tissue, the functions of each type of epithelial tissue, and at least one location for each type of epithelial tissue. p. 50
**8.** List the three categories of connective tissue, their functions, and the cell types that would be found within each category. p. 59
**9.** Summarize how connective tissues establish the framework of the body. p. 73
**10.** Compare and contrast the three forms of muscle tissue in terms of structure, function, and location. p. 74
**11.** Differentiate between neurons and neuroglia and discuss the functions of each. p. 76
**12.** Describe how nutrition and aging affect tissues. p. 76

## WEEK 2 (Sept. 11): THE INTEGUMENTARY SYSTEM

Reading: Martini Chapter 4 (Sections 4.1-4, *4.5, 4.6-7)

### Learning Outcomes:

**1.** Explain the organization and functions of the integumentary system. p. 87
**2.** Describe the histological organization of the layers of the epidermis and compare and contrast the functions of each layer and any specialized cells found within these layers. p. 88
**3.** Describe the histological organization of the dermis and compare and contrast the functions of each layer and any specialized cells found within these layers. p. 92
**4.** Analyze the structure of the subcutaneous layer (hypodermis) and its importance. p. 94
**5.** Compare and contrast the anatomy and functions of the skin's accessory structures: hair, glands, and nails. p. 95
**6.** Explain how the skin responds to injuries and repairs itself. p. 102
**7.** Summarize the effects of aging on the skin. p. 102

## WEEK 3 (Sept. 18): THE SKELETAL SYSTEM

Reading: Martini Chapter 5 (Sections 5.1-4); Chapter 6 (*Sections 6.1-6.8); Chapter 7 (*Sections 7.1-3); Chapter 8 (*Sections 8.1-2 & 8.11)

### Learning Outcomes:

**1.** Compare and contrast the structure and function of the various cell types found within developing and mature bone, how these cells contribute to the formation of compact bone and cancellous bone, and how these cells contribute to the structure and function of the periosteum and endosteum. p. 108
**2.** Compare and contrast the processes involved in the formation of bone and the growth of bone, and explain the factors involved in the regulation of these processes. p. 113
**3.** Describe the different types of fractures and outline how fractures heal. p. 118
**4.** Classify bones according to their shapes and give one or more examples for each type. p. 120
**5.** Explain how the normal functioning, growth, remodeling, and repair of the skeletal system is integrated with other systems of the body. p. 125
**6.** List the names of the bones that constitute the skull and the associated skull bones. p. 133
**7.** Compare and contrast the sutures of the skull. p. 140

**8.** List and describe the bones of the cranium. p. 140
**9.** Identify and describe the bones of the face. p. 150
**10.** Identify and list the functions of the bones of nasal complexes. p. 154
**11.** Compare and contrast the structural differences among the skulls of infants, children, and adults. p. 156
**12.** Compare and contrast the vertebral groups and describe the structural and functional differences among them. p. 158.
**13.** Explain the significance of the articulations of the thoracic vertebrae, the ribs, and the sternum. p. 167
**14.** Identify the bones that form the pectoral girdle and upper limb and their prominent surface features. p. 174
**15.** Identify the bones that form the pelvic girdle and lower limb and their prominent surface features. p. 184
**16.** Explain how studying the skeleton can reveal important information about an individual. p. 197
**17.** Compare and contrast the two ways to classify joints. p. 204
**18.** Explain the types of movements that can occur at a typical synovial joint and how synovial joints are classified according to the type and range of motion permitted at that joint. p. 207
**19.** Explain how aging may affect the joints of the body. p. 231

## WEEK 4 (Sept. 25): THE MUSCULAR SYSTEM

Reading: Chapter 9 (Sections 9.1, *9.2, 9.4, 9.6-9); Chapter 10 (Sections 10.1, *10.2-4); Chapter 11 (Sections 11.1, *11.2-5)

### Learning Outcomes:

**1.** List five functions of skeletal muscle. p. 236
**2.** Compare and contrast the gross and microscopic anatomy of a skeletal muscle. p. 236
**4.** Define a motor unit and explain how a motor unit is controlled by a single motor neuron. p. 247
**5.** Compare and contrast fast, slow, and intermediate skeletal muscle fibers. p. 248
**6.** Describe the arrangement of muscle fibers in parallel, convergent, pennate, and circular skeletal muscles. p. 249
**7.** Explain how a term may indicate the action of a muscle, the specific region of the body where a muscle might be found, or the structural characteristics of that muscle. p. 251
**8.** Explain how levers and pulleys are used to describe how a skeletal muscle produces movement. p. 253
**9.** Describe the effects of aging on skeletal muscles. p. 253
**10.** Describe the location and function of the four groups of axial muscles. p. 260
**11.** Identify the six subgroups of the muscles of the head and neck p. 262
**12.** List the three layers of the muscles of the vertebral column. p. 270
**13.** Identify the muscles of the oblique and rectus groups. p. 273
**14.** Describe how the action produced by a muscle at a joint depends on the joint structure and the muscle location relative to the axis of movement at the joint. p. 283
**15.** Identify and locate the muscles of the pectoral girdle and upper limb. p. 286
**16.** Identify and locate the compartments of the arm and forearm. p. 301
**17.** Identify and locate the muscles of the pelvic girdle and lower limb. p. 303
**18.** Identify and locate the compartments of the thigh and leg. p. 319

## WEEK 5 (Oct. 2): THE NERVOUS SYSTEM-Part 1

Reading: Chapter 13 (Sections 13.1-5, 13.8-9); Chapter 14 (Sections 14.1-4, *14.5-6); Chapter 15 (Sections 15.1, *15.2-3)

### Learning Outcomes:

**1.** Discuss the anatomical organization and general function of the nervous system. p. 339
**2.** List the two cell types that are found within the nervous system and discuss their functions. p. 340
**3.** Discuss the functions of each type of neuroglia. p. 342

**4.** Describe the structure of a typical neuron and discuss the basis for the structural and functional classification of neurons. p. 348
**5.** Describe the process of peripheral nerve regeneration after injury to an axon. p. 350
**6.** Explain the possible methods of interaction between individual neurons or groups of neurons in neuronal pools. p. 353
**7.** Explain the basic anatomical organization of the nervous system. p. 354
**8.** Discuss the structure and functions of the spinal cord. p. 361
**9.** Locate the spinal meninges, compare and contrast their structure and function. p. 361
**10.** Discuss the structure and location of the gray matter and white matter, and compare and contrast the roles of both in processing and relaying sensory and motor information. p. 364
**11.** Identify the regional groups of spinal nerves. p. 366
**12.** Define the term nerve plexus and compare and contrast the four main spinal nerve plexuses. p. 367
**13.** Describe the structures and steps involved in a neural reflex. p. 374
**14.** Explain how the anatomical name of a spinal tract tells you where the tract begins and ends within the CNS. p. 388
**15.** Learn about sensory tracts of the spinal cord. p. 388
**16.** Learn about motor tracts of the spinal cord. p. 394
**17.** Identify the centers in the brain that interact to determine somatic motor output. p. 398

## WEEK 6 (Oct. 9): THE NERVOUS SYSTEM-Part 2

Reading: Chapter 16 (Sections 16.1, 16.2, *16.3-16.8, *16.9); Chapter 17 (Sections 17.1-4)

### Learning Outcomes:

**1.** Identify the major regions of the brain and explain their functions. p. 404
**2.** Compare and contrast the structures that protect and support the brain. p. 406
**3.** Identify the anatomical structures of the brain. p. 413-422
**4.** Compare and contrast motor, sensory, association, and limbic areas of the cerebrum. p. 422
**5.** Learn about the 12 pairs of cranial nerves. p. 434
**6.** Compare and contrast the somatic and autonomic nervous systems. p. 450
**7.** Summarize the anatomy and physiology of the sympathetic nervous system. p. 450
**8.** Summarize the anatomy and physiology of the parasympathetic nervous system. p. 459
**9.** Summarize the concept of dual innervation within the autonomic nervous system. p. 462

---------- **READING WEEK (OCT 14-18): NO LECTURE** ----------

**MIDTERM EXAM** WILL BE SCHEDULED AFTER THE READING WEEK. START STYDYING AS EARLY AS POSSIBLE.

## WEEK 7 (Oct. 23): SENSES AND SPECIAL SENSES AND THE ENDOCRINE SYSTEM

Reading: *Chapter 18; Chapter 19 (Sections 19.1, *19.2-9)

### Learning Outcomes:

**1.** Define the terms receptor, sensory coding, tonic receptor, and phasic receptor. p. 472
**2.** Compare and contrast the four types of general sensory receptors. p. 473
**3.** Describe the anatomy of the olfactory receptors and the olfactory pathway connecting these receptors to the cerebral cortex. p. 476
**4.** Describe the anatomy of the taste receptors and the pathway connecting these receptors to the cerebral cortex. p. 478
**5.** Describe the anatomy of the external ear, middle ear, and internal ear. p. 480
**6.** Describe the anatomy of the eye. p. 491
**7.** Define hormone and target tissue; name the major classes of hormones based on structure, and describe an endocrine positive feedback response. p. 507

**8.** Describe the anatomy of the anterior lobe and posterior lobe of the pituitary gland and discuss the hormones they release. p. 508
**9.** Describe the anatomy of the thyroid gland and discuss the actions of the hormones released from this gland. p. 509
**10.** Describe the anatomy of the parathyroid gland and discuss the actions of the hormone released from this gland. p. 515
**11.** Compare and contrast the anatomy of the thymus in a prepubescent individual with that in an adult individual. p.516
**12.** List the cell types of the adrenal cortex and adrenal medulla and describe the hormones produced by each cell type. p. 516
**13.** Discuss the function of the hormones produced by the kidneys and the heart. p. 518
**14.** List the four cell types of the endocrine pancreas and the hormones produced by each cell type. p. 518
**15.** Compare and contrast the hormones produced by the testes and ovaries. p. 520
**16.** List the functions of the hormone produced by pinealocytes. p. 521
**17.** List two major functional changes that occur in the endocrine system as a person ages. p. 524

## WEEK 8 (Oct. 30): THE CARDIOVASCULAR AND LYMPHATIC SYSTEMS

Reading: Chapter 20 (Sections 20.1, *20.2-3); Chapter 21 (Sections 21.1-6); Chapter 22 (Sections 22.1-2, *22.6); Chapter 23 (Sections 23.1, *23.2-6, 23-7)

### Learning Outcomes:

**1.** Compare and contrast the components of blood and plasma. p. 529
**2.** Compare and contrast the formed elements of blood. p. 531
**3.** Explain erythropoiesis and leukopoiesis. p. 539
**4.** Compare and contrast the pulmonary and systemic circuits. p. 546
**5.** Outline the anatomy of the pericardium. p. 546
**6.** Describe the macroscopic and microscopic anatomy of the heart wall. p. 548
**7.** Outline how the heart is orientated within the thoracic cavity and explain the superficial anatomy of the heart. p. 550
**8.** Compare and contrast the anatomy of the four chambers of the heart. p. 553
**9.** Compare and contrast the anatomy of the right and left coronary arteries. p. 555
**10.** Compare and contrast the histology of an elastic artery, muscular artery, arteriole, capillary, venule, and vein. p. 568
**11.** Compare the percentage of blood that is normally contained within the heart, arteries, and capillaries to the percentage that is normally contained within the veins. p. 574
**12.** Outline three important functional patterns that describe the distribution of blood vessels within the body. p. 575
**13.** Outline the path blood would take as it passes from the right atrium of the heart to the lungs and back to the right atrium. p. 576
**14.** Describe the systemic veins. p. 590
**15.** Outline the age-related changes that occur in the cardiovascular system. p. 598
**16.** List the major functions of the lymphatic system. p. 604
**17.** Compare and contrast a lymphatic capillary and a vascular capillary. p. 605
**18.** Compare and contrast the thoracic duct and the right lymphatic duct. p. 606
**19.** Compare and contrast the different classes of lymphocytes. p. 607
**20.** Define the term "lymphatic nodule" and give two examples of where lymphatic nodules are found within the body. p. 610
**21.** Compare and contrast the anatomical structure of a lymph node to that of the thymus and spleen. p. 612
**22.** Describe the effects of aging on the lymphatic system and immune surveillance. p. 619

## WEEK 9 (Nov. 6): THE DIGESTIVE SYSTEM

Reading: Chapter 25 (Sections 25.1, *25.5-9)

**Learning Outcomes:**
**1.** Describe the histological organization of the four layers of the digestive tract. p. 651
**2.** Describe the structure and function of the pharynx. p. 661
**3.** Outline the gross and microscopic anatomy of the esophagus. p. 661
**4.** Describe the gross and microscopic anatomy of the stomach. p. 663
**5.** Describe the gross and microscopic anatomy of the small intestine. p. 668
**6.** Describe the gross and microscopic anatomy of the large intestine and compare and contrast it to that of the small intestine. p. 672
**7.** Describe the anatomy of the liver, gallbladder, and pancreas. p. 675
**8.** Describe the changes in the digestive tract that occur with aging. p. 682

**WEEK 10 (Nov. 13): FINAL LAB EXAM (Also see below)**
**NOTE: RESPIRATORY AND URINARY SYSTEMS (RECORDED LECTURES-will be posted on Quercus-no live lecture)**

Reading: Chapter 24 (Sections 24.1, *24.2-5, 24.6, *24.7-11); Chapter 26 (Sections 26.1, *26.2, 26.3)

**Learning Outcomes:**
**1.** List the main functions of the respiratory system. p. 625
**2.** Compare and contrast the anatomy and physiology of the upper respiratory system. p. 627
**3.** Describe the anatomy of the larynx. p. 630
**4.** Describe the anatomy of the trachea. p. 632
**5.** Compare and contrast the anatomy of the main bronchi. p. 632
**6.** Compare and contrast the anatomy of the right and left lungs. p. 633
**7.** Describe the anatomy of the pleural cavities and pleural membranes. p. 642
**8.** List the most important muscles of breathing. p. 643
**9.** List the changes that occur in the respiratory system at birth. p. 643
**10.** Identify the respiratory control centers. p. 643
**11.** List the major effects of aging on the respiratory system. p. 645
**12.** Outline the gross and histological anatomy of the kidney. p. 688
**13.** Outline the gross and histological anatomy of the ureter, bladder, and urethra. p. 697
**14.** Give examples of the effects of aging on the urinary system. p. 702

**WEEK 11 (Nov. 20): THE REPRODUCTIVE SYSTEM**

Reading: Chapter 27 (Sections 27.1, *27.2-3, 27.4)

**Learning Outcomes:**
**1.** Compare and contrast the general organization of the male and female reproductive systems. p. 708
**2.** Identify and describe the location, gross anatomy, and histology of the major structures of the male reproductive system. p. 708
**3.** Identify and describe the location, gross anatomy, and histology of the major structures of the female reproductive system. p. 719
**4.** Compare and contrast the age-related changes in the male and female reproductive systems. p. 733

**WEEK 12 (Nov. 27): EMBRYOLOGY AND HUMAN DEVELOPMENT**
Reading: Chapter 28 (Sections 28.1-5)

**Learning Outcomes:**
**1.** List the various periods of development. p. 740
**2.** Describe the process of fertilization. p. 740

**3.** Compare and contrast the three trimesters of gestation. p. 742
**4.** Outline the stages of labor and the events that occur immediately before and after delivery. p. 752
**5.** Summarize the changes that occur during the transition from fetus to neonate. p. 755
**6.** Summarize the anatomical patterns that are seen in the embryo that persist in the newborn and carry forward into the anatomy of the adult. p. 756

## LAB SCHEDULE: **(subject to change at discretion of instructor)**

In order to change your lab section, you must contact the registrar.

**LAB 1** (MON SEP 9 & TUE SEP 10): HISTOLOGY OF BASIC TISSUES

**LAB 2** (MON SEP 16 & TUE SEP 17): SURFACE ANATOMY & AXIAL SKELETON-Hand in assignment

**LAB 3** (MON SEP 23 & TUE SEP 24): SURFACE ANATOMY & APPENDICULAR SKELETON

**LAB 4** (MON SEP 30 & TUE OCT 1): THE MUSCULOSKELETAL SYSTEM I; START FETAL PIGS THIS WEEK-Need lab manual (Quiz 1 on lab 3)

**LAB 5** (MON OCT 7 & MON OCT 8): THE MUSCULOSKELETAL SYSTEM II (Quiz 2 on lab 4)

---------- **READING WEEK (OCT 14-18): NO LAB**----------

**LAB 6** (MON OCT 21 & TUE OCT 22): RESPIRATORY & DIGESTIVE SYSTEMS- Hand in assignment

**LAB 7** (MON OCT 28 & TUE OCT 29): URINARY AND REPRODUCTIVE SYSTEMS

**LAB 8** (MON NOV 4 & TUE NOV 5): **REVIEW LAB** (Quiz 3 on lab 7)

**FINAL LAB EXAM-WILL BE HOLD ON WEDNESDAY NOVEMBER 13TH DURING LECTURE TIME (11-1), LOCATION: LECTURE HALL-Ask your TAs for details.**

**LAB 9** (MON NOV 11 & TUE NOV 12): IN LAB ENDOCRINE AND BRAIN ASSIGNMENT

**LAB 10** (MON NOV 18 & TUE NOV 19): THE CARDIOVASCULAR SYSTEM

**LAB 11** (MON NOV 25 & TUE NOV 26): SENSES (Quiz 4 On lab 10-Hand in assignment))

# UNIVERSITY POLICIES

The University of Toronto is dedicated to fostering an academic community in which the learning and scholarship of every member may flourish, with vigilant protection for

individual human rights, and a resolute commitment to the principles of equal opportunity, equity and justice.

**ACCESSABILITY STATEMENT**
Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please contact AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in AA142) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca.

**ACADEMIC INTEGRITY STATEMENT**
Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (http://www.governingcouncil.utoronto.ca/policies/behaveac.htm) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:
*ON TESTS AND EXAMS:* Using or possessing unauthorized aids. Looking at someone else's answers during an exam or test. Misrepresenting your identity.

*IN ACADEMIC WORK:* Falsifying institutional documents or grades. Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources
(see http://www.utoronto.ca/academicintegrity/resourcesforstudents.html).