I. **INTRODUCTION**

A. Introduction to Histology: **Functional Histology** is the study of the microscopic anatomy of cells and tissues of plants and animals. It is commonly performed by examining cells and tissues under a light microscope or electron microscope; which have been sectioned, stained, and mounted on a microscope slide. Histological studies may be conducted using tissue culture, where live human or animal cells are isolated and maintained in an artificial environment for various research projects. The ability to visualize or differentially identify microscopic structures is frequently enhanced through the use of histological stains. Histology is an essential tool of biology and medicine. Histopathology, the microscopic study of diseased tissue, is an important tool in anatomical pathology, since accurate diagnosis of cancer and other diseases usually requires histopathological examination of samples.

B. The courses are designed to meet basic curriculum requirements for the Central Texas College Histology Laboratory Technician Program.

C. This course is occupationally related and provided didactic and practical knowledge required for entrance into the clinical portions of the Histology Laboratory Technology Program.

D. Prerequisite(s): None

II. **LEARNING OUTCOMES**

Upon successful completion of the courses, Functional Histology, the student will:

A. Identify and understand basic anatomy and physiology of cells and tissues.

B. Introduction to the healthcare environment and the histology laboratory.

C. Learn medical terminology associated with Histology.

D. Understand basic knowledge and care of laboratory microscopes.

E. Be able to recognize cellular and molecular changes in the tissues to be able to differentiate adenoma, sarcoma, carcinoma, lymphoma, and other types of neoplasm.
from “normal.”

**F.** Be able to differentiate normal from abnormal cells to distinguish disorders of the circulatory system.

**G.** Be able to differentiate normal from abnormal cells to distinguish disorders of the liver and biliary tract.

**H.** Be able to differentiate normal from abnormal cells to distinguish disorders of the pancreas.

**I.** Be able to differentiate normal from abnormal cells to distinguish disorders of the endocrine glands.

**J.** Be able to differentiate normal from abnormal cells to distinguish disorders of the urinary tract.

**K.** Be able to differentiate normal from abnormal cells to distinguish disorders of the reproductive system.

**L.** Be able to differentiate normal from abnormal cells to distinguish disorders of bones, joints, and skeletal muscle.

**M.** Be able to differentiate normal from abnormal cells to distinguish disorders of the nervous system.

**N.** Be able to differentiate normal from abnormal cells to distinguish disorders of the senses.

**O.** Be able to differentiate normal from abnormal cells to distinguish disorders of the skin.

**P.** Utilize appropriate safety equipment and procedures according to established laboratory protocol.

**Q.** Exhibit the professional, legal, and ethical attributes required by the Histology Laboratory Technician, and understand how the above relates to communication.

**R.** Perform quality control (QC) procedures according to established protocol and evaluate the results.

**S.** Understand laboratory mathematics as it relates to the Histology Lab.

**T.** At the conclusion of this lecture series, the student will have achieved the following: Achievement will be met when a minimum score of 75 percent is earned on the written examination covering the material.
III. INSTRUCTIONAL MATERIALS

The instructional materials identified for his course are viewable through www.ctcd.edu/books

IV. COURSE REQUIREMENTS

A. To receive transferable credits for this course, you must earn a grade of 2.5 or better.

B. Class attendance is mandatory. A student who is late for 15 minutes or more will be marked absent. A student who is late for less than 15 minutes late will be marked tardy. 2 tardies will count as 1 absence. 3 absences result in the loss of a letter grade for the course. 4 absences will disqualify a student from the HT program and the student will be required to meet with the program director for readmission.

C. Students with a grade of 2.4 or less should make an appointment with the instructor to discuss the reason for low performance. Any material not understood by the student can be discussed with the instructor privately during office hours. Office hours are posted; please try to schedule an appointment at your convenience.

D. Lecture examinations will be taken from class notes, assigned pages in your text, and any additional information; such as computer assignments or videos.

E. Laboratory examinations will be taken from a combination of lecture and any laboratory information covered in any format. Often, theory of procedures is required to perform the procedure and evaluate your results.

V. EXAMINATIONS

A. Five lecture, three laboratory examinations, and a laboratory assessment will be given. A comprehensive final examination will be given.

B. Makeup examinations will not be given. If you must miss an exam, you can use your final exam grade to replace your missed exam grade. Any additional missed exams would result in a “0” and cannot be made up.

VI. SEMESTER GRADE COMPUTATION

<table>
<thead>
<tr>
<th>Lecture Examinations</th>
<th>Point Value</th>
<th>Laboratory Examinations</th>
<th>Point Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture 1</td>
<td>100</td>
<td>Laboratory 1</td>
<td>100</td>
</tr>
<tr>
<td>Lecture 2</td>
<td>100</td>
<td>Laboratory 2</td>
<td>100</td>
</tr>
<tr>
<td>Lecture 3</td>
<td>100</td>
<td>Laboratory 3</td>
<td>100</td>
</tr>
<tr>
<td>Lecture 4</td>
<td>100</td>
<td>Laboratory Assessment</td>
<td>100</td>
</tr>
<tr>
<td>Lecture 5</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Lecture Points Possible</td>
<td>500</td>
<td>Total Lab Points Possible</td>
<td>400</td>
</tr>
<tr>
<td>Homework</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Examination</td>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NOTE: Plagiarism in any form will not be tolerated. A student who chooses to plagiarize will be given a zero on the assignment. A formal charge may be made to the College Disciplinary Board.

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. **Course Withdrawal:** It is the student’s responsibility to officially withdraw from a class if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College Application for Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

CTC Form 59 will be accepted at any time prior to **Friday of the 12th week** of classes during the **16-week** fall and spring semesters. The deadline for sessions of other lengths is as follows:

<table>
<thead>
<tr>
<th>Session</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-week session</td>
<td>Friday of the 7th week</td>
</tr>
<tr>
<td>8-week session</td>
<td>Friday of the 6th week</td>
</tr>
<tr>
<td>5-week session</td>
<td>Friday of the 3rd week</td>
</tr>
</tbody>
</table>

The equivalent date (75% of the semester) will be used for other sessions of other lengths. The specific last day to withdrawal is published each semester in the Schedule Bulletin.

A student who officially withdraws will be awarded the grade of “W” provided the student’s attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the college before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of “F” or “FN” for nonattendance.

B. **Administrative Withdrawal:** An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on CTC Form 59 for submission to the registrar.
C. **Incomplete Grade:** The College catalog states, “An incomplete grade may be given in those cases where the student has completed the majority of the course work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course…” Prior approval from the instructor is required before the grade of “I” for Incomplete is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an “F” for the course.

D. **Cellular Phones and Beepers:** Student cellular phones and beepers will be turned off while the student is in the classroom or laboratory. Students choosing to disregard this policy will be asked to leave and will be recorded as absent. If a cell phone rings or is used during testing, the test will be taken and a grade of zero will be given.

E. **American’s with Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

F. **Instructor Discretion:** The instructor reserves the right or final decision in course requirements.

G. **Civility:** The collegiate expectation is that students will conduct themselves with civility at all times in classroom. Minimal civility includes:

1. Being in class on time.
2. Staying in class for the entire class period.
3. Leaving early occurs only after informing the teacher, prior to class, of an unavoidable conflict requiring your early departure (if possible, position yourself close to the door for a minimum disruption of the class).
4. Avoiding such uncivil conduct as talking, sleeping, reading papers/magazines, or working on some other class homework assignment.
5. Using socially unacceptable language in classroom discussions.
   Failure to do so can result in disciplinary action up to and including expulsion.

VIII. **COURSE OUTLINE**

A. **Part 1: Functional Histology**

1. **Learning Outcomes:** Upon completion of this lesson, the student will:
   - Describe the role of the histology laboratory technician as a part of the health care team.
   - Demonstrate knowledge of medical terminology.
c. Identify the various parts of a binocular microscope and the types of microscopy.

d. Explain the function of the various parts of the microscope, equipment, and reagents used with the microscope.

e. Perform laboratory activities using safe laboratory behavior and regulatory compliance.

f. List potential hazards in the clinical laboratory including biological, chemical, fire, electrical, mechanical, physical, and radiation hazards.

g. Identify safety features in the student and clinical laboratory. Explain how safety practices are ensured.

h. List the importance of quality assurance in the clinical laboratory.

i. Perform metric measurements and conversions.

j. Explain the importance of a QC program; including QC samples, range, and charts. Explain the need for standardization in lab practice.

k. Demonstrate correct and safe use of lab equipment, microscope, and glassware. Demonstrate accurate measurement of liquids. Choose appropriate equipment for the measurement. Prepare dilutions. Define solute, solvent, solution, and dilution.

l. Choose appropriate mode of transmission for laboratory activities.

m. Classify correct phase of lab testing.

n. Exhibit a sense of professionalism by demonstrating the following characteristics: attend class regularly and punctually, seek activities which further learning, admit mistakes and take steps to correct them, repeat procedures when test result is in doubt, cooperate with instructor, take pride in laboratory medicine, comply with the stated dress code of the laboratory, and recognize the value of continuing education activities.

o. At the conclusion of this lecture series, the student will have achieved the following: Achievement will be met when a minimum score of 75 percent is earned on the written examination covering the material.

2. Learning Activities: Methods of Teaching and Learning

Students will be taught using various learning methods and activities; which includes lectures, demonstrations including hands on with microscope preserved slides, practice sessions, case studies, projects, laboratory exercises, clinical experiences, internet exercises, quizzes, exams, and recordings. All material covered by these methods may be covered on Exams.

B. Part 2: The Cell

1. Learning Outcomes: Upon completion of this lesson, the student will learn:

   Cell Structure and Function

   a. Pathology, epidemiology, signs, symptoms, syndromes, and other concepts of disease.
b. The effects of genetics and environment.
c. The meaning of “normal” and “abnormal”; test sensitivity and specificity; false-positive and false-negative tests; and the effect of prevalence on test interpretation.
d. Labile, stable, and permanent tissues; the role of stem cells.
e. Necrosis, apoptosis, and other cell changes in health and disease.
f. Acute and chronic inflammation and the body’s response to injury.
g. Regeneration, scarring, and repair in the recovery from injury.
h. Epithelial barriers and other nonimmune protection; alien antigens and the reactions of the immune system.
i. Cells and organs of the lymphoid and immune systems.
j. Anaphylaxis, delayed immunity, and other immune reactions.
k. Allergy and autoimmune disease.

C. **Part 3: Neoplasia**

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Definitions of adenoma, sarcoma, carcinoma, lymphoma, and other types of neoplasms.
   b. DNA mutations, proto-oncogenes, tumor suppressor genes, and the importance of apoptosis.
   c. Premalignant states, malignant clones, growth fraction, degrees of differentiation, tumor blood supply, invasion and metastasis, and immune surveillance.
   d. The importance of clinical history; grading, staging, biopsy, cytology, cell markers, paraneoplastic syndromes, other aspects of clinical behavior, and assessment.
   e. Surgery, radiation, chemotherapy, vaccination, and other immune treatments.

D. **Part 4: Basic Tissue Types:**

**Blood, Hematopoiesis, and Bone Marrow**

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Hemoglobin, hematocrit, red and white cell counts, red cell indices, and other assessments of the formed elements of blood.
   b. Hemorrhagic, hemolytic, and production-failure anemias; polycythemia.
   c. Leukopenia, leukocytosis, and lymphadenopathy.
   d. Acute and chronic leukemias; myeloproliferative syndromes; follicular and diffuse lymphomas; multiple myeloma and other plasma cell disorders.
   e. Hypersplenism, thymic hyper- and hypoplasia.
   f. The chemistry and optimum levels of high and low density lipoproteins and triglycerides.
   g. Hypertension and atherosclerosis.
   h. Aneurysms, dissections, and vasculitis.
i. Varicose veins and thrombophlebitis.

j. The cardiac conduction system and the electrocardiogram.

k. Right and left heart failure.

l. Coronary atherosclerosis, angina, coronary occlusion; valvular stenosis and insufficiency; myocarditis, cardiomyopathy, and pericarditis.

m. Septal defects, other shunts, obstructions, and other congenital disease.

n. Heart block, fibrillation, ectopic beats, escape rhythms, and other arrhythmias.

o. Hydrodynamic pressure, osmotic pressure, and the movement of fluid and blood.


q. Edema, acidosis, dehydration, and electrolyte imbalances.

r. Hemostasis, hemorrhage, congestion, and thrombosis.

s. Thromboembolism and infarction.

t. Hypovolemic, cardiac, and septic shock; collapse of blood circulation.

Disorders of Bones, Joints, and Skeletal Muscle

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Osteoporosis, osteomalacia; osteogenesis imperfecta, and other congenital disorders of bone.

   b. Fracture, infarction, and infection.

   c. Osteosarcoma, chondrosarcoma, and other tumors of bone.

   d. Osteoarthritis, rheumatoid arthritis, spondyloarthropathies, joint injuries; fibromyalgia and periarticular pain syndromes.

   e. Fibromatoses, fibrosarcoma, and other tumors of joints and soft tissues.

   f. Myasthenia gravis, muscular dystrophy; myopathies.

Disorders of the Skin

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Photoaging and other effects of sunlight; melisma and other effects of pregnancy; rheumatoid nodules and other lesions of systemic disease.

   b. Acne, impetigo, ringworm, warts; pediculosis and other infections and infestations.

   c. Eczema, urticarial, atopy, psoriasis; other acute and chronic dermatitis.

   d. Vitiligo, lentigo; other conditions of abnormal pigmentation.

   e. Nevi and malignant melanoma

Respiratory System Disorders of the Respiratory Tract

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Allergic rhinitis, the common cold, sinusitis, pharyngitis, laryngitis.
b. Atelectasis, pulmonary edema, and acute respiratory distress syndrome.
c. Emphysema and chronic bronchitis, interstitial fibrosis.
d. Pulmonary hypertension and thromboembolism.
e. Lobar and bronchopneumonia.
f. Bronchogenic carcinoma and other tumors.

Disorders of the Gastrointestinal Tract

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Nausea, vomiting, diarrhea, constipation, hemorrhage, ileus, and other signs and symptoms of gastrointestinal disease.
   b. Periodontitis, reflux esophagitis, gastritis, peptic ulcers, infectious diarrhea, hemorrhoids, and other diseases of the anatomic segments of the GI tract from mouth to anus.
   c. Intestinal infections.
   d. Celiac sprue and other malabsorption syndromes.
   e. Crohn’s disease and ulcerative colitis.
   f. Tubular adenoma, carcinoma of the colon, and other neoplasms of the large and small bowel.

Disorders of the Liver and Biliary Tract

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Jaundice, cholestasis, cirrhosis, portal hypertension, and other liver responses to injury.
   b. Acute and chronic viral hepatitis.
   c. Alcoholic, toxic, and metabolic liver disease; biliary cirrhosis and other conditions of intrahepatic bile ducts.
   d. Hepatocellular carcinoma and other tumors of the liver.
   e. Acute and chronic cholecystitis, cholelithiasis, and other conditions of the gallbladder and extrahepatic bile ducts.
   f. Acute and chronic pancreatitis.
   g. Diabetes and its complications; atherosclerosis, microangiopathy, glomerulopathy, peripheral neuropathy, retinopathy, infections.
   h. Carcinoma; endocrine tumors.

Disorders of the Urinary Tract

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Glycosuria, hematuria, proteinuria, Ketonuria, and other urine abnormalities.
   b. Obstruction, urolithiasis, transitional cell carcinoma, renal cell carcinoma.
   c. Cystitis, incontinence, and voiding disorders.
   d. Azotemia, uremia, clinical presentations of renal disease.
   e. Acute and chronic glomerulonephritis, acute tubular injury, acute and chronic drug/toxic injury, tubulointerstitial disease.
Disorders of the Endocrine Glands

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Functioning and null pituitary adenomas, Cushing’s Syndrome, Addison’s syndrome, goiter, thyrotoxicosis, thyroiditis, myxedema, hyperparathyroidism, diabetes, insipidus, and other conditions of the pituitary-target organ axis.
   
   b. Hyper- and hypoparathyroidism.
   
   c. Carcinoma of the thyroid and other neoplasms of endocrine organs.

Disorders of the Male Genitalia

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Erectile dysfunction and infertility.
   
   b. Peyronie’s disease, Bowen’s disease, varicocele, Taneia infections and other conditions of the penis, scrotum, and groin.
   
   c. Epididymitis, testicular tumors.
   
   d. Prostatitis, prostatic hyperplasia; prostate specific antigen, and prostate cancer.

Disorders of the Female Genitalia and Breast

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Infertility, menopause; pre-eclampsia, gestational diabetes, and disorders of pregnancy.
   
   b. Vaginitis, lichen sclerosis, and other vulvovaginal conditions.
   
   c. Human papillomavirus infection, dysplasia, and carcinoma of the cervix.
   
   d. Endometriosis, endometrial hyperplasia, and carcinoma; uterine leiomyoma.
   
   e. Ovarian cysts, carcinoma of the ovary; Teratomas fibromas, and other ovarian tumors.
   
   f. Fibrocystic condition, epithelial hyperplasia, fibroadenoma, and other benign breast disease.
   
   g. Ductal and lobular carcinoma of the breast.

Disorders of the Nervous System

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Increased intracranial pressure, herniation, trauma; subdural, epidural, and subarachnoid hemorrhage.
   
   b. Ischemic and hemorrhagic stroke, subarachnoid hemorrhage, laminar cortical necrosis.
   
   c. Meningitis, encephalitis, brain abscess
d. Multiple sclerosis and other demyelinating diseases; toxic encephalopathy.
e. Alzheimer disease, Parkinson disease; other degenerative conditions.
f. Glioma, meningioma, and other intracranial tumors.

Disorders of the Senses

1. **Learning Outcomes:** Upon completion of this lesson, the student will learn:

   a. Myopia, hyperopia, astigmatism; other disorders of refraction.
   b. Conjunctivitis, uveitis; other inflammatory conditions.
   c. Diabetic and hypertensive retinopathy, retinal detachment, macular degeneration; other conditions of the retina.
   d. Glaucoma, optic neuritis, and other conditions of the optic nerve.
   e. Retinoblastoma, malignant melanoma.
   f. Otitis media, cholesteatoma, otosclerosis; other conditions of the middle ear.
   g. Meniere’s syndrome; other conditions of the inner ear.
   h. Deafness.
   i. Loss of (or distorted perception of) taste, smell, proprioception, touch, pain.