School of Health Professions Student Catalog

For Academic Year 2014–2016

Academic Calendar

Class start dates and holidays — Fall Semester 2014 through Summer Semester 2016 and previous academic years (*information subject to change*)

Areas of Study

Faculty roster, curriculum and course descriptions, specific requirements for admission and more for the certificate and baccalaureate degree programs offered by the School of Health Professions

- Clinical Laboratory Science
- Cytogenetic Technology
- Cytotechnology
- Diagnostic Imaging
- Diagnostic Medical Sonography
- Health Care Disparities, Diversity and Advocacy
- Histotechnology
- Medical Dosimetry
- Molecular Genetic Technology
- Radiation Therapy
- Master of Science in Diagnostic Genetics

Policies and Procedures

Admission, registration, tuition and fees, scholarships, financial aid and a wide range of academic and general issues; includes links to corresponding policy pages of the Health Professions Student Handbook

About the School

Mission and vision of the School of Health Professions, student academic support services, Student Affairs Office, student life

About MD Anderson

MD Anderson's mission and vision, institutional profile and administrative officers

Disclaimer

This catalog is a general information publication only. It is not intended to nor does it contain all regulations that relate to students. The provisions of this catalog do not constitute a contract, express or implied, between any applicant, student or faculty member and The University of Texas MD Anderson Cancer Center School of Health Professions or The University of Texas System. The University of Texas MD Anderson Cancer Center reserves the right to withdraw courses at any time, to change fees or tuition, calendar, curriculum, degree requirements, graduation procedures and any other requirements affecting students. Changes will become effective whenever the proper authorities so determine and will apply to both prospective students and those already enrolled.

Clinical Laboratory Science

The clinical laboratory scientist is an essential member of the health care team, performing a myriad of laboratory procedures aimed at the diagnosis and treatment of disease.

Degree Offered

Bachelor of Science in Clinical Laboratory Science

The program is administered by:

Dean: Shirley Richmond, Ed.D., MLS(ASCP)

Program Director: Brandy Greenhill, Dr.PH, MLS(ASCP)CM

Education Coordinator: Kimberly Murray, M.A., MLS(ASCP)CMSH

Educational Preceptor: Christopher Einspahr, B.S., MLS (ASCP)CM

Medical Advisor: Jeffery Tarrand, M.D.

Roster of Faculty

Faculty	Degree and School	Teaching Assignments
Brandy Greenhill MLS(ASCP)CM Assistant Professor	DrPH., The University of Texas School of Public Health, Houston	• Clinical Chemistry • Immunohematology • Capstone Seminar
Kimberly Murray MLS(ASCP)CMSH Education Coordinator	M.A., University of Phoenix	• Hematology • Hemostasis • Pathology of Bodily Fluids • Microbiology
Vicki L. Hopwood CLSp (CG)	M.S., The University of Texas Graduate School of	• Genetics

CLDir (NCA) Assistant Professor	Biomedical Sciences	• Cytogenetics
Peter Hu CLSp (CG), CLSp (MB) CLS (NCA), MP (ASCP), MT (ASCP), MLS(ASCP)cm Assistant Professor	Ph.D., TUI University	• Molecular Genetics Technology • Management and Education
Adjunct faculty		
Harry R. Gibbs Associate Professor	M.D., Harvard Medical School	• Diversity and Cultural Competence
Marcus M. Mpwo Lecturer	M.S., Emporia State University	• Microbiology
Christopher Einspahr MLS (ASCP)CM Lecturer	B.S., UT MDACC School of Health Professions B.S., University of Houston	• Microbiology
Jeffery Tarrand Associate Professor	M.D., University of Virginia	• Microbiology

Program in Clinical Laboratory Science

Mission

The MD Anderson Cancer Center Program in Clinical Laboratory Science, in concert with the mission and vision of The University of Texas MD Anderson Cancer Center, is committed to the education of technically and academically competent graduates prepared to meet the immediate and future needs of the Clinical Laboratory Science profession.

Goals

The faculty of the Program in Clinical Laboratory Science is committed to:

- Providing the didactic and clinical instruction that offers the graduate the opportunity to prepare to:
    - Perform procedures in all areas of the clinical laboratory
    - Integrate and correlate laboratory data
    - Solve problems relating to the production of laboratory results
- Maintaining an effective program of student development and learning
- Leading the student in developing an understanding and appreciation for a total quality management program, the skills necessary to establish quality control measures, and to making appropriate decisions to maintain accuracy and precision
- Meeting the future needs of the Clinical Laboratory Science profession by including:
    - State-of-the-art procedures and instrumentation

    - Courses that offer career alternatives
    - Opportunities to participate in research and development of molecular techniques
- Developing the framework for the graduate to maintain and grow in professional competence throughout his lifetime by promoting participation in continuing education activities of the laboratory, MD Anderson Cancer Center and the community
- Communicating the necessity of obeying a professional code of conduct toward patients, visitors, and all health care professionals and of demonstrating the highest regard for human dignity and life

Objectives

The University of Texas MD Anderson Program in Clinical Laboratory Science is designed to prepare students to perform clinical laboratory analysis, make appropriate decisions and solve problems to become successful entry-level clinical laboratory scientists.

The program provides instruction and training in all the major areas of the clinical laboratory through both didactic and clinical training. Most students enter the program to pursue a Bachelor of Science degree.

The clinical laboratory scientist is an essential member of the health care team, performing a myriad of laboratory procedures aimed at the diagnosis and treatment of disease.

The technical procedures and complex instruments used in modern laboratory medicine require well-educated and technically proficient scientists. Clinical laboratory scientists are problem solvers, technologists who use their knowledge and technical skills to operate and repair laboratory instruments, monitor quality control programs, produce high-quality patient test results and correlate test results with disease processes.

The primary goal of the Clinical Laboratory Science program is provide the community with competent, entry-level clinical laboratory scientists (medical laboratory scientists) who are prepared to meet the qualifications for certification in their profession.

While many scientists choose to work in hospital laboratories, others opt to develop new testing procedures in diagnostic and research laboratories. Scientists with leadership ability and administrative skills manage the laboratory operations. Those interested in computer technology use their laboratory knowledge and skills in the management of laboratory information systems. Others provide educational programs to prepare the scientists for the future. There are even opportunities for scientists to serve as self-employed consultants.

CLS Competencies

The CLS curriculum offers the student the opportunity to obtain the following competencies:

1. Accurate application of mathematic principles in the clinical laboratory science domain of practice.
2. Appropriate interpersonal and public speaking skills in the clinical and academic setting.
3. Appropriate oral and written communication in the clinical and academic setting.

4. Appropriate computer skills in the clinical and academic setting.
5. Synthesis of information from primary and secondary sources using recognized research techniques.
6. Critical reading and writing strategies to evaluate, interpret and analyze non-fiction, academic and professional readings.
7. Knowledge of quality assurance through application of quality control and required documents for regulatory compliance.
8. Correlation of disease processes with appropriate assays for diagnosis.
9. Application of management principles in the clinical laboratory science domain of practice.
10. Ability to collect specimens and determine the criteria of acceptability and rejection.
11. Ability to operate instrumentation, troubleshoot and document preventive maintenance.
12. Ability to describe the theory and principle of operation of the test methodology for all areas of the clinical laboratory.
13. Ability to perform appropriate assays with the ability and accuracy to determine the accuracy of results from interference substances.
14. Ability to correctly perform appropriate manual procedures when necessary.
15. Ability to apply knowledge of test limitations and select appropriate corrective action for out-of-limits situations.
16. Ability to organize workflow to make efficient use of time and materials.
17. Ability to differentiate between appropriate and inappropriate results by recognizing normal, abnormal and critical values and taking appropriate action where necessary.

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA
- Math & Science GPA
- Last 60 hours GPA
- Personal qualities such as maturity and professional goals based on the personal essay, interview, and reference letters
- Ability to meet the SHP non-academic technical standards.
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office. See SHP Academic Calendar for application dates.

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

Students pursuing a Bachelor of Science degree typically enter at the Junior level; however, there are a limited number of entry positions available at the Senior level on a case by case basis. Application and supporting documents must be submitted to the Office of the Registrar.

Applicants to the Program of Clinical Laboratory Science must satisfy the following requirements for admission:

- All prerequisite course work must be from a regionally accredited college or university.
- The applicant must have satisfactorily completed all prerequisite courses listed prior to graduating. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.
- A minimum grade point average of 2.5 on a 4.0 scale both overall and in science courses is required to be considered for admission
- Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.
- Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. The internet-based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites

Prerequisites for the two-year program:

A minimum of 60 semester credit hours (SCH) that includes:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional 18 SCH

Within these 60 hours, the following must be included:

- 8 SCH in Biological Sciences that may include Biology, Human Anatomy & Physiology with or without laboratory components
- 16 SCH in Chemistry to include:
- General Chemistry I & II
- Organic Chemistry I
- Organic Chemistry II or Biochemistry.

Note: 12 of the above 24 SCH may be satisfied by the Natural Sciences Texas Core course selection

Prerequisites for the one-year, Senior, program – contact Program Director for details.

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	SCH
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6
MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6

SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

http://statecore.its.txstate.edu/

About the Texas Core Curriculum and transfers between the State of Texas public institutions: "Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer, and that decision is binding on any Texas school to which you transfer".

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit, and amount of credit to be awarded. Program faculty is consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHP course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHP courses with the results being reported to the Registrar.

Graduation

Each candidate for graduation with a baccalaureate degree in Clinical Laboratory Science must have completed a minimum of 138 semester credit hours of course work. Within this requirement, the students must have completed the following:

- At least 40 semester credit hours of advanced (3000/4000) course work

- At least 25% of the total semester credit hours required must have been earned at the University of Texas MD Anderson Cancer Center School of Health Professions

Graduation occurs mid-August. Upon graduation, students are eligible to take the national certification exam given by the American Society for Clinical Pathology (ASCP). This exam is given throughout the year. Please check with the program director for application deadlines.

Upon passing the certification examination, the student is considered a certified Medical Laboratory Scientist. The awarding of the degree is not contingent upon a student passing a national certification examination.

Curriculum

The Program in Clinical Laboratory Science is a highly intensive course of study composed of didactic and clinical training. Didactic courses are presented in clinical hematology and hemostasis, clinical chemistry, clinical microscopy, microbiology, immunohematology, immunology, molecular diagnostics, human tissue typing and management.

The course of study will offer the student the opportunity to obtain the necessary:

- Fundamental knowledge to enter the profession as a capable medical laboratory scientist
- Highly specialized skills that will broaden career opportunities

During the clinical phase of instruction, training and supervision are provided at leading clinical laboratories at sister medical institutions within the Texas Medical Center and beyond, in order that students may develop expertise in a variety of settings and experience the breadth of opportunity available to Clinical Laboratory Scientists.

Current Affiliations

During the clinical phase of instruction, training and supervision are provided in affiliated clinical laboratories, including:

- Conroe Regional Medical Center
- Gulf Coast Regional Blood Center
- St. Luke's Hospital in the Texas Medical Center
- St. Luke's Hospital in the Woodlands
- Texas Children's Hospital
- Laboratory Corporation of America
- North Cypress Medical Center
- Quest Diagnostics

Accreditation

The MD Anderson Program of Clinical Laboratory Science is accredited by and has conformed its curriculum to the standards published and monitored by the

National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).
5600 N. River Rd., Suite 720
Rosemont, IL 60018-5119
Phone: 773-714-8880
Fax: 773-714-8886

Course listings

Junior Year:

The Laboratory Sciences programs admit students at the Junior Year level who share a Junior Year curriculum consisting of:

- Laboratory sciences core courses
- Program-specific core courses
- Program-specific elective courses

Clinical Laboratory Science (CLS): Junior Year courses	
Laboratory Sciences: shared core courses	
HS 3102 Molecular Techniques Lab	1
HS 3210 Laboratory Mathematics	2
HS 4310 Medical Microbiology	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
TOTAL CORE COURSES SCH	**8**
CLS Program Core	
HS3270 Critical Thinking	2
HS 3300 Immunology	3
HS 3330 Pathology of Body Fluids	3
HS 3333 Statistics	3
HS 4300 Pathophysiology	3
HS 3340 Research Methods	3
HS 3310 Intro to Quality in Health Care	3
HS 4111L Medical Microbiology lab	1
HS 4160 Critical Scientific Analysis	1
TOTAL CLS PROGRAM CORE COURSES SCH	**22**

Senior Year**

Course	Hours
CL 4231 Immunohematology Lab	2

CL 4245 Hemostasis	2
CL 4320 Advanced Medical Microbiology	3
CL 4321 Clinical Microbiology	3
CL 4330 Immunohematology (blended)	3
CL 4332 Clinical Immunohematology	3
CL 4250 Phlebotomy	2
CL 4260 Capstone Seminar	2
CL 4424 Miscellaneous Microbiology	4
CL 4370 Advanced Studies	3
CL 4375 Research Project	3
CL 4500 Clinical Chemistry	5
CL 4530 Clinical Core Rotation	5
CL 4540 Clinical Hematology	5
HS 4371 Management and Education (on-line)	3
TOTAL	48**

**Students entering the School of Health Professions for the first time at the Senior level must take the following additional required courses

HS 3300 Immunology** (or equivalent course)
HS 3330 Pathology of Body Fluids**
HS 4100 Issues in Health Care Ethics**
HS 4101 Diversity and Cultural Competence**

Course Descriptions

Junior Year Course Descriptions

HS 3102 Molecular Techniques Laboratory (1 semester credit hour)
A study of the laboratory skills involved in transporting, preparing and reporting final results of specimens that include blood, bone marrow and solid tissue samples. The course will provide participants with hands-on laboratory experience in: performing molecular techniques such as DNA extraction, purification and quantification; preparing and viewing PCR products and DNA fingerprints via gel electrophoresis and bacterial transformation. (Admission to Program)

HS 3110 Medical Terminology (1 semester credit hour)
An introduction to medical terminology. Emphasis on word roots, prefixes, suffixes, spelling and analysis of unfamiliar terms. Additional background information on the anatomy that relates to various body systems will be discussed.

HS 3120 Introduction to Cytogenetics (1 semester credit hours)
A detailed study of human G-banded chromosomes. Includes instruction in banding pattern recognition and polymorphic variation. Includes classroom instruction and hands-on experience.

HS 3203 Advanced Molecular Techniques (2 semester credit hours)
This is a continuation of the previous introduction to molecular techniques laboratory course. Emphasis on performing additional molecular techniques such as, but not limited to various DNA extraction methods, amplification methods, electrophoresis, and fluorescent in-situ hybridization.

HS 3210 Laboratory Math (2 semester credit hours)
The basic principles and theory of clinical, biochemical, and analytical laboratory math related calculations. It includes basic operations such as problem solving using percentiles, rates, ratios, mole ratios, molality, pH, conversions, solving for proportions and more.

HS 3254 Immunohistochemistry (2 semester credit hours)
A comprehensive course that deals with the fundamentals of immunohistochemistry as applied to the theory and practical techniques in histopathology. The students acquire basic knowledge of how immunology is applied in the development of immunohistochemistry reagents and techniques. Emphasis will be placed on the clinical significance of diagnostic and prognostic indicators used in immunohistochemistry techniques. Troubleshooting and standardization of reagents are emphasized.

HS 3270 Critical Thinking in Health Professions (2 semester credit hours)
This course is designed to provide health professions students with resources for improving critical thinking skills. The course will introduce basic concepts of critical thinking through integration into interactive case studies, problem based scenarios, and project design assignments. The specific objectives of this course coincide with the University of Texas MD Anderson Cancer Center School of Health Professions' definition of critical thinking.

HS 3300 Immunology (3 semester credit hours)
This course focuses on the basic concepts in immunology, and covers general properties of immune responses; cells and tissues of immune system; lymphocyte activation and specificity; effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation. Course delivery is a blend of lecture and on line, self-paced activities.

HS 3310 Introduction to Quality in Healthcare (3 semester credit hours)
This course will provide an overview of the history, development and application of quality concepts. The components of quality management, quality assurance and quality control will be addressed through discussions and assignments on the history of quality, the different approaches to quality, such as Six Sigma and ISO standards, and how to define, implement and ensure compliance to the quality assurance and quality control process.

HS 3320 Medical Genetics (3 semester credit hours)
This course is a study of the role of genetics in medicine including: Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping. A comprehensive review of the cell cycle, mitosis, and meiosis and pedigree analysis is incorporated as well. (Admission to Program)

HS 3330 Pathology of Body Fluids (3 semester credit hours)
This course is a study of the anatomy and physiology of the kidney and the formation, elimination and composition of urine. Various body fluids (CSF, Synovial, Plural, Serous, etc.) will be study and associations made with various disease states. Interpretation of urinary and body fluids elements, chemical assays and the correlation with normal and abnormal physiology: Course delivery is a blend of lecture and on line, self-paced activities. (Admission to Program)

HS 3333 Statistics (3 semester credit hours)
This course provides an introduction to statistical techniques. Emphasis will be placed on probability and probability distributions, sampling and descriptive measures, inference and hypothesis testing, linear regression, and analysis of variance. (Prerequisite HS 3101)

HS 3340 Research Methods (3 semester credit hours)
This research methods course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have the opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references, learn how to make an outline, and write a literature review on their assigned topic. Curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster. (Admission to Program)

HS 3370 Fundamentals of Writing and Critical Thinking (3 semester credit hours)
This basic writing course stresses both reading and writing skills and is designed to teach students to improve their ability to write logically and develop short essays, brief formal summaries, and reports.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course content is designed to create an awareness of ethnocentrism and a beginning understanding of cultural similarities and diversity. It provides the student with knowledge of the concepts of cultural relativity, cultural integration and variation in cultural values, organization and institutions.

HS 4111L Medical Microbiology Student Laboratory (1 semester credit hour)
The course utilizes biochemical, morphological, and serological techniques to illustrate concepts from the lecture course relating to microbial structure, metabolism, virulence, and transmission. Students also receive instruction on proper technique and procedures for a number of different tests, including culturing, staining, carbohydrate utilization, immunoassays, and microscopy.

HS 4160 Critical Scientific Analysis (1 semester credit hour)
Students will analyze current scientific publications for research questions, hypothesis, study design and statistical analysis and the application of proper scientific formats in the clinical laboratory professions. Students will complete pre-session assignments, participate in group discussion & present their group findings.

HS 4161 Seminar in Health Care (1 semester credit hour)
Seminar based course covering topics in the Clinical Laboratory Sciences

HS 4170 Special Topics I (1 semester credit hour)
A review of the principles of mathematics and statistics used in the clinical laboratories, this course presentation includes an introduction to the selection and operation of a laboratory information system.

HS 4300 Pathophysiology (3 semester credit hours)
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topic covered includes central concepts of pathophysiology of the cells and tissues and alterations on organs and systems with an emphasis on carcinogenesis. Appropriate diagnostic and treatment procedures are covered.

HS 4310 Medical Microbiology (3 semester credit hours)
This course is the study of the utilization of morphological, biochemical, serological, disease inducing characteristics for microorganism, fungi, mycobacterium and virus identification. Course delivery a blend of lecture and on-line, self-paced activities.

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. It includes management and motivational theories, communication skills, regulatory and accreditation requirements, budget and strategic planning, curriculum design and examination instruction.

Senior Year Course Descriptions

CL 4231 Immunohematology Lab (2 semester credit hour)
Laboratory emphasizes hands-on instruction in basic blood bank techniques, resolution of compatibility problems and advanced antibody identification methods.
Corequisite: CL 4330

CL 4245 Hemostasis (2 semester credit hours)
An analysis of the mechanisms of hemostasis, the analytical techniques used to measure coagulation and the correlation of test results with hemostatic disorders.

CL 4250 Phlebotomy (2 semester credit hours)
This course emphasizes professional conduct and adherence to safety regulations and policies. Course includes practical experience in patient blood procurement by venipuncture and microcollection techniques.

CL 4260 Capstone Seminar (2 semester credit hours)
This course provides an integration of the information obtained by laboratory testing in the various laboratory disciplines.
Prerequisite: CL 4321, CL 4330, CL4500, CL4540, CL4245, HS 3330

CL 4320 Advanced Medical Microbiology (3 semester credit hours)
A comprehensive study of clinically important aerobic and anaerobic bacteria. Course consists of both didactic and student laboratory sessions. This course has a Lab fee of $30.00.

CL 4321 Clinical Microbiology (3 semester credit hours)
Clinical laboratory study of the utilization of morphological biochemical and serological characteristics for microorganism identification.
Prerequisite: CL 4320

CL 4330 Immunohematology (3 semester credit hours)
An in-depth study of the basic principles of immunology, human blood group systems, blood group genetics and the theory and application of blood bank techniques. This course has a Lab fee of $30.00

CL 4332 Clinical Immunohematology (3 semester credit hours)
Clinical laboratory study of the serodiagnostic studies of blood group identification and transfusion service procedures.
Prerequisite: CL 4231, 4330

CL 4370 Advanced Studies (3 semester credit hours)
The study of some of the more esoteric areas of clinical laboratory. Topics include molecular diagnostic procedures utilizing recombinant DNA technology, Cytogenetics and bone marrow transplantation testing. This course has a Lab fee of $30.00

CL 4375 Research Project (3 semester credit hours)
An independent study that may be a case study analysis, laboratory test procedure evaluation, or investigation of a laboratory problem. This course has a Lab fee of $30.00

CL 4500 Clinical Chemistry (5 semester credit hours)
A comprehensive study of the methods used to determine the chemical composition of body fluids. Study includes principles of analytical procedures and the correlation of test results with normal and abnormal physiological states. Additionally, the course will include the study of special chemistry techniques, including electrophoresis, radioimmunoassay, enzyme immunoassay and nephelometry. This course has a Lab fee of $30.00

CL 4424 Miscellaneous Microbiology (4 semester credit hours)
Study of protozoan, helminthic and arthropod parasites and clinically important viruses of medical significance in humans. The course will also discuss the clinically important fungi and their interaction with the human host and recognized species of mycobacteria that are known to cause disease in human hosts. In addition, the course includes a study of serological techniques

such as agglutination, precipitation, enzyme immunoassay and immunofluorescence. Student Laboratory demonstrations/practice will be a part of this course.

CL4530 Clinical Core Rotation (5 semester credit hours)
Clinical laboratory study of blood cell counts and special procedures, using manual and automated methodology. Operation, maintenance and troubleshooting of the hematological high volume analyzers. Manual cell counting and morphological interpretation of blood and bone marrow cells.
Prerequisite: CL 4500, CL 4540, HS 3330

CL 4540 Clinical Hematology (5 semester credit hours)
A comprehensive study of the formation of blood cells, functions of the hematopoietic system, related hematological disease and instrumentation and manual procedures to quantify and identify cells. Analysis of the maturation cell sequence in peripheral blood and the morphological characteristics of these cells. Flow cytometry will also be discussed. This course has a lab fee of $30.00

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. It includes management and motivational theories, communication skills, regulatory and accreditation requirements, budget and strategic planning, curriculum design and examination instruction. Course delivery is on-line, interactive, self-paced.

Degree and Certificate Programs

Clinical Laboratory Science

Cytogenetic Technology

Cytotechnology

Diagnostic Imaging

Diagnostic Medical Sonography

Health Care Disparities, Diversity and Advocacy

Histotechnology

Medical Dosimetry

Molecular Genetic Technology

Radiation Therapy

Master of Science in Diagnostic Genetics

Cytogenetic Technology

Cytogenetic technologists study the structure of human chromosomes and the role of specific changes in the diagnosis and monitoring of acquired and inherited abnormalities.

Degree Offered

Bachelor of Science Degree in Cytogenetic

The program is administered by:

- **Dean:** Shirley Richmond, Ed.D.
- **Program Director:** Jun Gu, M.D., Ph.D., CG(ASCP)^{CM}
- **Education Coordinator:** Vicki L. Hopwood, M.S.,CG(ASCP)^{CM}, MB (ASCP)
- **Clinical Coordinator:** Ming Zhao, M.D., CG(ASCP)^{CM}, MB (ASCP)
- **Medical Advisor:** Xinyan Lu, M.D., FACMG

Roster of Faculty

Faculty Member	Degree and School	Teaching Assignments
Jun Gu CG(ASCP)^{CM} Assistant Professor	M.D., Medical School of Zhejiang University, Ph.D. TUI University	• Clinical Cytogenetics • Prenatal/Postnatal Cytogenetics • Introduction to G-Band Karyotyping
Vicki L. Hopwood CG(ASCP)^{CM} Assistant Professor	M.S. The University of Texas Graduate School of Biomedical Sciences	• Genetics of Hematologic Disease • Special Topics in Genetics • Cytogenetic Lab Techniques • Research Seminar • Medical Genetics
Peter Hu MLS(ASCP)^{CM}CG^{CM}MB^{CM} Associate Professor	Ph.D. TUI University	• Molecular Genetics • Medical Genetics
Awdesh Kalia Assistant Professor	Ph.D. All India Institute of Medical Sciences New Delhi, India	• Basic Techniques Lab • Molecular Techniques Lab • Advanced Medical Genetics

Adjunct faculty:

Diana Anderson Lecturer	M.A. University of Phoenix	• Diversity and Cultural

		Competence
Mary Ann Ball Lecturer	Ph.D. School of Medicine Indianapolis	• Diversity and Cultural Competence
Sau Wai Cheung Professor	Ph.D., School of Medicine Indianapolis	• Prenatal/Postnatal Cytogenetics
Lawrence Frimpong CG(ASCP)^{cm} Lecturer	MBA, B.S. Texas Women's University	• Oncology Cytogenetics
Colleen Gallagher Assistant Professor	Ph.D. The Union Institute & University	• Issues in Health Care Ethics
Jaime Garcia-Heras Assistant Professor	M.D., Ph.D. La Plata University School of Medicine Argentina	• Oncology Cytogenetics • Prenatal/Postnatal Cytogenetics
Gary Lu, FACMG Assistant Professor	M.D., Sun Yat-Sen University of Medical Sciences P.R.China	• Oncology Cytogenetics
Xinyan Lu Assistant Professor	M.D. Suzhou Medical College P.R. China	• Oncology Cytogenetics
Atousa Maleki FACMG, CG(ASCP)^{CM} Assistant Professor	Ph.D. The University of Texas Graduate School of Biomedical Sciences	• Clinical Cytogenetics
Reza Marvdashti Professor	Ph.D. University of Manchester Manchester, England	• Genetics • Microbiology
Kimberly Murray Instructor	M.A. University of Phoenix	• Hematology
Ankita Patel Associate Professor	Ph.D. Eastern Virginia Medical School	• Clinical Cytogenetics
Sen Pathak Research Professor	Ph.D. Banaras Hindu University	• Cytogenetics
Janice L. Smith Assistant Professor	Ph.D. University of Alabama	• Prenatal/Postnatal Cytogenetics

Program in Cytogenetics

Mission

The MD Anderson Cancer Center Program in Cytogenetic Technology, in concert with the mission and vision of The University of Texas MD Anderson Cancer Center, is committed to the education of technically and academically competent graduates prepared to meet the immediate and future needs of the Cytogenetic Technology profession.

Objectives

The Cytogenetic Technology program is designed to prepare students to become entry-level clinical cytogenetic technologists. The program provides instruction in all the major areas of clinical cytogenetics including:

- Prenatal cytogenetics
- Cancer cytogenetics
- Molecular techniques
- The structure of human chromosomes
- The role of specific changes in the diagnosis and monitoring of acquired and inherited abnormalities

Abnormalities of chromosome number and morphology are linked with over 400 syndromes associated with mental retardation and other phenotypic abnormalities. Identification of these chromosomal abnormalities by cytogenetic technologists provides clinicians in prenatal/postnatal clinics with sufficient information to plan for medical complications that may arise from specific gene defects.

Cancer cytogenetics is a rapidly growing field where the cytogeneticist plays a key role in the diagnosis, prognosis and treatment of both hematological malignancies and solid tumors. World Health Organization (WHO) guidelines require either cytogenetics or molecular genetics for standard workup of leukemias and lymphomas.

Cytogenetic technologists are leaders in the development of applications for new DNA technologies that are transforming modern-day medicine.

Cytogenetic technologists have a wide range of career options in cancer centers, pediatric and genetic counseling clinics, chemical industries, biotechnology companies, research laboratories, molecular cytogenetic laboratories, computer imaging sales and development, pathology labs and research and teaching institutions.

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA, Science and Math GPA
- Personal qualities such as maturity and professional goals based on the personal essay, interview, and reference letters.
- Ability to meet the SHP non-academic technical standards.
  process
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office. See SHP Academic Calendar for application dates.

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admissions section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

The Bachelor of Science degree program is either a one-year or two-year program with entry at either the junior or senior level. Application and supporting documents must be submitted to the Office of the Registrar. http://registrar.uth.tmc.edu/Admissions/appformslist. Qualified students are accepted on a rolling basis.

Applicants to the Program of Cytogenetic Technology must satisfy the following requirements for admission:

- **All prerequisite course work** must be from a regionally accredited college or university.
- **The applicant must have satisfactorily completed** all prerequisite courses listed prior to graduating. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.
- **A minimum grade point average** of 2.5 on a 4.0 scale both overall and in science and mathematics courses is required to be considered for admission. Special circumstances may be considered, but at the discretion of the Admissions Committee.
- **Texas Success Initiative (TSI)** - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.
- **Test of English as a Foreign Language (TOEFL)** - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites

Prerequisites for the two-year program

A minimum of 60 semester credit hours (SCH) that include:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 18 SCH

Within the required 60 SCH, the following must be included:

- 8 SCH in Biological Sciences
- 16 SCH hours in Chemistry

Note: 12 of the above 24 SCH may be satisfied by Texas Core Natural Sciences course selection

Prerequisites for the one-year program

A minimum of 90 semester credit hours (SCH) that include:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 48 SCH

Within the required 90 SCH, the following must be included:

-
- 11 SCH of upper level division courses (3000, 4000)
- 8 SCH in Biological Sciences
- 16 SCH hours in Chemistry
- 3 - 4 SCH of Microbiology
- 3 - 4 SCH of Genetics

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	SCH
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6

MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

http://statecore.its.txstate.edu/

About the Texas Core Curriculum

Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit, and amount of credit to be awarded. Program faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHP course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHP courses with the results being reported to the Registrar.

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 136 semester credit hours of course work if admitted into the two-year program or a minimum of 139 semester credit hours of coursework if admitted into the one-year program. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester hours of advanced (3000/4000) course work
- At least 25% of the total required semester credit hours

Graduation occurs in August. Upon graduation, students are eligible to take the Clinical Cytogenetics Board of Certification exam given by the American Society for Clinical Pathology (ASCP). Please check with the program director for application deadlines and exam dates. Upon

passing this exam, the student is considered a certified cytogenetic technologist. The awarding of the degree or certificate is not contingent upon a student passing the national certification exam.

Curriculum

This intensive program is composed of a didactic phase followed by directed clinical training at affiliated hospitals and laboratories. During the didactic phase, formal lectures are presented on the principles of medical genetics, molecular and biochemical basis of genetic disease, karyotyping, hematology, clinical cytogenetics and molecular genetic technology. Laboratory sessions coordinated with lectures and covering the fundamentals of diagnostic laboratory procedures are included in the didactic phase. Graduates of the program are eligible to take the CG(ASCP) Board of Certification exam

Current Affiliations

The Program in Cytogenetic Technology has developed clinical affiliations with leading clinical cytogenetic laboratories in Texas and beyond in order that students may develop expertise in a variety of settings and experience the breadth of opportunity available to Cytogenetic Technologists. Clinical experiences in these laboratories offer students the opportunity to achieve competence and confidence in performing a wide variety of cytogenetic procedures on patients' specimens

- Baylor College of Medicine, Houston, TX
- Center for Medical Genetics, Houston, TX
- NeoGenomics Inc, Fort Meyers, FL
- Northwestern University, ACL Laboratories, Chicago, IL
- Texas Children's Hospital, Houston, TX
- The University of Chicago, Chicago, IL
- The Delta Pathology Group, LLC, Shreveport LA
- The University of Texas Southwestern Medical Center, Dallas, TX
- Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY
- Vanderbilt University Medical Center, PathGroup, Nashville, TN

Accreditation

The Cytogenetic Technology Program is accredited and has conformed its curriculum to the standards published and monitored by:

National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).
5600 N. River Rd., Suite 720
Rosemont, IL 60018-5119
847-939-3597
773-714-8880
773-714-8886 (Fax)

Course listings

Junior Year:

The Laboratory Sciences programs admit students at the Junior Year level who share a Junior Year curriculum consisting of:

- Laboratory sciences core courses
- Program-specific core courses
- Program-specific elective courses

Junior Year for Cytogenetic Technology

Cytogenetic Technology (CGT):Junior Year courses	
The Laboratory Sciences shared core courses	
HS 3102 Molecular Techniques Lab	1
HS 3210 Laboratory Mathematics	2
HS 4310 Medical Microbiology	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
TOTAL CORE COURSES SCH	8
CGT Program Core	
HS 3120 Introduction to Cytogenetics	1
HS 3270 Critical Thinking in Health Professions	2
HS 3300 Immunology	3
HS 3320 Medical Genetics	3
HS 3330 Pathology of Body Fluids)	3
HS 3333 Statistics	3
HS 3340 Research Methods	3
HS 4300 Pathophysiology	3
HS 4111L Microbiology Lab	1
TOTAL CGT PROGRAM CORE SCH	22
CGT Program Electives	0
TOTAL CGT JUNIOR YEAR SCH	30

Senior Year**

CC 4120 Introduction to G-band Karyotyping	1
CC 4152 Prenatal Cytogenetics	1
CC 4181 Independent Research Project II	1
CC 4210 Molecular and Biochemical Basis of Disease: a Cytogenetic Case-Based Analysis	2
CC 4240 Advanced Cytogenetic Laboratory Techniques	2
CC 4280 Independent Research Project I	2
CC 4320 Special Topics in Genetics	3
CC 4450 Clinical Cytogenetics	4
CC 4390 Advanced Topics in Cytogenetics	3
CC 4521 Prenatal/Postnatal Cytogenetics Clinical Laboratory Rotation	5
CC 4530 Basic Laboratory Techniques	5
CC 4531 Hematological Cytogenetics Clinical Laboratory Rotation	5
GT 4300 Advanced Medical Genetics	3
GT 4330 Genetics of Hematological Disease	3
HS 4110 Molecular Genetics Technology	1
HS 4160 Critical Scientific Analysis	1
HS 4161 Seminar in Health Care	1
HS 4371 Management and Education	3
MG 4199 Special Topics (elective) 1 hour	
Total	46**

****Students entering the School of Health Professions for the first** time at the Senior level must take the following additional required courses that are described in the Junior Year for Laboratory Sciences section of the catalog :

HS 4100 Issues in Health Care Ethics (1)**
HS 4101 Diversity and Cultural Competency 1)**
HS 4170 Special Topics I**

Course Descriptions

Junior Year

HS 3102 Molecular Techniques Laboratory (1 semester credit hour)
A study of the laboratory skills involved in transporting, preparing and reporting final results of specimens that include blood, bone marrow and solid tissue samples. The course will provide participants with hands-on laboratory experience in: performing molecular techniques such as DNA extraction, purification and quantification; preparing and viewing PCR products and DNA fingerprints via gel electrophoresis and bacterial transformation. (Admission to Program)

HS 3110 Medical Terminology (1 semester credit hour)
An introduction to medical terminology. Emphasis on word roots, prefixes, suffixes, spelling and

analysis of unfamiliar terms. Additional background information on the anatomy that relates to various body systems will be discussed.

HS 3120 Introduction to Cytogenetics (1 semester credit hours)
A detailed study of human G-banded chromosomes. Includes instruction in banding pattern recognition and polymorphic variation. Includes classroom instruction and hands-on experience.

HS 3203 Advanced Molecular Techniques (2 semester credit hours)
This is a continuation of the previous introduction to molecular techniques laboratory course. Emphasis on performing additional molecular techniques such as, but not limited to various DNA extraction methods, amplification methods, electrophoresis, and fluorescent in-situ hybridization.

HS 3210 Laboratory Math (2 semester credit hours)
The basic principles and theory of clinical, biochemical, and analytical laboratory math related calculations. It includes basic operations such as problem solving using percentiles, rates, ratios, mole ratios, molality, pH, conversions, solving for proportions and more.

HS 3254 Immunohistochemistry (2 semester credit hours)
A comprehensive course that deals with the fundamentals of immunohistochemistry as applied to the theory and practical techniques in histopathology. The students acquire basic knowledge of how immunology is applied in the development of immunohistochemistry reagents and techniques. Emphasis will be placed on the clinical significance of diagnostic and prognostic indicators used in immunohistochemistry techniques. Troubleshooting and standardization of reagents are emphasized.

HS 3270 Critical Thinking in Health Professions (2 semester credit hours)
This course is designed to provide health professions students with resources for improving critical thinking skills. The course will introduce basic concepts of critical thinking through integration into interactive case studies, problem based scenarios, and project design assignments. The specific objectives of this course coincide with the University of Texas MD Anderson Cancer Center School of Health Professions' definition of critical thinking.

HS 3300 Immunology (3 semester credit hours)
This course focuses on the basic concepts in immunology, and covers general properties of immune responses; cells and tissues of immune system; lymphocyte activation and specificity; effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation. Course delivery is a blend of lecture and on line, self-paced activities.

HS 3310 Introduction to Quality in Healthcare (3 semester credit hours)
This course will provide an overview of the history, development and application of quality concepts. The components of quality management, quality assurance and quality control will be addressed through discussions and assignments on the history of quality, the different approaches to quality, such as Six Sigma and ISO standards, and how to define, implement and ensure compliance to the quality assurance and quality control process.

HS 3320 Medical Genetics (3 semester credit hours)
This course is a study of the role of genetics in medicine including: Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping. A comprehensive review of the cell cycle, mitosis, and meiosis and pedigree analysis is incorporated as well. (Admission to Program)

HS 3330 Pathology of Body Fluids (3 semester credit hours)
This course is a study of the anatomy and physiology of the kidney and the formation, elimination and composition of urine. Various body fluids (CSF, Synovial, Plural, Serous, etc.) will be study and associations made with various disease states. Interpretation of urinary and body fluids elements, chemical assays and the correlation with normal and abnormal physiology: Course delivery is a blend of lecture and on line, self-paced activities. (Admission to Program)

HS 3333 Statistics (3 semester credit hours)
This course provides an introduction to statistical techniques. Emphasis will be placed on probability and probability distributions, sampling and descriptive measures, inference and hypothesis testing, linear regression, and analysis of variance. (Prerequisite HS 3101)

HS 3340 Research Methods (3 semester credit hours)
This research methods course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have the opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references, learn how to make an outline, and write a literature review on their assigned topic. Curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster. (Admission to Program)

HS 3370 Fundamentals of Writing and Critical Thinking (3 semester credit hours)
This basic writing course stresses both reading and writing skills and is designed to teach students to improve their ability to write logically and develop short essays, brief formal summaries, and reports.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course content is designed to create an awareness of ethnocentrism and a beginning understanding of cultural similarities and diversity. It provides the student with knowledge of the concepts of cultural relativity, cultural integration and variation in cultural values, organization and institutions.

HS 4111L Medical Microbiology Student Laboratory (1 semester credit hour)
The course utilizes biochemical, morphological, and serological techniques to illustrate concepts

from the lecture course relating to microbial structure, metabolism, virulence, and transmission. Students also receive instruction on proper technique and procedures for a number of different tests, including culturing, staining, carbohydrate utilization, immunoassays, and microscopy.

HS 4160 Critical Scientific Analysis (1 semester credit hour)
Students will analyze current scientific publications for research questions, hypothesis, study design and statistical analysis and the application of proper scientific formats in the clinical laboratory professions. Students will complete pre-session assignments, participate in group discussion & present their group findings.

HS 4161 Seminar in Health Care (1 semester credit hour)
Seminar based course covering topics in the Clinical Laboratory Sciences

HS 4170 Special Topics I (1 semester credit hour)
A review of the principles of mathematics and statistics used in the clinical laboratories, this course presentation includes an introduction to the selection and operation of a laboratory information system.

HS 4300 Pathophysiology (3 semester credit hours)
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topic covered includes central concepts of pathophysiology of the cells and tissues and alterations on organs and systems with an emphasis on carcinogenesis. Appropriate diagnostic and treatment procedures are covered.

HS 4310 Medical Microbiology (3 semester credit hours)
This course is the study of the utilization of morphological, biochemical, serological, disease inducing characteristics for microorganism, fungi, mycobacterium and virus identification. Course delivery a blend of lecture and on-line, self-paced activities.

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. It includes management and motivational theories, communication skills, regulatory and accreditation requirements, budget and strategic planning, curriculum design and examination instruction.

Senior Year

CC 4120 Introduction to G-band Karyotyping (1 semester credit hour)
A detailed study of human G-banded chromosomes. Includes instruction in banding pattern recognition, polymorphic variation, and determination of band level and the International System for Human Cytogenetic Nomenclature (ISCN). Includes classroom instruction and hands-on experience.

CC 4152 Prenatal Cytogenetics (1 semester credit hour)
A study of indications for prenatal diagnosis and the procedures used to obtain specimens for such diagnoses: ultrasonography, cordocentesis, amniocentesis and CVS; biochemical assays for

metabolic diseases; problems encountered in prenatal chromosome analysis; teratology; and explanations and demonstrations of prenatal cytogenetic techniques and procedures.
Prerequisite: CC 4120

CC 4181 Independent Research Project II (1 semester credit hour)
This course is designed to allow students to have the opportunity to conduct independent research activities with guidance from their faculty advisor. Students are required to submit a formal proposal for review and approval by the program faculty. *Prerequisite*: CC 4280

CC 4210 Molecular and Biochemical Basis of Disease: a Cytogenetic Case-Based Analysis (2 semester credit hours)
A comprehensive study of cytogenetic disease using case studies. The relationships between molecular defect and the nature of its clinical pathology will be explored through the examination of biochemical pathways affected such as metabolic, transport, neurological , and muscle and bone. In addition, cytogenetic analysis will be examined through the pre-analytical and analytical, and post-analytical process. Students will build a foundation of critical decision making and an understanding of the principles of the molecular and biochemical basis of cytogenetic disease.

CC 4240 Advanced Cytogenetic Laboratory Techniques (2 semester credit hours)
A comprehensive study of the cytogenetic analysis of solid tumors. Course includes the study of tumor origin and development, mechanisms of transformation in carcinogenesis and random versus nonrandom findings in human solid tumors. The student will also study the mutagenic effects derived from lifestyle and environmental factors as they relate to malignant disease. This course combines both lecture and laboratory experience into one integrated learning experience. Lab fee of $30.00.

CC 4280 Independent Research Project I (2 semester credit hours)
This course is designed to provide students with an opportunity to independently explore a research area of interest related to cytogenetic technology. Students will perform a literature review. Class discussions will explore experimental design and searching the research literature.

CC 4320 Special Topics in Genetics (3 semester credit hours)
This course will introduce the student to the newest methodologies and topics in genetics. Current topics include spectral karyotyping, creation of bac clone FISH probes, DNA sequencing, array comparative genomic hybridization (aCGH) and use of online genetic databases.
Prerequisite: HS 4110

CC 4390 Advanced Topics in Cytogenetics (3 semester credit hours)
This will be a capstone course where students work on case studies to develop their problem solving skills in a clinical cytogenetic environment. Students will also participate in a national review in clinical cytogenetics. Finally, students will show mastery of the field of cytogenetics through practice exams and eventually taking a comprehensive cytogenetic exam. *Prerequisite*: GT 4300

CC 4450 Clinical Cytogenetics (4 semester credit hours)
A comprehensive study of chromosome morphology and terminology, general principles of clinical cytogenetics, abnormalities of chromosome number and structure, disorders of autosomes, sex chromosome disorders, the X chromosome, the Y chromosome, congenital versus acquired abnormalities and the ISCN. Students will perform slide analysis of peripheral blood and bone marrow cases. Laboratory fee of $30.00.
Prerequisite: GT 4300

CC 4521 Prenatal/Postnatal Cytogenetics Clinical Laboratory Rotation (5 semester credit hours)
This laboratory rotation complements, expounds on and practically applies the study of cytogenetic procedures and techniques used in prenatal and postnatal diagnosis of chromosomal disorders. This laboratory rotation also provides the students an opportunity to observe and participate in the testing algorithms and reflex testing that occur in this type of cytogenetic testing environment. Laboratory fee of $30.00
Prerequisite: CC 4152

CC 4530 Basic Laboratory Techniques (5 semester credit hours)
A comprehensive study of maintaining laboratory quality control in accordance with federal, state and local regulations, as well as College of American Pathologist on-site inspections and proficiency testing. Also, a study of laboratory skills as they apply to amniotic fluid, chorionic villus sampling, abortus tissue, blood, bone marrow and solid tissue samples with respect to transporting, preparing, culturing, harvesting, banding, analyzing, photographing, karyotyping and reporting final results of specimens. Students will also be instructed in fluorescent in situ hybridization techniques and computer imaging of cytogenetic specimens. Laboratory fee of $30.00.
Prerequisite: GT 4300

CC 4531 Hematological Cytogenetics Clinical Laboratory Rotation (5 semester credit hours)
This laboratory rotation provides the student with comprehensive practical applications in all aspects of the cytogenetic study of hematological malignant disease: specimen preparation, culture and harvest, banding techniques, microscopic cell analysis, photographic techniques, karyotype preparation, evaluation, probe application and ISCN. Quality control procedures and safety considerations are stressed. Laboratory fee of $30.00.
Prerequisite: GT 4330

GT 4300 Advanced Medical Genetics (3 semester credit hours)
A study of the role of genetics in medicine. This course will allow the students to understand the basic genetic principles and their applications in clinical genetics. This course focuses on applying genetic principle in real clinical situations

GT 4330 Genetics of Hematological Disease (3 semester credit hours)
A comprehensive study of the principles and procedures used in the genetic analysis of peripheral blood and bone marrow in the study of malignant processes. The course emphasizes the genetic abnormalities occurring in leukemias and lymphomas and their clinical significance. Students will learn a multidisciplinary approach in the interpretation of disease diagnosis,

prognosis and progression by learning how to integrate morphology, pathology and flow test results together with genetic changes.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course is designed to provide each student with a fundamental understanding of the concepts of cultural competency, diversity, and inclusion. The course content of each module emphasizes the following seven culturally competent areas of diversity: Building Relationships across Culture; Communication Across Differences; Conflict resolution Across Cultures ; Microinequities within the Workplace;. Diversity and Inclusion; Abilities: A Journey from Exclusion to Inclusion; Spirituality and health care practices.

HS 4110 Molecular Genetics Technology (1 semester credit hour)
The study of clinical laboratory molecular diagnostic procedures utilizing recombinant DNA technology and its application to the many aspects of the clinical laboratory.
Prerequisite: GT 4230, CC 4531

HS 4160 Critical Scientific Analysis (1 semester credit hour)
Student will analyze current scientific publications for research questions, hypotheses, study design and statistical analysis, and the application of proper scientific formats in the clinical laboratory professions. Students will complete pre-session assignments, participate in group discussions & present their group findings.

HS 4161 Seminar in Health Care (1 SCH)
Seminar-based course covering topics in the clinical laboratory sciences

HS 4170 Special Topics I (1 semester credit hour)
A review of the principles of mathematics and statistics used in the clinical laboratories. Course presentation includes introduction to the selection and operation of a laboratory information system.

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. It includes management and motivational theories, communication skills, regulatory and accreditation requirements, budget and strategic planning, curriculum design and examination instruction. Course delivery is on-line, interactive, self-paced.

MG 4199 Special Topics
An independent study of scientific literature. Literature Review of current topics emphasized.

Cytotechnology

A career as a cytotechnologist is both challenging and rewarding. Students are offered training in all major aspects relevant to the practice of cytotechnology as a profession

Degree Offered
Bachelor of Science Degree in Cytotechnology.

The program is administered by:

Dean: Shirley Richmond, Ed.D.
Program Director ad interim: Liza Di Filippo, MBA,CT(ASCP)
Medical Director: Gregg Staerkel, M.D.

Roster of Faculty

Faculty	Degree and School	Teaching Assignments
Liza Di Filippo CT(ASCP) Program Director ad-interim	MBA, Our Lady of the Lake University	• Intro to Cytotechnology • Theory and Practice of Cytopreparatory Techniques I & II • Gyn Cytopathology • Gyn Diagnostic Lab I, II & III • Non-Gyn Cytopathology I & II • Non-Gyn Diagnostic Laboratory • FNA Cytopathology • FNA Diagnostic Laboratory • Laboratory Management Research Project • Clinical Rotation • Cytopathology Theory
Naila Khan (ASCP) Health Educator	BS, School of Health Professions University of Texas MDACC	• Theory and Practice of Cytopreparatory Techniques I & II • Gyn Diagnostic Lab I, II & III • Non-Gyn Cytopathology I & II • Non-Gyn Diagnostic Laboratory

		• FNA Cytopathology • FNA Diagnostic Laboratory • Laboratory Management Research Project • Clinical Rotation • Student Project
Toysha Mayer HT(ASCP) Instructor Education Coordinator	MBA, University of Phoenix	Immunocytochemistry
Vicki L. Hopwood CLSp (CG) CLDir (NCA) Assistant Professor	M.S., The University of Texas Graduate School of Biomedical Sciences	• Cytogenetics • Fluorescent In Situ Hybridization
Adjunct Faculty		
Nancy Caraway Professor	M.D., The University of Texas Health Science Center at San Antonio	• Gyn Cytopathology • Non-Gyn Cytopathology I & II • FNA Cytopathology
Yun Gong Associate Professor	M.D., Zhejiang Medical University	• Gyn Cytopathology • Non-Gyn Cytopathology I & II
Ming Guo Assistant Professor	Master of Medicine in Pathology, Peking Union Medical College	• Molecular Pathology
Ruth L. Katz Professor	M.D., University of Witwatersrand Medical School, Johannesburg, Republic of South Africa	• Non-Gyn Cytopathology II • FNA Cytopathology

Uma R. Kundu **Assistant Professor**	M.D., Louisiana State University	• Molecular Pathology • Gyn Cytopathology • Non-Gyn Cytopathology • FNA Cytopathology
Abha Khanna CT (ASCP)	M.A., University of Lucknow, India	• Image Analysis
Sinchita Roy Chowdhuri Assistant Professor	M.D. University of Calcutta, Ph.D. University of Illinois	• Molecular Pathology • Gyn Cytopathology • Non-Gyn Cytopathology • FNA Cytopathology
Savitri Krishnamurthy Professor	M.D., Calcutta Medical School	• Research Project • Immunocytochemistry
Gene Langdon	M.D., Baylor College of Medicine	• Gyn Cytopathology • Non-Gyn Cytopathology • NA Cytopathology
Gregg Staerkel Professor	M.D., The University of Texas Medical Branch at Galveston	• Gyn Cytopathology • Non-Gyn Cytopathology I & II • FNA Cytopathology
John Stewart Assistant Professor	M.D., Ph.D., Georgetown University	• Non-Gyn Cytopathology I & II • FNA Cytopathology

The Program in Cytotechnology

Mission

The MD Anderson Cancer Center Program in Cytotechnology, in concert with the mission and vision of The University of Texas MD Anderson Cancer Center, is committed to the education of technically and academically competent graduates prepared to meet the immediate and future needs of the Cytotechnology Technology profession.

Objectives

The Cytotechnology program is designed to prepare students to become entry level cytotechnologists. Working with a microscope, cytotechnologists study specimens from all body sites. Using subtle clues present within the cells, they can detect cancer cells, precancerous lesions, benign tumors, infectious agents and inflammatory processes.

The study consists of:

- Lectures
- Demonstrations at the multi-headed microscope in a tutored setting
- Independent student microscope time with faculty feedback
- Rotations through various cytology laboratories providing experience in routine and specialized procedures

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA
- Biology and Chemistry GPA
- Personal qualities such as maturity and professional goals based on the personal essay, aptitude test, interview, and reference letters.
- Ability to meet the SHP non-academic technical standards.
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office before the deadline date. See SHP Academic Calendar for application deadline dates.

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

The Bachelor of Science in Cytotechnology is either a one-year or two-year program with entry at either the junior or senior level. Application and supporting documents must be submitted to the Office of the Registrar. http://registrar.uth.tmc.edu/Admissions/admiss_info.htm

Applicants to the Cytotechnology program must satisfy the following requirements for admission.

All prerequisite course work must be from an accredited college or university.

The applicant must have satisfactorily completed all prerequisite courses listed prior to graduating. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.

Candidates who completed the prerequisite courses seven or more years before their application may need to update their academic skills in biology, with two courses in Anatomy and/or Physiology, (3 semester hours each) with a minimum GPA of 2.5. This requirement may be waived at the discretion of the program director.

A minimum grade point average of 2.5 on a 4.0 scale both overall and in the science courses is required.

Interview and completion of a questionnaire, Parts I, II, and III.

Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites

Prerequisites for the two-year program
A minimum of 60 semester credit hours (SCH) that includes:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 18 SCH

Within these 60 hours, the following must be included:

- 8 SCH in Biological Sciences, to include 4 SCH in Anatomy and Physiology
- 8 SCH hours in Chemistry

Note: 12 of the above 16 SCH may be satisfied by the Natural Sciences Texas Core course selection

Prerequisites for the one-year program
A minimum of 90 semester credit hours (SCH) that includes:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 48 SCH

Within these 90 hours, the following must be included:

- 18 SCH of upper level division courses (3000, 4000)
- 20 SCH Biological Sciences, to include 4 SCH in Anatomy and Physiology
- 8 SCH hours in Chemistry

Note: 12 of the above 28 SCH may be satisfied by the Natural Sciences Texas Core course selection

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	**SCH**
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6
MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH)	3

Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

http://statecore.its.txstate.edu/

About the Texas Core Curriculum:

Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHS course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHS courses with the results being reported to the Registrar.

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 135 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester credit hours of advanced (3000/4000) course work
- At least 25% of the total semester credit hours required must be taken at MD Anderson

Graduation occurs in August. Upon graduation, students are eligible to take the national certification exam in cytotechnology given by the American Society for Clinical Pathology (ASCP).

Please check with the program director for application deadlines and exam dates. Upon passing the exam, the student is considered a certified cytotechnologist. The awarding of the degree is not contingent upon a student passing the national certification exam.

Curriculum

This intensive program is composed of a didactic and laboratory phase followed by directed clinical training at affiliated hospitals and cytology laboratories. The primary goal of the Cytotechnology program is to provide the community with cytotechnologists who are prepared to work at the staff level in hospital and private laboratories and university medical centers. With experience, cytotechnologists can perform at the supervisory, educational and administrative levels. The job responsibilities of cytotechnologists are expanding and research opportunities are increasing with the advancement of new tumor identification techniques and Human Papilloma Virus testing.

Affiliations

The Program in Cytotechnology has developed affiliations with reference labs and sister medical institutions within the Texas Medical Center and beyond, so that students will develop expertise

in a variety of settings and experience the breadth of opportunity available to a certified cytotechnologist.

Current affiliations:

- Houston, TX: LabCorp, Quest Diagnostics, The Methodist Hospital
- Galveston, TX: The University of Texas Medical Branch

Accreditation
The program is accredited by and has conformed its curriculum to the standards and guidelines published and monitored by the:

Commission on Accreditation of Allied Health Education Programs (CAAHEP)
1361 Park St.
Clearwater, FL 33756
Phone: 727-210-2350 Fax: 727-210-2354

Course Listings

Junior Year:

The Laboratory Sciences programs admits students at the Junior Year level who share a Junior Year curriculum consisting of:

- Laboratory sciences shared core courses
- Program-specific core courses
- Program-specific elective courses

Cytotechnology (CYTO): Junior Year courses	
Laboratory Sciences: shared core courses	
HS 3102 Molecular Techniques Lab	1
HS 3210 Laboratory Mathematics	2
HS 4310 Medical Microbiology	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
TOTAL JUNIOR YEAR CORE COURSES SCH	8
CYTO Program Core	
HS 3110 Medical Terminology	1
HS 3254 Immunohistochemistry	2
HS 3300 Immunology	3
HS 3320 Medical Genetics	3
HS 3330 Pathology of Body Fluids	3

HS 3333 Statistics	3
HS 3340 Research Methods	3
HS 4111L Microbiology Lab	1
HS 4300 Pathophysiology	3
TOTAL CYTO PROGRAM CORE SCH	22
CYTO Program Electives – No electives required	0
TOTAL CYTO JUNIOR YEAR PROGRAM SCH	30

Senior Year **

Course	Hours
CT 4101 Introduction to Cytotechnology	1
CT 4102 Theory and Practice of Cytopreparatory Techniques I	1
CT 4107 Nongynecologic Cytopathology II	1
CT 4111 Theory and Practice of Cytopreparatory Techniques II	1
CT 4114 Research Project	1
CT 4118 Immunocytochemistry, Image Analysis	1
CT 4119 Cytogenetics, Fluorescent In Situ Hybridization and Polymerase Chain Reaction	1
CT 4120 Lab Management	1
CT 4209 Fine-Needle Aspiration Cytopathology	2
CT 4213 Nongynecologic Diagnostic Lab II	2
CT 4216 Cytopathology Theory	2
CT 4217 Cytopathology Diagnostic Lab	2
CT 4303 Gynecologic Cytopathology	3
CT 4305 Nongynecologic Cytopathology I	3
CT 4306 Nongynecologic Diagnostic Lab I	3
CT 4308 Gynecologic Diagnostic Lab II	3
CT 4310 Fine-Needle Aspiration Diagnostic Lab	3
CT 4312 Gynecologic Diagnostic Lab III	3
CT 4404 Gynecologic Diagnostic Lab I	4
CT 4715 Clinical Rotation	7
Total	45**

****Students entering the School of Health Professions for the first** time at the Senior level must take the following additional required courses that are described in the Junior Year for Laboratory Sciences section of the catalog:

HS 4100 Issues in Health Care Ethics (1)**
HS 4101 Diversity and Cultural Competence (1)**

Course Descriptions

HS series course descriptions, including Junior Lab Sciences

HS 3102 Molecular Techniques Laboratory (1 semester credit hour)
A study of the laboratory skills involved in transporting, preparing and reporting final results of specimens that include blood, bone marrow and solid tissue samples. The course will provide participants with hands-on laboratory experience in: performing molecular techniques such as DNA extraction, purification and quantification; preparing and viewing PCR products and DNA fingerprints via gel electrophoresis and bacterial transformation. (Admission to Program)

HS 3110 Medical Terminology (1 semester credit hour)
An introduction to medical terminology. Emphasis on word roots, prefixes, suffixes, spelling and analysis of unfamiliar terms. Additional background information on the anatomy that relates to various body systems will be discussed.

HS 3120 Introduction to Cytogenetics (1 semester credit hours)
A detailed study of human G-banded chromosomes. Includes instruction in banding pattern recognition and polymorphic variation. Includes classroom instruction and hands-on experience.

HS 3203 Advanced Molecular Techniques (2 semester credit hours)
This is a continuation of the previous introduction to molecular techniques laboratory course. Emphasis on performing additional molecular techniques such as, but not limited to various DNA extraction methods, amplification methods, electrophoresis, and fluorescent in-situ hybridization.

HS 3210 Laboratory Math (2 semester credit hours)
The basic principles and theory of clinical, biochemical, and analytical laboratory math related calculations. It includes basic operations such as problem solving using percentiles, rates, ratios, mole ratios, molality, pH, conversions, solving for proportions and more.

HS 3254 Immunohistochemistry (2 semester credit hours)
A comprehensive course that deals with the fundamentals of immunohistochemistry as applied to the theory and practical techniques in histopathology. The students acquire basic knowledge of how immunology is applied in the development of immunohistochemistry reagents and techniques. Emphasis will be placed on the clinical significance of diagnostic and prognostic indicators used in immunohistochemistry techniques. Troubleshooting and standardization of reagents are emphasized.

HS 3270 Critical Thinking in Health Professions (2 semester credit hours)
This course is designed to provide health professions students with resources for improving critical thinking skills. The course will introduce basic concepts of critical thinking through integration into interactive case studies, problem based scenarios, and project design assignments. The specific objectives of this course coincide with the University of Texas MD Anderson Cancer Center School of Health Professions' definition of critical thinking.

HS 3300 Immunology (3 semester credit hours)
This course focuses on the basic concepts in immunology, and covers general properties of immune responses; cells and tissues of immune system; lymphocyte activation and specificity; effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation. Course delivery is a blend of lecture and on line, self-paced activities.

HS 3310 Introduction to Quality in Healthcare (3 semester credit hours)
This course will provide an overview of the history, development and application of quality concepts. The components of quality management, quality assurance and quality control will be addressed through discussions and assignments on the history of quality, the different approaches to quality, such as Six Sigma and ISO standards, and how to define, implement and ensure compliance to the quality assurance and quality control process.

HS 3320 Medical Genetics (3 semester credit hours)
This course is a study of the role of genetics in medicine including: Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping. A comprehensive review of the cell cycle, mitosis, and meiosis and pedigree analysis is incorporated as well. (Admission to Program)

HS 3330 Pathology of Body Fluids (3 semester credit hours)
This course is a study of the anatomy and physiology of the kidney and the formation, elimination and composition of urine. Various body fluids (CSF, Synovial, Plural, Serous, etc.) will be study and associations made with various disease states. Interpretation of urinary and body fluids elements, chemical assays and the correlation with normal and abnormal physiology: Course delivery is a blend of lecture and on line, self-paced activities. (Admission to Program)

HS 3333 Statistics (3 semester credit hours)
This course provides an introduction to statistical techniques. Emphasis will be placed on probability and probability distributions, sampling and descriptive measures, inference and hypothesis testing, linear regression, and analysis of variance. (Prerequisite HS 3101)

HS 3340 Research Methods (3 semester credit hours)
This research methods course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have the opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references, learn how to make an outline, and write a literature review on their assigned topic. Curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster. (Admission to Program)

HS 3370 Fundamentals of Writing and Critical Thinking (3 semester credit hours)
This basic writing course stresses both reading and writing skills and is designed to teach students to improve their ability to write logically and develop short essays, brief formal summaries, and reports.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course content is designed to create an awareness of ethnocentrism and a beginning understanding of cultural similarities and diversity. It provides the student with knowledge of the concepts of cultural relativity, cultural integration and variation in cultural values, organization and institutions.

HS 4111L Medical Microbiology Student Laboratory (1 semester credit hour)
The course utilizes biochemical, morphological, and serological techniques to illustrate concepts from the lecture course relating to microbial structure, metabolism, virulence, and transmission. Students also receive instruction on proper technique and procedures for a number of different tests, including culturing, staining, carbohydrate utilization, immunoassays, and microscopy.

HS 4160 Critical Scientific Analysis (1 semester credit hour)
Students will analyze current scientific publications for research questions, hypothesis, study design and statistical analysis and the application of proper scientific formats in the clinical laboratory professions. Students will complete pre-session assignments, participate in group discussion & present their group findings.

HS 4161 Seminar in Health Care (1 semester credit hour)
Seminar based course covering topics in the Clinical Laboratory Sciences

HS 4170 Special Topics I (1 semester credit hour)
A review of the principles of mathematics and statistics used in the clinical laboratories, this course presentation includes an introduction to the selection and operation of a laboratory information system.

HS 4300 Pathophysiology (3 semester credit hours)
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topic covered includes central concepts of pathophysiology of the cells and tissues and alterations on organs and systems with an emphasis on carcinogenesis. Appropriate diagnostic and treatment procedures are covered.

HS 4310 Medical Microbiology (3 semester credit hours)
This course is the study of the utilization of morphological, biochemical, serological, disease inducing characteristics for microorganism, fungi, mycobacterium and virus identification. Course delivery a blend of lecture and on-line, self-paced activities.

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. It includes

management and motivational theories, communication skills, regulatory and accreditation requirements, budget and strategic planning, curriculum design and examination instruction.

Senior Year Course descriptions

CT 4101 Introduction to Cytotechnology (1 semester credit hour)
The student is introduced to the ethics and liability of the profession, the use of the light microscope and the professional role of the cytotechnologist. The course also includes lectures on the basic cellular structure and function, cell division, the origins of clinical cytology, evaluation of the cell sample and slide marking.

CT 4102 Theory and Practice of Cytopreparatory Techniques I (1 semester credit hour)
The course consists of the basic study and practice of techniques used for handling cytological specimen preparation and fixation and staining of specimens for cytological study, including compliance with laboratory safety, biohazard precautions and HPV testing.

CT 4107 Nongynecologic Cytopathology II (1 semester credit hour)
Students will study the normal anatomy and physiology of the urinary tract, central nervous system and body cavities. They learn cytomorphology of benign and malignant conditions of these organs/sites.

CT 4111 Theory and Practice of Cytopreparatory Techniques II (1 semester credit hour)
The course consists of the advanced study and practice of techniques used for handling specimen preparation, fixation and staining of specimens for cytological study including compliance with laboratory safety and biohazard precautions. Special techniques include Thin-Prep processing, Autocyte preparation, Ficoll-Hypaque technique, cell block preparation and special stains (Gomori's methenamine silver and Diff-quick stains).

CT 4114 Research Project (1 semester credit hour)
Guided study and/or research on a specific cytopathological issue. Includes collection and study of cases, photography, literature reviews, compiling data and poster or paper presentation.

CT 4118 Immunocytochemistry, Image Analysis (1 semester credit hour)
Introduction to theoretical knowledge and practical experience in these adjunct diagnostic techniques.

CT 4119 Cytogenetics, Fluorescent In Situ Hybridization and Polymerase Chain Reaction (1 semester credit hour)
Introduction to cytogenetic study and Polymerase Chain Reaction (theoretical knowledge) and practical experience in fluorescent in situ hybridization technique.

CT 4120 Laboratory Management (1 semester credit hour)
Introduction to quality control and assurance, laboratory regulations, inventory methods, budgeting, information systems and leadership.

CT 4209 Fine-Needle Aspiration Cytopathology (2 semester credit hours)
The study of normal anatomy and cytology of benign and malignant pathology and corresponding cytomorphological features of fine-needle aspiration specimens from lung, breast, thyroid, salivary gland, liver, pancreas, kidney, adrenal gland, bone, soft tissue, skin and lymph nodes.

CT 4213 Nongynecologic Diagnostic Laboratory II (2 semester credit hours)
The course consists of an advanced study of cytomorphological features of respiratory, gastrointestinal, urinary and central nervous systems and effusions for microscopic and clinical analysis of exfoliative nongynecologic specimens. The students will have hands-on laboratory experience.

CT 4216 Cytopathology Theory (2 semester credit hours)
Medical terminology and cytopathology theory.

CT 4217 Cytopathology Diagnostic Laboratory (2 semester credit hours)
The student will learn to apply cytodiagnostic criteria on gynecological, nongynecologic and fine-needle aspiration specimens and develop practical expertise in microscopic and clinical analysis of these specimens to provide an accurate diagnosis. The students will have hands-on laboratory experience.

CT 4303 Gynecologic Cytopathology (3 semester credit hours)
Students will study the normal anatomy, physiology and benign and malignant pathology of the female genital tract and corresponding cytomorphological features, as well as the value of cytological diagnosis in patient management.

CT 4305 Nongynecologic Cytopathology I (3 semester credit hours)
Students will study the normal anatomy, physiology and benign and malignant pathology with corresponding cytomorphological features of the respiratory system and gastrointestinal tract. The value of cytological diagnosis in patient management is included.

CT 4306 Nongynecologic Diagnostic Laboratory I (3 semester credit hours)
The course consists of the application of cytomorphological features of the respiratory system and gastrointestinal tract for microscopic and clinical analysis of exfoliative nongynecologic specimens from these organs. The students will have hands-on laboratory experience.

CT 4308 Gynecologic Diagnostic Laboratory II (3 semester credit hours)
The course consists of the application of cytodiagnostic criteria for microscopic analysis (screening, detecting, marking and diagnosing), and reporting cervicovaginal specimens in conjunction with clinical history. SurePath preparations are used as study material.

CT 4310 Fine-Needle Aspiration Diagnostic Laboratory (3 semester credit hours)
The students will have hands-on laboratory experience as they learn to apply cytodiagnostic criteria and develop practical expertise in microscopic and clinical analysis of fine-needle aspiration specimens from lung, breast, thyroid, salivary gland, liver, pancreas, kidney, adrenal gland, bone, soft tissue, skin and lymph nodes with clinical correlation.

CT 4312 Gynecologic Diagnostic Laboratory III (3 semester credit hours)
The course consists of advanced application of cytodiagnostic criteria for microscopic analysis (screening, detecting, marking and diagnosing) and reporting cervicovaginal specimens on conventional and Thin Prep monolayer preparations in conjunction with clinical history. Quality control and clinical ethics are included.

CT 4404 Gynecologic Diagnostic Laboratory I (4 semester credit hours)
The course consists of basic application of cytodiagnostic criteria for microscopic and clinical analysis (screening, detecting, marking and diagnosing) and reporting cervicovaginal specimens in conjunction with clinical history. Conventional pap smears and monolayer preparations of gynecologic specimens are used. The students will have hands-on laboratory experience.

CT 4715 Clinical Rotation (7 semester credit hours)
The student will have laboratory and clinical experience in all of the following laboratories: Laboratory Corporation of America, Cytology Laboratory; The University of Texas Medical Branch at Galveston; Quest Diagnostics Laboratory; The Methodist Hospital; MD Anderson Cytology Processing Laboratory; Fine-Needle Aspiration Clinics; and cytology specimen screening.

Diagnostic Imaging

Diagnostic Imaging is a specialty devoted to the study of routine and advanced radiographic imaging procedures. The curriculum includes emerging advanced technologies in Computed Tomography and Magnetic Resonance Imaging. The program prepares student for various careers in hospitals, clinics, education, and management by offering the four degrees described below.

C**ertificate Offered**
Certificate in Radiologic Sciences
Note: Certificates may be awarded at the completion of the second year of the Diagnostic Imaging Program, allowing the student to sit for the American Registry of Radiologic Technologists (ARRT) certification examination.

Degrees Offered by the Program in Diagnostic Imaging

- Bachelor of Science in Diagnostic Imaging Education
- Bachelor of Science in Diagnostic Imaging Management
- Bachelor of Science in Computed Tomography
- Bachelor of Science in Magnetic Resonance Imaging

The program is administered by:
Dean: Shirley Richmond, Ed.D.

Program Director: William Undie, Ed.D., RT(R)

Education Coordinator: Computed Tomography: Deborah Scroggins, M.S.R.S., RT(R)(CV)(M)(CT)

Education Coordinator - Magnetic Resonance Imaging: Sonja Boiteaux, M.S.RS., RT(R)(MR)

Education Coordinator - Education/Management: Suzieann Richards-Bass, M.A.Ed., MBA., RT(R)

Clinical Coordinator: Kenya Haugen, D.M., M.S. (R)

Medical Advisor: Aurelio Matamoros, M.D.

Roster of Faculty

Faculty	Degree and School	Teaching Assignments
William Undie RT (R)(T) Assistant Professor	Ed.D., Clark Atlanta University	• Radiation Safety and Protection
Shaun T. Caldwell RT (R) (T) Assistant Professor	M.S., Utah State University Logan, UT	• Instructional Design • Research Project • Research Techniques in Radiologic Sciences • Teaching Strategies in Health Care Education
Sonja Boiteaux RT (R) (MR) Instructor	M.S.R.S. Midwestern State Wichita Falls, TX	• MRI of the Nervous System • MRI of the Chest, Abdomen and Pelvis • MRI of the Extremities • MRI Internship • MRI Physics I - Physics Instrumentation & Safety • MRI Physics II - Advanced MRI Procedures • Special Topics and Future Directions in MRI • MRI Comprehensive Review
Aurelio Matamoros, Jr. Professor	M.D., University of Colorado Boulder, CO	• Radiography, Pathology and Trauma

Suzieann Richards-Bass RT(R) Instructor	M.Ed., University of Phoenix M.B.A., Webster University	• Clinical Education I, II, III, IV • Fiscal Analysis in Health Care • Imaging Diverse Populations • Internship I, II & III • Leadership in Radiologic Sciences • Management Skills • Patient Care in Radiologic Sciences • Radiographic Anatomy & Positioning I,II,III,IV • Imaging Diverse Populations • Imaging Pathology • Introduction to Specialty Modalities • Capstone Registry Review • Principles of Radiographic Exposure II
Kenya Haugen, DM, MS, RT(R) Senior Health Professions Educator	Doctor of Management in Organizational Leadership University of Phoenix	• Principles of RAD Exposure 1 • Radiation Safety & Protection
David Clayton BS, RT(R)(QM) Senior Health Professions Educator	B.S.R.S. Midwestern State University. Wichita Falls, TX	• Clinical Education I thruVI • Digital Imaging & Quality Management in Radiology (Labs
La Shanda Smith BS, RT(R) Senior Health Professions Educator	BS Shool of Health Professions, UTMDACC	• Clinical Education I thruVI
Deborah Scroggins M.S.RS., RT.(R) (CV) (M) (CT) Instructor	M.S.RS., Midwestern State Wichita Falls, TX	• CT Physics, Instrumentation & Radiation Safety • Sectional Anatomy • CT of the Nervous System • Advanced CT Procedures • CT of the Chest, Abdomen and Pelvis • Interventional CT Procedures & Instrumentation

		• CT of the Extremities • CT Comprehensive Review • Internship I, II, & III • Introduction to CT
Adjunct Faculty		
Christine B. Capitan RT (R) (T)	M.B.A., University of Houston, , TX	• Leadership in Radiologic Sciences
Veronica Garza Lecturer	M.A., University of Houston, Houston, TX	• Management of Human Resources
Harry R. Gibbs Associate Professor	M.D., Harvard Medical School, Cambridge, MA	• Diversity and Cultural Competence
Laurel R. Hyle Lecturer	M.PH., J.D., University of Houston Law Center Houston, TX	• Medical Law
Mona Lopez Lecturer	M.Div., Houston Graduate School of Theology Houston, TX	• Computed Tomography
Mahsa Dehghanpour CMD	Ed.D., University of Houston Houston, TX	• Radiobiology
Thomas Nishino Assistant Professor	Ph.D., Lehigh University Bethlehem, PA	• Digital Imaging • Quality Management in Radiology
Donna M. Reeve Senior Medical Physicist Lecturer	M.S., The University of Texas Graduate School of Biomedical Sciences, Houston, TX	• Principles of Radiographic Exposure • Magnetic Resonance Imaging
S. Jeff Shepard Senior Medical Physicist	M.S., The University of Texas Southwestern Medical School, Dallas, TX	• Quality Management in Radiology

		• Digital Imaging

The Program in Diagnostic Imaging

Mission
The mission of the Diagnostic Imaging Program is to provide the highest quality of education to diagnostic imaging students
through formal didactic and state-of-the-art clinical experiences that prepare our students to be diagnostic imaging
professionals who are patient care focused, critical thinkers and engaged in lifelong learning.

Vision
We shall be the premier educational program in Diagnostic Imaging by providing innovative curricular, clinical and
continuing education services to the diagnostic imaging community and the patients we serve.

Goals
Goals and Student Learning Outcomes
Fulfillment of the program's mission is assessed by the program's effectiveness and the degree to which the program achieves the goals and learning outcomes that will enable our students to succeed academically and professionally:

Goal: 1. Students will develop patient care focus by providing superior patient care.
Student Learning Outcomes:
1. Students will provide empathetic professional patient care.
2. Student will demonstrate judicious use of ionizing radiation.

Goal: 2. Students will demonstrate critical thinking skills in the clinical environment
Student Learning Outcomes:
1. Students will competently perform non-routine procedures including trauma, pediatric portable and surgical examinations.
2. Students will appropriately evaluate images

Goal: 3. Students will adopt a philosophy of life-long learning through continuing education and professional involvement.
Student Learning Outcomes:
1. Students will demonstrate professional growth
2. Students will demonstrate a sense of professionalism and desire to learn

Goal: 4. Students will embrace the MD Anderson core values of caring, integrity and discovery.
Student Learning Outcomes:
1. Students will demonstrate the core values of caring, integrity and discovery.

Goal: 5 . Students will communicate effectively in a variety of settings
Student Learning Outcomes:

1. Students will be able to utilize effective oral communication during simulation and clinical settings
2. Students will communicate effectively during oral Presentation of Projects
Program Objectives

The radiologic technologist is a prominent member of the health care team focused on the diagnosis and treatment of human disease. Radiologic technologists work with ionizing radiation, radiopharmaceuticals, sound waves and magnetic fields to produce medical images in diagnostic imaging or radiology departments of hospitals and medical clinics or free-standing imaging centers.

The University of Texas MD Anderson Cancer Center Diagnostic Imaging Program is designed to prepare students for a challenging career in the Radiologic Sciences through formal didactic and state-of-the-art clinical education. Today's medical practice dictates that technologists have advanced skills in imaging, patient assessment and treatment of specific disease.

Accreditation information:
The University of Texas MD Anderson Cancer Center, Diagnostic Imaging Program is accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT). The program has a full 8-year accreditation with the next review date in August, 2019. The University of Texas MD Anderson Cancer Center is regionally accredited through The Commission on Colleges of the Southern Association of Colleges and Schools (SACS). Effectiveness data for the program will be available on the JRCERT and The University of Texas MD Anderson Cancer Center, School of Health Professions websites.
Contact information for JRCERT:
20 N. Wacker Drive, Ste 2850
Chicago, IL 60606-3182
Phone 312-704-5300
Fax 312-704-5304
Website: www.jrcert.org
E-mail: mail@jrcert.org

Objectives
The radiologic technologist is a prominent member of the health care team focused on the diagnosis and treatment of human disease.

Radiologic technologists work with ionizing radiation, radiopharmaceuticals, sound waves and magnetic fields to produce medical images in diagnostic imaging or radiology departments of hospitals and medical clinics or free-standing imaging centers.

The University of Texas MD Anderson Cancer Center Diagnostic Imaging Program is designed to prepare students for a challenging career in the Radiologic Sciences through formal didactic and state-of-the-art clinical education. Today's medical practice dictates that technologists have advanced skills in imaging, patient assessment and treatment of specific disease.

The program accommodates Bachelor of Science degree-seeking students as follows:
Those who are working towards initial certification in Radiologic Technology (radiography): these students enter the Diagnostic Imaging Program as sophomores.
Graduates of an accredited program in radiologic sciences, with acceptable transferable credits, who must submit proof of certification and have completed the required Texas core curriculum. These students enter the Diagnostic Imaging Program during the senior year of their education and complete their degree through The University of Texas MD Anderson School of Health Professions.

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA, and pre-requisite GPA
- Personal qualities such as maturity and professional goals as expressed in the interview and described in reference letters.
- Ability to meet the SHP non-academic technical standards.
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Additional Admission factors for applicants to the Certificate Program:

- Clinical site visit evaluation: 8 hours clinical site observation at The University of Texas MD Anderson Cancer Center

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

The Certificate in Radiologic Sciences is a two-year program, with entry at the Sophomore year.

The Bachelor of Science in Diagnostic Imaging is either a three-year program (entry at Sophomore level) or a one-year program (entry at Senior level). Application and supporting documents must be submitted to the Office of the Registrar.

Applicants to the Certificate in Radiologic Sciences and applicants to the Bachelor of Science in Diagnostic Imaging Program must satisfy the following requirements for admission:

All prerequisite course work must be from a regionally accredited college or university.

The applicant must have satisfactorily completed all required prerequisite courses for their program. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.

Clinical site visit (Certificate Applicants only**)** 16 hours clinical site observation at The University of Texas MD Anderson Cancer Center. Contact the Diagnostic Imaging Program office (713-79-3455) to request a site visit form.

CPR American Heart Association certification

Minimum overall grade point average of 2.5 on a 4.0 scale.

Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites

Prerequisites for the Certificate in Radiologic Sciences Program

Minimum of 30 SCH of Texas Core Curriculum (see table below)
Within these 30 SCH, the following must be included:

Anatomy and Physiology
Note: Full completion of the 42 SCH of the Texas Core Curriculum is recommended.

Prerequisites for the three-year BS Program

Minimum of 42 (SCH) that includes:

- Texas Core Curriculum - 42 SCH (see table below)
- Anatomy & Physiology I - must be included in the above 42 SCH

Prerequisites for the one-year BS Program for students holding ARRT certification prior to admission:

- Applicants must hold an ARRT certification (for which a maximum of 30 SCH (may be awarded at the discretion of the SHP Curriculum Committee)
- Minimum of 58 (SCH) that include:
    - Texas Core Curriculum – 42 SCH (see table below)
    - An additional 16 SCH
    - Anatomy & Physiology I that must be included in the required 58 SCH

Prerequisites for the one-year BS Program for students that have completed the SHP two-year certificate program:

Minimum of 100 SCH that include:

- Completion of the Texas Core Curriculum (must include Anatomy & Physiology) 42 SCH
- Completion of the SHP DI 2yr Curriculum (58 SCH)

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	SCH
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6
MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3

HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

http://statecore.its.txstate.edu/

About the Texas Core Curriculum

Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

Advanced Placement
The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHS course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHS courses with the results being reported to the Registrar.

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 130 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester credit hours of advanced (3000/4000) course work
- At least 25% of the total semester credit hours required must be taken at MD Anderson

Upon completion of formal didactic and clinical education, students will have demonstrated the professional skills necessary to work with ionizing radiation, radiopharmaceuticals, sound waves and magnetic fields to produce medical images in diagnostic imaging or radiology departments of hospitals and medical clinics or free-standing imaging centers.

Graduation occurs in August. Upon graduation, students are eligible to take the national certification exam administered by the American Registry of Radiologic Technologists (ARRT). Please check with the program director for application deadlines and exam dates. Upon passing the exam, the student is considered a certified Radiological Technologist. The awarding of the degree is not contingent upon a student passing the national certification exam.

Curriculum
The curriculum meets or exceeds the curriculum recommendations of the American Society of Radiologic Technologists (ASRT). This intensive three-year program is composed of a didactic phase followed by directed clinical training at affiliated hospitals and laboratories.

Current Affiliations
During the clinical phase of instruction, training and supervision are provided in a variety of clinical sites:

Houston, TX:

- The University of Texas MD Anderson Cancer Center
- The Methodist Hospital TMC
- Memorial Hermann Hospital TMC
- Texas Children’s Hospital TMC
- Michael E. DeBakey VA Medical Center TMC
- St. Luke’s Episcopal Health System TMC
- TIRR - Memorial Hermann

Beyond Houston:

- UT Medical Branch, Galveston **,** TX
- Texas Children's Hospital, Sugarland, TX
- Texas Children's Health Clinic, Cypress, T**X**

Accreditation
The Diagnostic Imaging Program is accredited by and has conformed its curriculum to the standards and guidelines published and monitored by:
The Joint Review Committee on Education in Radiologic Technology (JRCERT)
20 North Wacker, Suite 2850
Chicago, IL 60606-3182
Phone: 312-704-5300
Fax: 312-704-5304

Curriculum

Radiography two-year program CORE (Sophomore & Junior years)

Radiography Curriculum CORE	SCH
DI 2161 Clinical Education I	1
DI 2201 Principles of Radiographic Exposure I	2
DI 2221 Patient Care in Radiologic Sciences	2
DI 2242 Principles of Radiographic Exposure II	2
DI 2262 Clinical Education II	2
DI 2263 Clinical Education III	2
DI 2331 Radiographic Anatomy and Positioning I	3
DI 2332 Radiographic Anatomy and Positioning II	3
DI 2333 Radiographic Anatomy and Positioning III	3
DI 2334 Radiographic Anatomy and Positioning IV	3
DI 2335 Radiographic Anatomy and Positioning V	3
DI 3200 Capstone: Registry Review	2
DI 3242 Digital Imaging	2
DI 3243 Quality Management in Radiology	2
DI 3250 Imaging Pathology (2hr or 3hr course)	2
DI 3261 Clinical Education IV	2
DI 3262 Clinical Education V	2
DI 3263 Clinical Education VI	2
DI 4101 Radiation Safety and Protection	1
DI 4300 Research Techniques in Radiologic Sciences	3
DI 4301 Research Project	3
HS 3340 Research Methods	3

HS 3370 Fundamentals of Writing and Critical Thinking	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
HS 4111 Medical Law	1
RT 4210 Radiobiology	2
Total Hours	58

Senior/3rd year specialty

Bachelor of Science in Diagnostic Imaging Education	SCH
DI 4310 Teaching Strategies in Health Care Education	3
DI 4311 Instructional Design	3
DI 4313 Education Internship I	3
DI 4314 Education Internship II	3
DI 4315 Issues in Health Care Education	3
DI 4316 Leadership in Radiologic Sciences	3
DI 4319 Fiscal Analysis in Health Care	3
DI 4322 Effective Human Resources Management	3
DI 4323 Management Skills for the New Supervisor	3
DI 4326 Individual Projects	3
TOTAL Education Emphasis	30

Senior/3rd year Specialty

Bachelor of Science in Computed Tomography (CT)	SCH
DI 4351 CT and Interventional Physics I	3
DI 4352 CT and Interventional Procedures of the Nervous System	3
DI 4353 CT and Interventional Physics II	3
DI 4354 CT and Interventional Procedures of the Chest, Abdomen, Pelvis	3
DI 4355 CT Advanced Interventional Procedures and Instrumentation (Lab)	3
DI 4356 CT and Interventional Procedures of the Extremities	3
DI 4357 CT Interventional Comprehensive Review	3
DI 4393 Internship I - CT	3
DI 4394 Internship II - CT	3
DI 4395 Internship III - CT	3
TOTAL CT emphasis	30

Senior/3rd year Specialty

Bachelor of Science in Diagnostic Imaging Management	SCH
DI 4316 Leadership in Radiologic Sciences	3
DI 4317 Staff Development	3
DI 4318 Promotional Strategies in Radiologic Sciences	3
DI 4319 Fiscal Analysis in Health Care	3
DI 4320 Current Trends in Healthcare Management	3
DI 4321 Operations Management	3
DI 4322 Effective Human Resources Management	3
DI 4323 Management Skills for the New Supervisor	3
DI 4324 Management Internship I	3
DI 4328 Management Internship II	3
TOTAL	**30**

Senior/3rd year Specialty

Bachelor of Science in Magnetic Resonance Imaging	SCH
DI 4361 MRI Physics I: Physics, Instrumentation and Safety	3
DI 4362 MRI of the Nervous System	3
DI 4363 MRI Physics II: Advanced MRI Procedures, Contrast Agents and Quality Assurance	3
DI 4364 MRI of the Extremities	3
DI 4365 Special Topics and Future Directions in MRI	3
DI 4366 MRI of the Chest, Abdomen, and Pelvis	3
DI 4367 MRI Comprehensive Review	3
DI 4390 MRI Internship I - MRI	3
DI 4391 MRI Internship II - MRI	3
DI 4392 MRI Internship III - MRI	3
TOTAL	**30**

Entry at Senior Year

Bachelor of Science in Computed Tomography	SCH
HS 3370 Fundamentals of Writing and Critical Thinking	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
HS 4111 Medical Law	1
DI 4300 Research Techniques in Radiologic Sciences	3

DI 4301 Research Project	3
DI 4351 CT and Interventional Physics I	3
DI 4352 CT and Interventional Procedures of the Nervous System	3
DI 4353 CT and Interventional Physics II	3
DI 4354 CT and Interventional Procedures of the Chest, Abdomen, Pelvis	3
DI 4355 CT Advanced Interventional Procedures and Instrumentation (Lab)	3
DI 4356 CT and Interventional Procedures of the Extremities	3
DI 4357 CT Interventional Comprehensive Review	3
DI 4393 Internship I - CT	3
DI 4394 Internship II - CT	3
DI 4395 Internship III - CT	3
TOTAL CT Emphasis	**42**

Entry at Senior Year

Bachelor of Science in Education	SCH
HS 3370 Fundamentals of Writing and Critical Thinking	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
HS 4111 Medical Law	1
DI 4300 Research Techniques in Radiologic Sciences	3
DI 4301 Research Project	3
DI 4310 Teaching Strategies in Health Care Education	3
DI 4311 Instructional Design	3
DI 4323 Management Skills for the New Supervisor	3
DI 4313 Internship I	3
DI 4314 Internship II	3
DI 4315 Issues in Health Care Education	3
DI 4316 Leadership in Radiologic Sciences	3
DI 4319 Fiscal Analysis in Health Care	3
DI 4322 Effective Human Resources Management	3
DI 4326 Individual Projects	3
TOTAL Education Emphasis	**42**

Entry at Senior Year

Bachelor of Science in Management	SCH
HS 3370 Fundamentals of Writing and Critical Thinking	3

HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
HS 4111 Medical Law	1
DI 4300 Research Techniques in Radiologic Sciences	3
DI 4301 Research Project	3
DI 4316 Leadership in Radiologic Sciences	3
DI 4317 Staff Development	3
DI 4318 Promotional Strategies in Radiologic Sciences	3
DI 4319 Fiscal Analysis in Health Care	3
DI 4320 Current Trends in Healthcare Management	3
DI 4321 Operations Management	3
DI 4322 Effective Human Resources Management	3
DI 4323 Management Skills for the New Supervisor	3
DI 4324 Management Internship I	3
DI 4328 Management Internship II	3
TOTAL	**42**

Entry at Senior Year

Bachelor of Science in Magnetic Resonance Imaging	SCH
HS 3370 Fundamentals of Writing and Critical Thinking	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
HS 4111 Medical Law	1
DI 4300 Research Techniques in Radiologic Sciences	3
DI 4301 Research Project	3
DI 4361 MRI Physics I: Physics, Instrumentation and Safety	3
DI 4362 MRI of the Nervous System	3
DI 4363 MRI Physics II: Advanced MRI Procedures, Contrast Agents and Quality Assurance	3
DI 4364 MRI of the Extremities	3
DI 4365 Special Topics and Future Directions in MRI	3
DI 4366 MRI of the Chest, Abdomen and Pelvis	3
DI 4367 MRI Comprehensive Review	3
DI 4390 Internship I - MRI	3
DI 4391 Internship II - MRI	3
DI 4392 Internship III - MRI	3
TOTAL MRI Emphasis	**42**

Course Descriptions

DI 1100 Introduction to Radiologic Sciences (2 semester credit hours)
This course provides a professional overview of the program, including elementary radiation protection and medical terminology. Students are required to complete hands-on laboratory assignments. Lab fee of $30.00.

DI 2161 Clinical Education (1 semester credit hours)
This course provides the student with clinical experience in radiography. Students must demonstrate ARRT and program competencies.

DI 2201 Principles of Radiographic Exposure I (2 semester credit hours)
The student will learn darkroom procedures, theory of radiation production, image production and radiographic equipment. Students are required to complete hands-on laboratory assignments. Lab fee of $30.00.

DI 2221 Patient Care in Radiologic Sciences (2 semester credit hours)
The course presents the student with information about patient care and management in radiology. CPR certification and psychosocial aspects of patient care are also introduced.

DI 2242 Principles of Radiographic Exposure II (2 semester credit hours)
This course continues the study of radiographic imaging, instrumentation, image production and factors affecting image quality. Students are required to complete hands-on laboratory assignments. Lab fee of $30.00.

DI 2262 Clinical Education II (2 semester credit hours)
This course is a continuation of DI 2361.

DI 2263 Clinical Education III (3 semester credit hours)
This course is a continuation of DI 2362.

DI 2331 Radiographic Anatomy and Positioning I (5 semester credit hours)
The student is introduced to radiographic anatomy, proper positioning, radiographic protocols and radiographic production in the laboratory. Students are required to complete hands-on laboratory assignments. Lab fee of $30.00.

DI 2332 Radiographic Anatomy and Positioning II (3semester credit hours)
This course is a continuation of DI 2331. Students are required to complete hands-on laboratory assignments. Lab fee of $30.00.

DI 2333 Radiographic Anatomy and Positioning III (3 semester credit hours)
This course is a continuation of DI 2332. Students are required to complete hands-on laboratory assignments. Lab fee of $30.00.

DI 2334 Radiographic Anatomy and Positioning IV (3 semester credit hours)

This course is a continuation of DI 2333. Students are required to complete hands-on laboratory assignments. Lab fee of $30.00.

DI 2335 Radiographic Anatomy and Positioning V (3 semester credit hours)
This course is a continuation of DI 2334. Students are required to complete hands-on laboratory assignments.

DI 3200 Capstone: Registry Review (2 semester credit hours)
This course presents the student with a review of didactic and clinical applications in radiography.

DI 3242 Digital Imaging (2 semester credit hours)
This course will teach the student about digital imaging in routine and specialized 2-D and 3-D images, data management and fusion practices.

DI 3243 Quality Management in Radiology (2 semester credit hours)
This course will instruct the student in the development of a quality management program in Radiology. Lab fee of $30.00.

DI 3250 Imaging Pathology (2 semester credit hours)
A study of human pathology and its appearance in imaging. Course will focus on radiographic presence of pathology. Focus may vary, with instructor consent, on imaging modality of choice.

DI 3261 Clinical Education IV (2 semester credit hours)
This course is a continuation of DI 2363.

DI 3262 Clinical Education V (2 semester credit hours)
This course is a continuation of DI 3361.

DI 3263 Clinical Education VI (2 semester credit hours)
This course is a continuation of DI 3362.

DI 3322 Critical Care in Radiologic Sciences (3 semester credit hours)
This course focuses on imaging the trauma patient. Topics include critical care of patients in the imaging department, pathology, and patient prognosis.

DI 3344 Forensic Radiology (3 semester credit hours)
This course will be a comprehensive study of the diagnostic imaging's role in forensics. It will include discussion of defining forensics, forensic radiology, and the process of body decomposition. The student will be provided with an in-depth study of the identification of the dead, including anthropological, dentistry, and mass casualty situations. The course will cover forensic radiology in violent crimes, non-violent crimes (smuggling, larceny, art forgery), and abuse. There will also be discussion on safety and precautions for the imaging technologist and on being a witness in court. Also covered will be the future of forensic radiology.

DI 3346 Professional Development (Conferences, Workshops, Lectures, Competitions) - Repeatable (3 semester credit hours)
Attendance of educational sessions at district, state, regional or national conferences. Consent of instructor required. 12 documented contact hours per each (32 CE) credit for maximum of 3 credits?

DI 3347 Current Issues in Diagnostic Imaging (3 semester credit hours)
Current issues and trends in the health care industry and environment affecting diagnostic imaging.

DI 3348 Seminars (Special Topics) - Repeatable (1-3 semester credit hours)
Special seminars relating to new developments, pathology and disease process, quality assurance and the future of imaging. Advisor Approval Required.

DI 3349 Bone Densitometry (3 semester credit hours)
Comprehensive study of the methods of bone density measurement (bone densitometry, DEXA), the pathogenesis of osteoporosis, quality management issues, therapies for osteoporosis and a review of additional analysis methods.

DI 3351 Cancer in Diagnostic Imaging (3 semester credit hours)
A study of cancer and diagnostic imaging's role in the diagnosis and staging of cancer of most human organ systems. This course will include a review of the pathophysiology of cancer and introduction to the imaging pathways for cancer.

DI 3352 Professional Literature Research (3 semester credit hours)
This course prepares the student for professional contribution through literature review. Students will analyze and synthesize profession related journal articles and prepare a literature research paper for the purpose of publication.

DI 4101 Radiation Safety and Protection (1 semester credit hour)
This course requires the student to demonstrate a detailed understanding of atomic structure, types of ionizing radiation, radiation detection devices, units of measurement, personal and public radiation safety practices and dose limitations from brachytherapy sources and external beam radiation devices. The course identifies radiation regulatory and advisory agencies and the specific requirements of each.

DI 4210 Radiobiology (2 semester credit hours)
This course presents the students with cellular, subcellular and tissue biology. The course requires the students to discriminate between types of cellular damage caused by ionizing radiation. Additionally, students are exposed to proliferation kinetics, fractionated radiotherapy, acute and chronic effects of radiation on human cells and body systems, principles of linear energy transfer and relative biologic effectiveness and the impact of radiosensitizers and radioprotectors on patient treatment.

DI 4300 Research Techniques in Radiologic Sciences (3 semester credit hours)
This course will teach the student the principles and methods of conducting practical research in

health care.

DI 4301 Research Project (3 semester credit hours)
This course will prepare the student to complete a research project.

DI 4304 Sectional Anatomy (3 semester credit hours)
This course will provide a review of the gross anatomy of the entire body. Detailed study of gross anatomical structures will be conducted systematically for location, relationship to other structures and function. Structures are located and identified in axial (transverse), sagittal, coronal and orthogonal (oblique) planes. Illustrations and anatomic images will be compared with MR, ultrasound and CT images in the same imaging planes and at the same level when applicable. The characteristic appearance of each anatomical structure as it appears on CT, MR and ultrasound, when applicable, will be stressed.

DI 4310 Teaching Strategies in Health Care Education (3 semester credit hours)
This course will teach the student how to analyze learning theories with emphasis on adult learners and the elements of quality education.

DI 4311 Instructional Design (3 semester credit hours)
This course will instruct the student in the theory and application of instructional design in health care education and training.

DI 4313 Education Internship I (3 semester credit hours)
In this course the student applies advanced technical skills as well as concepts in the area of professional elective major.

DI 4314 Education Internship II (3 semester credit hours)
This course is a continuation of DI 4313.

DI 4315 Issues in Health Care Education (3 semester credit hours)
This course will introduce the student to the current trends and issues related to Health Science Education.

DI 4316 Leadership in Radiologic Sciences (3 semester credit hours)
This course will prepare the student for technical and professional involvement, defusing emotionally charged situations, coaching, team building, setting and reaching goals.

DI 4317 Staff Development (3 semester credit hours)
Topics covered in this course include: building trust, establishing expectations, performance evaluation and reviews, giving constructive criticism, and principles of motivation.

DI 4318 Promotional Strategies in Radiologic Sciences (3 semester credit hours)
This course teaches the student how to develop patient, physician and community programs to promote health care services.

DI 4319 Fiscal Analysis in Health Care (3 semester credit hours)
This course will provide the student with the skills necessary for managing the financial and technical aspects of radiology and radiation oncology.

DI 4320 Current Trends in Health Care Management (3 semester credit hours)
This course will prepare the student to analyze and manage trends in health care management and delivery systems.

DI 4321 Billing, Coding and Reimbursement Operations Management (3 semester credit hours)
This course introduces the student to current practices in billing and reimbursement for health care services

DI 4322 Effective Human Resources Management (3 semester credit hours)
This course will teach the student about staff recruitment, retention techniques, and laws related to resource management. Topics include hiring and terminating practices, harassment and discrimination.

DI 4323 Management Skills for the New Supervisor (3 semester credit hours)
This course will teach the student about the transitioning from a Professional Employee to a Supervisor.

DI 4324 Management Internship I (3 semester credit hours)
In this course, the student applies advanced technical skills as well as concepts in the area of professional elective major.

DI 4326 Individual Projects (3 semester credit hours)
This course consists of special research projects assigned to the students.

DI 4328 Management Internship II (3 semester credit hours)
Course Continuation of DI 4314

DI 4350 Introduction to Computed Tomography (3 semester credit hours)
This course will teach the student about digital imaging in routine and specialized 2-D and 3-D images, data management and fusion practices.

DI 4351 CT and Interventional Physics I (3 semester credit hours)
Course content will deliver a basic understanding of the physical principles and instrumentation involved in computed tomography. The historical development and evolution of computed tomography will be reviewed. A brief introduction to computer systems will be covered which will include a review of digital image fundamentals and computers in diagnostic imaging. CT image processing will be examined and will include image formation, digitization processing techniques and hardware. CT systems and operations will be studied and will include: CT x-ray tube technology; collimators and filters; gantry and detectors, characteristics and function. CT image reconstruction will be studied and will include image reconstruction from projections and reconstruction algorithms. CT image formation, processing and presentation will be included.

Content will delve into image manipulation, image quality and factors affecting quality. Radiation safety and patient dose reduction techniques will be introduced.
Prerequisites: Admission to program.

DI 4352 CT and Interventional Procedures of the Nervous System (3 semester credit hours)
Content provides detailed coverage of procedure protocols for CT and Interventional Radiography (IR) imaging of the Nervous System. Protocols include, but are not limited to, indications for the procedure, patient education, preparation, orientation and positioning, patient history and assessment, contrast media usage, scout image, selectable scan parameters and archiving of the images. Protocols will be taught for differentiation of specific structures, patient symptomology and pathology. Images studied will be reviewed for quality, anatomy and pathology. Procedure protocols vary from facility to facility and normally are dependent on the preferences of the radiologists. Content provides thorough coverage of common diseases diagnosable via CT. Each disease or trauma process is examined from its description, etiology, associated symptoms and diagnosis with appearance on CT and IR images.
Prerequisites: Admission to program and DI 4304.

DI 4353 CT and Interventional Physics II (3 semester credit hours)
This advanced course in computed tomography is designed to assist the technologist in understanding the key concepts of advanced scanning techniques, provide an in-depth study of contrast agents used in CT, and quality assurance. This course will include the physical principles, instrumentation, image quality considerations, patient dose considerations, and clinical applications of the following advanced practices: Mobile CT, Helical CT, , Real-time Fluoroscopic CT, 3D CT, Computed Tomography Angiography, Endoscopy (Virtual) CT, Cardiac CT, Positron Emission CT (PET-CT), Single Photon Emission Computed Tomography - CT (SPECT-CT) and Functional CT.
Prerequisite: DI 4351.

DI 4354 CT and Interventional Procedures of the Chest, Abdomen, Pelvis(3 semester credit hours)
The course content provides detailed coverage of procedure protocols for CT and Interventional Radiography (IR) imaging of the chest (to include thorax), abdomen and pelvis (male and female). Protocols include, but are not limited to, indications for the procedure, patient education, preparation, orientation and positioning, patient history and assessment, contrast media usage, scout image, selectable scan parameters, filming and archiving of the images. Protocols will be taught for differentiation of specific structures, patient symptomology and pathology. Images studied will be reviewed for quality, anatomy and pathology. Procedure protocols vary from facility to facility and normally are dependent on the preferences of the radiologists. Terms associated with these pathologies will be included.
Prerequisite: DI 4304.

DI 4355 CT Advanced Interventional CT Procedures and Instrumentation. Lab (3 semester credit hours)
Course content will focus on interventional imaging including surgery, biopsy and CT-guided minimally invasive treatment delivery. This includes a review of anatomy, pathology and imaging protocols for CT. Content will include in-depth study of safety, pharmacology, patient

care and assessment which will include patient emergencies in relation to Interventional CT. CT image quality assurance and patient/ personnel dosimetry and radiation safety as it relates specifically to Interventional CT fluoroscopy will be discussed. The future of interventional CT will be presented.
Prerequisite: DI 4351

DI 4356 CT and Interventional Procedures of the Extremities (3 semester credit hours)
Content provides detailed coverage of procedure protocols for CT and Interventional Radiography (IR) imaging of the upper and lower extremities. Protocols include, but are not limited to, indications for the procedure, patient education, preparation, orientation and positioning, patient history and assessment, contrast media usage, scout image, selectable scan parameters, filming and archiving of the images. Protocols will be taught for differentiation of specific structures, patient symptomology and pathology. Images studied will be reviewed for quality, anatomy and pathology. Procedure protocols vary from facility to facility and normally are dependent on the preferences of the radiologists. Terms associated with these pathologies will be included.
Prerequisite: DI 4304

DI 4357 CT Interventional Comprehensive Review (3 semester credit hours)
Course content will integrate clinical skills and classroom theories in a comprehensive study of CT and Interventional Radiography (IR) physics, instrumentation, safety, contrast agents, procedures and quality assurance.

DI 4360 Introduction to MRI (3 semester credit hours)
This course is designed to introduce the student to the basic principles of MRI. Content will include very basic overview of MRI Safety, physics, equipment, procedures, contrast agents and the future of MRI.

DI 4361 MRI Physics I: Physics, Instrumentation and Safety (3 semester credit hours)
Course content introduces the student to the physics and instrumentation of magnetic resonance imaging. The historical evolution of MRI is discussed. Students will be presented with the concepts of MRI including components of a system, MR imaging principles and an understanding of basic MR pulse sequences and introduction to MR angiography. Imaging parameters, tissue characteristics and artifact reduction techniques will be presented. Content includes an in-depth study of MRI safety.
Prerequisite: Admission to program.

DI 4362 MRI of the Nervous System (3 semester credit hours)
Content is designed to provide students with a review of the anatomy of the central nervous system (brain and spine) and its MR tissue characteristics. The student will review various imaging techniques and the design of specialized receiver coils. Magnetic resonance angiography of brain vasculature will be introduced. Spectroscopy and Functional Imaging of the nervous system will be introduced. Field strength specific optimization of neuro protocols will be covered. Common pathology seen on MR images of the central nervous system will be presented.
Prerequisite: Admission to program Concurrent with DI 4363.

DI 4363 MRI Physics II: Advanced MRI Procedures, Contrast Agents and Quality Assurance (3 semester credit hours)
Content covers evaluation of organ function and diagnosis of disease process using advanced MRI procedures with emphasis on spectroscopy, functional MR, perfusion/diffusion, and parallel imaging. Course content will also include an in-depth study of MRI contrast agents and quality assurance in MR imaging, including requirements for ACR accreditation in MRI. An introduction to MRI site planning and administration will be included.
Prerequisite: DI 4361

DI 4364 MRI of the Extremities (3 semester credit hours)
This course will then focus on MR imaging and angiography of the extremities that will include a review of the musculoskeletal system anatomy and an understanding of the MR tissue characteristics. Pathology of the musculoskeletal system will be discussed. Differences in anatomy between adults and children and how these differences will affect the MR tissue characteristics will be presented. Content will include a review of specialized coils and optimal scanning techniques for use with children and adults, including field strength specific extremity protocol optimization. Differences in pathology and specific pediatric pathology also will be discussed.
Prerequisite: Concurrent with DI 4361

DI 4365 Special Topics and Future Directions in MRI (3 semester credit hours)
Course content will cover current topics and future directions in MR Imaging: such as interventional MRI including surgery, biopsy, and MR-guided minimally invasive treatment delivery. This includes a review of anatomy, pathology and imaging protocols for MRI. Content will include in-depth study of magnet safety, pharmacology, patient care and assessment that will include magnet-related emergencies in relation to MRI. MRI quality assurance as it relates specifically to MRI will be discussed.
Prerequisite: DI 4361

DI 4366 MRI of the Chest, Abdomen and Pelvis (3 semester credit hours)
Content is designed to provide students with a review of the anatomy of the thorax, mediastinum, abdomen and the pelvis including the male and female reproductive systems with an understanding of the MR tissue characteristics. The student will review motion suppression techniques, such as respiratory and cardiac gating, and the design of specialized receiver coils. The use of magnetic resonance angiography to visualize the blood vessels will be discussed, as well as field strength specific optimization of body imaging protocols. Pathology of the thorax, mediastinum, abdomen and pelvis as demonstrated through MR imaging will be presented.
Prerequisite: DI 4363

DI 4367 MRI Comprehensive Review (3 semester credit hours)
Course content will integrate clinical skills and classroom theories in a comprehensive capstone of key MRI concepts in physics, instrumentation, safety, contrast agents, procedures and quality assurance.
Prerequisites: DI 4361, 4362, 4363, 4364, 4365, 4366

DI 4390 MRI- Internship I – (3 semester credit hours)
In this course the student applies advanced technical skills as well as concepts in the area of MRI. Students will be introduced to the MR imaging suite, equipment and coils. Students will be familiar with MR imaging procedures with consideration to MR safety, preparation of the exam room, scanner interface, selection of coils, patient care and preparation.
Prerequisite: Admission to program.

DI 4391 MRI Internship II (3 semester credit hours)
Course Continuation of DI 4391
Prerequisite: Advisor approval required.

DI 4392 MRI Internship III (3 semester credit hours)
Prerequisite: Admission to program.

DI 4393 CT Internship I (3 semester credit hours)
Advisor Approval Required. In this course the student applies advanced technical skills as well as concepts in the area of professional elective major. Content is designed to provide an overview of CT use in the clinical setting. Understanding the equipment, protocols, patient care and patient positioning will be studied and practiced as they relate to successful CT imaging. The clinical internship will focus on image critique, sectional anatomy, and pathology as seen on images. Internship course progression will be based on competencies completed with the previous internship.
Prerequisite: Admission to program.

DI 4394 CT Internship II (3 semester credit hours)
Course Continuation of DI 4393
Prerequisite: Advisor approval required.

DI 4395 CT Internship III (3 semester credit hours)
Course Continuation of DI 4394
Prerequisite: Advisor approval required

HS 3340 Research Methods (3 semester credit hours)
This course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have the opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references, learn how to make an outline, and write a literature review on their assigned topic. Curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster.

HS 3370 Fundamentals of Writing and Critical Thinking (3 semester credit hours)
This basic writing course stresses both reading and writing skills and is designed to teach students to improve their ability to write logically and develop short essays, brief formal summaries, and reports.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course is designed to provide each student with a fundamental understanding of the concepts of cultural competency, diversity, and inclusion. The course content of each module emphasizes the following seven culturally competent areas of diversity: Building Relationships across Culture; Communication Across Differences; Conflict resolution Across Cultures; Micro-inequities within the Workplace. Diversity and Inclusion; Abilities: A Journey from Exclusion to Inclusion; Spirituality and health care practices.

HS 4111 Medical Law (1 semester credit hour)
This course introduces the student to medical law and case studies in medical imaging and radiation therapy.

Diagnostic Medical Sonography

Diagnostic Medical Sonography is a non-invasive imaging modality that uses high frequency sound waves to produce a dynamic visual image of the internal organs or tissues in the body including abdominal organs, a developing fetus, male or female reproductive organs, and blood flow.

Information Sessions for Prospective Diagnostic Medical Sonography Students

Time: 5:00 - 6:00pm, on the following Thursdays:
February 6, 2014, March 6, 2014, April 3, 2014,
May 1, 2014, June 5, 2014, July 3, 2014, August 7, 2014

Venue:
School of Health Professions, Room Y2.5809
1515 Holcombe Blvd., Houston, TX 77030

For more information and directions, call the Diagnostic Imaging Program 713-792-3455

Degree Offered

Bachelor of Science in Diagnostic Medical Sonography

The program is administered by:

Dean: Shirley Richmond, Ed.D.
Program Director: William Undie, Ed.D., RT(R)
Medical Advisor: Aurelio Matamoros, M.D.

Graduates of this program will have a number of career options as technologists, supervisors, administrators, trainers, researchers, and sales representatives. Areas of employment include hospitals, clinics, private physicians' offices, and industry. Graduates may also choose to work as freelance sonographers for mobile services. Evaluation of the job market and a survey of employers indicate a strong demand for well-trained sonographers.

The educational standards of this program are based on the Diagnostic Medical Sonography National Educational Curriculum.

Upon graduation, participants will be eligible to take the national registry examination administered by the American Registry of Diagnostic Medical Sonography (ARDMS) under category 3A (www.ARDMS.org).

Mission, Vision, and Goals

Mission
The mission of the Diagnostic Medical Sonography Program is to provide the highest quality of education to diagnostic imaging students through formal didactic and state-of-the-art clinical experiences that prepare students to be diagnostic medical sonographers who are focused on patient care, are critical thinkers, and are engaged in lifelong learning.

Vision
We shall be the premier educational program in Diagnostic Medical Sonography by providing innovative curricular, clinical and continuing education services to the diagnostic imaging community and the patients we serve.

Goals
Fulfillment of the program's mission is assessed by the program's effectiveness and the degree to which the program achieves the goals in which our students will academically and professionally:

- Goal: 1. Students will develop a patient care focus by providing superior patient care
- Goal: 2. Students will demonstrate critical thinking skills.
- Goal: 3. Students will adopt a philosophy of life-long learning through continuing education and professional involvement.
- Goal: 4. Students will embrace the MD Anderson core values of caring, integrity and discovery
- Goal: 5 Students will communicate effectively in a variety of settings

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA, and pre-requisite GPA
- Personal qualities such as maturity and professional goals as expressed in the interview and described in reference letters
- Ability to meet the SHP non-academic technical standards
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office.

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

Texas Success Initiative (TSI) All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level coursework will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

The Admissions Committee considers as much information as possible when evaluating an applicant's qualifications for admission including experience in direct patient care contact or in shadowing a professional in the field.

How to apply

1. **Submit all required forms and documentation** to the Application site at the University of Texas Health Science Center Registrar. Please note: At the very beginning of setting up your application on the UTHSCH site, you will need to scroll to the very bottom of the list of Programs to locate **"Diagnostic Medical Sonography"** since the programs are not listed in true alphabetical order. If you need assistance with progressing through the on-line application, call or e-mail the help contact listed on that site.

2. **Complete an interview, by invitation of the Admissions Committee**. An interview is a required part of the admissions process. A final decision on acceptance is made after this

interview. The purpose of the interview is two-fold: It enables you to ask questions in order to evaluate the program for your needs and it gives the program personnel a chance to weigh such factors as your motivation and interpersonal skills.

Student selection is highly competitive and the number of students accepted into the program is limited. All students must be at least 18 years of age prior to the start of any clinical rotation.

Prerequisites

- Associate or Bachelor degree from a regionally accredited institution
- Completion of a minimum of 42 semester credit hours that include:
  - The Texas Core Curriculum - 42 SCH (see table below)
  - College Physics
  -Anatomy and Physiology 1 & 2
- Attendance at an SHP campus information session
- Minimum overall Grade Point Average of 2.5 on a 4.0 scale
- Three professional references
- Experience in direct patient care contact or in shadowing a professional in the field
- Interview panel scores

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) **This must include courses from the following specific areas as indicated:**	**SCH**
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6
MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3

VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHS course content in areas not covered by

the above examination program. Programs may elect to administer examinations that cover material specific to SHS courses with the results being reported to the Registrar.

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 130 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson: At least 40 semester credit hours of advanced (3000/4000) course work.

Graduation occurs in August. **Upon graduation,** participants will be eligible to take the national registry examination administered by the American Registry of Diagnostic Medical Sonography (ARDMS) under category 3A (www.ARDMS.org). The awarding of the degree is not contingent upon a student passing the national certification exam

Clinical Rotations

Students rotate through multiple clinical sites at The Texas Medical Center. The diversity of examination procedures at the respective facilities offers the students broad skills, as well as opportunities for future employment upon graduation.

Curriculum

DS 3301	General Ultrasound I	3
DS 3341	Abdominal Ultrasound	3
DS 3315	Instrumentation lab	3
DS 3352	Sonography Sectional Anatomy	3
HS 3370	Fundamentals of Writing and Critical thinking	3
HS 4100	Issues in Health Care Ethics	1
DS 3302	General Ultrasound II	3
DS 3321	Sonography Physics I	3
DS 3342	Gynecologic Ultrasound	3
DS 3361	Abdominal and Pelvic Pathology	3
HS 4101	Diversity and Cultural Communication	1
DS 3311	Clinical Internship I	3
DS 3303	General Ultrasound III	3
DS 3322	Sonographic Physics II	3
DS 3343	Obstetrics Sonography	3
DS 3362	Gynecologic pathology	3
HS 4111	Medical Law	1
DS 3312	Clinical Internship 11	3
DS 4351	Doppler sonography	3
DS 4362	Obstetrics Pathology	3
DS 4343	Neurosonography and Pediatric sonography	3
DI 4301	Research Techniques in Radiologic Sciences	3

DS 4311	Clinical Internship III	3
DS 4341	Breast Sonography	3
DS 4344	Sonography of Superficial structures	2
DS 4345	Sonography of High Risk Obstetrics	3
DI 4301	Professional Project	2
DS 4353	Sonography Seminar and Capstone Review	2
DS 4312	Clinical Internship IV	3
Total Hours		78

Upon completion of formal didactic and clinical education, students will have demonstrated the professional skills necessary to work with ionizing radiation, radiopharmaceuticals, sound waves and magnetic fields to produce medical images in diagnostic imaging or radiology departments of hospitals and medical clinics or free-standing imaging centers.

For More Information

Please contact:
The University of Texas MD Anderson Cancer Center
Diagnostic Medical Sonography program
School of Health Professions - Unit 2
1515 Holcombe Boulevard
Houston, Texas 77030-4009
713-792-3455

Health Care Disparities, Diversity and Advocacy

This program is approved by the Texas Higher Education Coordinating Board. The program is pending approval by the Southern Association of Colleges and Schools.

Currently no applications are being accepted for this program.

The purpose of the program is to provide the student with specific knowledge and skills related to global health care disparities, diversity and cultural competence in the health care setting and advocating patient centered care. This degree presents the student with unique opportunities to blend the practices of health care disparities, diversity and patient advocacy.

The program will provide a degree to Health Care Disparities, Diversity and Advocacy majors and can be a degree completion program for students who have academic and/or professional experience in a health care related field. The degree is offered in a non-traditional format utilizing hybrid/blended learning. Students may enroll full-time or part-time to accommodate employment obligations.

Graduates can use this education to develop professional growth in their clinical expertise or seek employment in health care disparities, diversity or patient advocacy.

Degree Offered
Bachelor of Science in Health Care Disparities, Diversity and Advocacy

The program is administered by:

- Dean: Shirley Richmond, Ed.D
- Program Director: Shaun T. Caldwell, M.S., RT(R)(T)
- Medical Advisors: Harry R. Gibbs MD, Chief Diversity Officer, Chris Hernandez MBA, Patient Advocacy, Lovell Jones PhD, Health Disparities

Program in Health Care Disparities, Diversity and Advocacy

Mission
The mission of the Health Care Disparities, Diversity and Advocacy program is to provide the highest quality of education to students through formal didactic and practical experiences in the practice of health care disparities, diversity and patient advocacy.

Vision
We shall be the premier provider of education in health care disparities, diversity and patient advocacy based on best practices and research in these professions.

Objectives
Goal: Our students will concentrate on health disparities.

Student Learning Outcomes:

The student will:

1. demonstrate awareness of factors contributing to disparities in health care among certain populations
2. identify resources available for reducing health disparities
3. demonstrate health professionals role in eliminating health disparities

Goal: Our students will be culturally competent

Student Learning Outcomes:

The student will:

1. demonstrate cultural sensitivity
2. analyze barriers to the delivery of health care in selected populations
3. apply solutions to selected concerns in populations studied

Goal: Our students will be patient advocates.

Student Learning Outcomes:

The student will:

1. demonstrate communication techniques in difficult environments
2. evaluate risks in health care institution- patient relationship
3. identify federal, state and local regulations related to patient advocacy

Selection Process
Admission is dependent on factors that include:

- Cumulative GPA, and pre-requisite GPA
- Personal qualities such as maturity and professional goals as expressed in the interview and described in reference letters.
- Ability to meet the SHP non-academic technical standards.
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office. **NOTE: The application to this program will be made available by the** Office of the Registrar

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

All prerequisite course work must be from a regionally accredited college or university.

The applicant must have satisfactorily completed all prerequisite courses listed prior to graduating. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.
Students entering the program must have earned a minimum of 42 semester credit hours of Texas General Education Core Curriculum (see table below).

Candidates who completed the prerequisite courses seven or more years before admission may need to update their academic skills. For specific information, contact the program director.

Minimum overall grade point average of 2.5 on a 4.0 scale.

Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level coursework will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites
Students entering the program must have earned a minimum of 42 semester credit hours of Texas General Education Core Curriculum (see table below).

In addition, applicants must have completed a minimum of 34 semester credit hours of acceptable transferrable credit of elective courses or complete an additional 34 semester credit hours of elective curriculum at The University of Texas M. D. Anderson Cancer Center School of Health Professions.

Applicants who hold nationally recognized certification in a health profession and are graduates of an accredited program may be awarded a maximum of 36 semester credit hours as elective course work. Credit hours given will be evaluated and determined using set criteria developed by the program's admissions committee.

An applicant who has earned a baccalaureate degree from a regionally accredited college or university may be awarded a second such degree by meeting the following requirements:

1. Accepted to UTMDACC SHP
2. Fulfilled all General Education Core curriculum requirements
3. Completed a minimum of 44 hours of the required curriculum
4. Provided supporting documents to the Office of the Registrar.

A minimum of 42 semester credit hours (SCH) that includes:

- The Texas Core Curriculum (see table below)

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	SCH
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6

MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

http://statecore.its.txstate.edu/

About the Texas Core Curriculum Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHS course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHS courses with the results being reported to the Registrar.

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 120 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester credit hours of advanced (3000/4000) course work
- At least 25% of the total semester credit hours required must be taken at MD Anderson

Upon completion of formal didactic curriculum, students will have demonstrated the professional skills necessary to function as an effective agent in health care disparities, diversity, and patient advocacy.

Graduation occurs in August. Prior to graduation, students must successfully complete a final competency examination with a score of 75% or greater.

Curriculum

Required Courses	**Hours**
DI 4300 Research Techniques in Radiologic Science	3
DI 4301 Research Project	3
HS 3270 Critical Thinking in Health Care	2
HS 3370 Fundamentals of Writing	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
HS 4111 Medical Law	1
HS 4311 Health Professions Leadership	3
HS 4312 Global Health Practice	3
HS 4313 Disparities in Health Care	3
HS 4321 Accommodating Differences in the Health Care Setting	3

HS 4322 Mentoring Across Difference	3
HS 4323 Spiritual Health Beliefs	3
HS 4331 Patient Advocacy	3
HS 4332 Healthcare Policy and Practice	3
HS 4342 Professional Internship	3
HS 4346 Independent Projects	3
Total Required Course Credit Hours	**44**
Elective Courses ***Students who choose to complete elective courses at The University of Texas MD Anderson Cancer Center may choose from the course offering below.***	**Hours**
DI 3345 Directed Readings (variable credit hours 1-3)	1-3
DI 3346 Professional Development (repeatable) (variable credit hours 1-3)	1-3
DI 4310 Teaching Strategies in Health Care Education	3
DI 4311 Instructional Design	3
DI 4312 Patient Education	3
DI 4322 Effective Human Resources Management	3
DI 4323 Management Skills for New Supervisor	3
HS 3320 Medical Genetics	3
HS 3333 Statistics	3
HS 3340 Research Methods	3
HS 3347 Current Issues in Health Care	3
HS 4371 Management and Education	3
Total Free Elective Courses Offered	**34**

Course Descriptions

DI 3345 Directed Readings (1-3 semester credit hours)
Directed reading and research, followed by the writing of a report or the creation of a project. Credit hours are based on size, length and depth of paper or project.

DI 3346 Professional Development (Conferences, Workshops, Lectures, Competitions) - Repeatable (1-3 semester credit hours)
Attendance of educational sessions at district, state, regional or national conferences. Consent of instructor required. 12 documented contact hours per each (32 CE) credit for maximum of 3 credits

DI 4300 Research Techniques in Radiologic Science (3 semester credit hours)
This course will teach the student the principles and methods of conducting practical research in health care.

DI 4301 Research Project (3 semester credit hours)
This course will prepare the student to complete a research project.

DI 4310 Teaching Strategies in Health Care Education (3 semester credit hours)
This course will teach the student how to analyze learning theories with emphasis on adult learners and the elements of quality education.

DI 4311 Instructional Design (3 semester credit hours)
This course will instruct the student in the theory and application of instructional design in health care education and training.

DI 4312 Patient Education (3 semester credit hours)

This course will teach the student how to plan, develop and assess patient education products and methods.

DI 4322 Effective Human Resources Management (3 semester credit hours)
This course will teach the student about staff recruitment, retention techniques, and laws related to resource management. Topics include hiring and terminating practices, harassment and discrimination.

DI 4323 Management Skills for the New Supervisor (3 semester credit hours)
This course will teach the student about the transitioning from a Professional Employee to a Supervisor.

HS 3270 Critical Thinking in Health Professions (2 semester credit hours)
This course is designed to provide health profession students with resources for improving critical thinking skills. The course will introduce basic concepts of critical thinking through integration into interactive case studies, problem based scenarios, and project design assignments. The specific objectives of this course coincide with The University of Texas M. D. Anderson Cancer Center School of Health Profession definition of critical thinking.

HS 3320 Medical Genetics (3 semester credit hours)
This course is a study of the role of genetics in medicine including: Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping. A comprehensive review of the cell cycle, mitosis, and meiosis and pedigree analysis is incorporated as well.

HS 3333 Statistics (3 semester credit hours)
This course provides an introduction to statistical techniques. Emphasis will be placed on probability and probability distributions, sampling and descriptive measures, inference and hypothesis testing, linear regression, and analysis of variance.

HS 3340 Research Methods (3 semester credit hours)
This research methods course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have the opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references, learn how to make an outline, and write a literature review on their

assigned topic. Curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster. (Admission to Program)

HS 3347 Current Issues in Health Care (3 semester credit hours)
Current issues and trends in the health care industry and environment affecting health care communities.

HS 3370 Fundamentals of Writing (3 semester credit hours)
This basic writing course is designed to teach students to write clear, well-organized, and mechanically acceptable prose. Students will be introduced to the processes of composing thesis statements, crafting arguments, revision process, citing, and documenting sources in accordance with APA style. In addition, this course will provide an understanding and aid in the development of critical thinking skills in preparation for more advanced course work in the Diagnostic Imaging Program. The course stresses both reading and writing skills. Activities will include exercises designed to reinforce correct grammar, and avoid common sentence structure errors. Skills gained in this course should help students improve their ability to write logically developed short-essay tests and brief, formal summaries and reports. This course is guided by the specific objectives of the The University of Texas MD Anderson Cancer Center School Of Health Professions' Quality Enhancement Plan.

HS 4100 Issues in Health Care Ethics
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competency
This course is designed to provide each student with a fundamental understanding of the concepts of cultural competency, diversity, and inclusion. The course content of each module emphasizes the following seven culturally competent areas of diversity: Building Relationships across Culture; Communication Across Differences; Conflict resolution Across Cultures; Microinequities within the Workplace;. Diversity and Inclusion; Abilities: A Journey from Exclusion to Inclusion; Spirituality and health care practices.

HS 4111 Medical Law
This course introduces the student to medical law and case studies in medical imaging and radiation therapy.

HS 4311 Health Professions Leadership
This course presents effective strategies in management and leadership across cultural differences within a care centric work environment to create trust, respect, and inclusiveness within healthcare teams.

HS 4312 Global Health Practice
This course introduces the student to the socio-cultural, political and economic determinants of health and health status at a global level; understands the impact of cultural, ethical, lifestyle,

social, and economic causational factors that influence cancer prevention, research, treatment, and post care.

HS 4313 Disparities in Health Care
This course introduces research and education which address the determinants of disparities as well as interventions and policies designed to eliminate disparities within cancer care and treatment.

HS 4321 Accommodating Differences in the Health Care Setting
This course explores how the following cultural influences of Mental and Physical Abilities, Sexual Orientation, and Gender Identity impact patient care.

HS 4322 Mentoring Across Difference
This course provides the skills to build successful mentoring relationships across cultural differences.

HS 4323 Spiritual Health Beliefs
This course offers healthcare professionals an awareness of spiritual and religious beliefs and practices so that they will be better informed in providing effective care to patients.

HS 4331 Patient Advocacy
This course encourages the student to critically think about hospital process and to assist patients by providing education and advice regarding patient rights and intervenes as a patient representative when necessary.

HS 4332 Healthcare Policy & Practice
This course provides an understanding of the critical role of systematic evaluation in assessing the effectiveness of health services programs and policies.

HS 4342 Professional Internship

In this course the student applies skills as well as concepts in the area of health care disparities, or health care diversity or patient advocacy.

HS 4346 Independent Projects
This course is designed for individual projects, research, special seminars, or further investigation of emerging technology or profession specific issues. Semester credit hours are assigned in relationship to the complexity of the individual student's goals.

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. It includes management and motivational theories, communication skills, regulatory and accreditation requirements, budget and strategic planning, curriculum design and examination instruction. Course delivery is on-line, interactive, self-paced.

Histotechnology

Histotechnology is the specialty devoted to the application of theoretical knowledge and practical techniques in biologic and chemical sciences in the preparation of tissue samples for microscopic examination.

Degree Offered
Bachelor of Science in Histotechnology (HTL)

The program is administered by:

- Dean: Shirley Richmond, Ed.D.
- Program Director: Mark A. Bailey, M.A., HTL(ASCP)^{CM}
- Education Coordinator: Toysha Mayer, D.H.Sc., MBA, HT (ASCP)
- Senior Health Professions Educator: Hilda Hinojosa, BS, HTL(ASCP)^{cm}
- Medical Advisor: Stanley R. Hamilton, M.D.

Roster of Faculty

Faculty	Degree and School	Teaching Assignments
Mark A. Bailey HTL (ASCP)^{CM} Assistant Professor	M.A., Texas A&M University	• Immunohistochemistry • Theory and Practice of Histotechniques • Theory of Special Staining • Applied Chemistry - Laboratory Operations • Clinical Histotechniques • Laboratory Rotations I, II, III • Medical Terminology
Toysha Mayer D.H.Sc.	Doctorate of Health Sciences (D.H.Sc.) Nova Southeastern University. MBA, University of Phoenix	• Immunohistochemistry • Theory and Practice of Histotechniques • Theory of Special Staining • Applied Chemistry - Laboratory Operations • Clinical Histotechniques Laboratory Rotations I,II,III

Shaun Caldwell Assistant Professor	M.S., Weber State University	• Diversity and Cultural Competence
Stephanie Hamilton Assistant Professor	Ed.D., University of Houston	• Theory and Practice of Cytopreparatory Techniques I, II • Issues in Health Care Ethics
Adjunct faculty		
Mary Ann Ball Lecturer	M.S., University of Texas at Tyler	• Diversity and Cultural Competence
Colleen Gallagher Associate Professor	Ph.D., The Union Institute and University	• Issues in Health Care Ethics
Harry R. Gibbs Associate Professor	M.D., Harvard Medical School	• Diversity and Cultural Competence
Stanley R. Hamilton Professor	M.D., Indiana University School of Medicine	• Human Pathology
Cynthia Maurstad Adjunct Instructor	Ph.D., University of Louisiana, Lafayette	• Pathophysiology for Health Professions

The Program in Histotechnology

Mission

The MD Anderson Cancer Center Program in Histotechnology, in concert with the mission and vision of The University of Texas MD Anderson Cancer Center, is committed to the education of technically and academically competent graduates prepared to meet the immediate and future needs of the Histotechnology profession.

Objectives
The primary objective of the Histotechnology program is to provide entry level histotechnologists who are prepared to perform a wide variety of routine as well as more advanced laboratory techniques such as:

- Immunohistochemistry
- In Situ Hybridization

- Tissue Management

Our graduates are prepared to work in a variety of settings such as hospitals, medical schools, veterinary medicine, research, private independent laboratories, industry and local, state and federal agencies in both urban and rural settings.

Selection Process
Admission is dependent on factors that include:

- Cumulative GPA, Science and Math GPA
- Personal qualities such as maturity
- Professional goals based on the personal essay, interview, reference letters, laboratory experience and employment history
- Ability to meet the SHP non-academic technical standards.
- Race, religion, national origin, veteran status, gender, and disability are not factors considered in the selection process.

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office. See SHP Academic Calendar for application dates.

Nonacademic Requirements
For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

The Bachelor of Science degree is either a one-year or two-year program with entry at either the junior or senior level. Application and supporting documents must be submitted to the Office of the Registrar.

Applicants to the Program of Histotechnology must satisfy the following requirements for admission.

All prerequisite course work must be from a regionally accredited college or university.

The applicant must have satisfactorily completed all prerequisite courses listed prior to graduating. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.

Applicants to the Histotechnology Program must have completed all core curriculum courses required by the Texas Education Code and all biology and chemistry courses required by the

Board of Registry of the American Society for Clinical Pathologists (ASCP)
33 West Monroe Street, Suite 1600
Chicago, IL 60603

Phone: 312-541-4999
Fax: 312-541-499

A minimum grade point average of 2.5 on a 4.0 scale both overall and in science and mathematics courses is required to be considered for admission. Special circumstances may be considered, but at the discretion of the Admissions Committee.

Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites

Prerequisites for the two-year program

A minimum of 60 semester credit hours (SCH) that includes:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 18 SCH

Within the above 60 hours, the following must be included:

- 3 SCH in college mathematics, or statistics which may be satisfied by the Texas Core course selection
- 22 SCH in Biology and Chemistry

Note: 12 of the above 25 SCH may be satisfied by Natural Science Texas Core course selection

Prerequisites for the one-year program

A minimum of 86 semester credit hours (SCH) that includes:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 44 SCH

Within the above 86 hours, the following must be included:

- 18 SCH of upper level division courses (3000, 4000).
- 28 SCH in Biology and Chemistry

Note: 12 of the above 46 SCH may be satisfied by Natural Science Texas Core course selection

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	SCH
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6
MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH)	6

• GOVT 2301 American Government I • GOVT 2302 American Government II	
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

http://statecore.its.txstate.edu/

About the Texas Core Curriculum

Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHS course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHS courses with the results being reported to the Registrar

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 126 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester credit hours of advanced (3000/4000) course work
- At least 25% of the total semester credit hours required must be taken at MD Anderson

Graduation occurs in August. Upon graduation, students are eligible to take the national certification exam in histotechnology given by the American Society for Clinical Pathology (ASCP) board of registry. Please check with the program director for application deadlines and exam dates. Upon passing either exam, the student is considered to be a certified histotechnologist. The awarding of the degree is not contingent upon a student passing the national certification exam.

Curriculum

This intensive two-year program is composed of a didactic phase followed by directed clinical training at affiliated hospitals and laboratories. During the didactic phase, formal lectures, demonstrations and rotations through clinical laboratories provide experience in routine and specialized procedures.

Laboratory sessions are coordinated with lectures and cover the fundamentals of diagnostic laboratory procedures and are included in the didactic phase. The program maintains an extensive collection of reference books, microscopic slides and projection slides for use in lectures and independent study.

Students are expected to maintain high academic performance and display appropriate professional and ethical behavior during all phases of their education and training.

Clinical Affiliates

The Program in Histotechnology has developed affiliations with reference labs and medical institutions in Houston, so that students will develop expertise in a variety of settings and experience the breadth of opportunity available to a certified histotechnologist. During the clinical phase of instruction, training and supervision are provided in affiliated clinical laboratories:

Austin, TX
Seton Family of Hospitals

Cypress, TX
North Cypress Medical Center

Houston, TX
Applied Diagnostics
Harris Health System

Memorial Hermann Southwest Hospital
Houston Methodist Hospital – TMC
University of Texas Medical School -TMC

r**Accreditation**

The Histotechnology program is accredited by, and the curriculum conforms to the standards published and monitored by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)
5600 N. River Rd., Suite 720
Rosemont, IL 60018-5119
Phone: 773-714-8880
Fax: 773-714-8886

Course listings

Histotechnology Junior Year:
The Laboratory Sciences programs admits students at the Junior Year level who share a Junior Year curriculum consisting of:

- Shared core courses
- Program-specific core courses
- Program-specific elective courses

Histotechnology(HISTO): Junior Year courses	SCH
Laboratory Sciences: shared core courses	
HS 3102 Molecular Techniques Lab	1
HS 3210 Laboratory Mathematics	2
HS 4310 Medical Microbiology	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
TOTAL CORE COURSES SCH	**8**
HISTO Program Core	
HS 3110 Medical Terminology	1
HS 3310 Introduction to Quality in Health Care	3
HS 3300 Immunology	3
HS 3320 Medical Genetics	3
HS 3340 Research Methods	3
TOTAL HISTO PROGRAM CORE SCH	**13**
HISTO Program Electives, by Semester:	

FALL ELECTIVES: 4hrs from list below	**4**
HS 3270 Critical Thinking in Health Professions	2
HS 4111L Medical Microbiology Lab	1
HS 4160 Critical Scientific Analysis	1
HS 3330 Pathology of Body Fluids	3
SPRING ELECTIVES: 3hrs from list below	**3**
DI 4310 Education Methodologies	3
HS 3333 Statistics	3
TOTAL HISTO JUNIOR YEAR SCH	**28**

HISTO Senior Year** Courses	SCH
CT 4102 Theory and Practice of Cytopreparatory Techniques I	1
CT 4111 Theory and Practice of Cytopreparatory Techniques II	1
HS 3254 Immunohistochemistry	2
HS 4300 Pathophysiology	3
HT 4141 Applied Chemistry - Laboratory Operations I	1
HT 4142 Applied Chemistry - Laboratory Operations II	1
HT 4312 Theory & Practice of Histotechniques I	3
HT 4399 Special Topics in Histotechnology	3
HT 4413 Theory & Practice of Histotechniques II	4
HT 4444 Theory of Special Stains	4
HT 4521 Histotechniques Laboratory Rotation I	5
HT 4522 Histotechniques Laboratory Rotation II	5
HT 4523 Histotechniques Laboratory Rotation III	5
Total	**38****

****Students entering the School of Health Professions for the first** time at the Senior level must take the following additional required courses that are described in the Junior Year for Laboratory Sciences section of the catalog:

HS 4100 Issues in Health Care Ethics (1)**
HS 4101 Diversity and Cultural Competence (1) **

Course Descriptions

HS series course descriptions, including Junior Lab Sciences

HS 3102 Molecular Techniques Laboratory (1 semester credit hour)
A study of the laboratory skills involved in transporting, preparing and reporting final results of specimens that include blood, bone marrow and solid tissue samples. The course will provide participants with hands-on laboratory experience in: performing molecular techniques such as DNA extraction, purification and quantification; preparing and viewing PCR products and DNA fingerprints via gel electrophoresis and bacterial transformation. (Admission to Program)

HS 3110 Medical Terminology (1 semester credit hour)
An introduction to medical terminology. Emphasis on word roots, prefixes, suffixes, spelling and analysis of unfamiliar terms. Additional background information on the anatomy that relates to various body systems will be discussed.

HS 3120 Introduction to Cytogenetics (1 semester credit hours)
A detailed study of human G-banded chromosomes. Includes instruction in banding pattern recognition and polymorphic variation. Includes classroom instruction and hands-on experience.

HS 3203 Advanced Molecular Techniques (2 semester credit hours)
This is a continuation of the previous introduction to molecular techniques laboratory course. Emphasis on performing additional molecular techniques such as, but not limited to various DNA extraction methods, amplification methods, electrophoresis, and fluorescent in-situ hybridization.

HS 3210 Laboratory Math (2 semester credit hours)
The basic principles and theory of clinical, biochemical, and analytical laboratory math related calculations. It includes basic operations such as problem solving using percentiles, rates, ratios, mole ratios, molality, pH, conversions, solving for proportions and more.

HS 3254 Immunohistochemistry (2 semester credit hours)
A comprehensive course that deals with the fundamentals of immunohistochemistry as applied to the theory and practical techniques in histopathology. The students acquire basic knowledge of how immunology is applied in the development of immunohistochemistry reagents and techniques. Emphasis will be placed on the clinical significance of diagnostic and prognostic indicators used in immunohistochemistry techniques. Troubleshooting and standardization of reagents are emphasized.

HS 3270 Critical Thinking in Health Professions (2 semester credit hours)
This course is designed to provide health professions students with resources for improving critical thinking skills. The course will introduce basic concepts of critical thinking through integration into interactive case studies, problem based scenarios, and project design assignments. The specific objectives of this course coincide with the University of Texas MD Anderson Cancer Center School of Health Professions' definition of critical thinking.

HS 3300 Immunology (3 semester credit hours)
This course focuses on the basic concepts in immunology, and covers general properties of

immune responses; cells and tissues of immune system; lymphocyte activation and specificity; effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation. Course delivery is a blend of lecture and on line, self-paced activities.

HS 3310 Introduction to Quality in Healthcare (3 semester credit hours)
This course will provide an overview of the history, development and application of quality concepts. The components of quality management, quality assurance and quality control will be addressed through discussions and assignments on the history of quality, the different approaches to quality, such as Six Sigma and ISO standards, and how to define, implement and ensure compliance to the quality assurance and quality control process.

HS 3320 Medical Genetics (3 semester credit hours)
This course is a study of the role of genetics in medicine including: Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping. A comprehensive review of the cell cycle, mitosis, and meiosis and pedigree analysis is incorporated as well.

HS 3330 Pathology of Body Fluids (3 semester credit hours)
This course is a study of the anatomy and physiology of the kidney and the formation, elimination and composition of urine. Various body fluids (CSF, Synovial, Plural, Serous, etc.) will be study and associations made with various disease states. Interpretation of urinary and body fluids elements, chemical assays and the correlation with normal and abnormal physiology: Course delivery is a blend of lecture and on line, self-paced activities.

HS 3333 Statistics (3 semester credit hours)
This course provides an introduction to statistical techniques. Emphasis will be placed on probability and probability distributions, sampling and descriptive measures, inference and hypothesis testing, linear regression, and analysis of variance.
(Prerequisite HS 3101)

HS 3340 Research Methods (3 semester credit hours)
This research methods course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have the opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references, learn how to make an outline, and write a literature review on their assigned topic. Curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster. (Admission to Program)

HS 3370 Fundamentals of Writing and Critical Thinking (3 semester credit hours)
This basic writing course stresses both reading and writing skills and is designed to teach students to improve their ability to write logically and develop short essays, brief formal summaries, and reports.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional

practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course content is designed to create an awareness of ethnocentrism and a beginning understanding of cultural similarities and diversity. It provides the student with knowledge of the concepts of cultural relativity, cultural integration and variation in cultural values, organization and institutions.

HS 4111L Medical Microbiology Student Laboratory (1 semester credit hour)
The course utilizes biochemical, morphological, and serological techniques to illustrate concepts from the lecture course relating to microbial structure, metabolism, virulence, and transmission. Students also receive instruction on proper technique and procedures for a number of different tests, including culturing, staining, carbohydrate utilization, immunoassays, and microscopy.

HS 4160 Critical Scientific Analysis (1 semester credit hour)
Students will analyze current scientific publications for research questions, hypothesis, study design and statistical analysis and the application of proper scientific formats in the clinical laboratory professions. Students will complete pre-session assignments, participate in group discussion & present their group findings.

HS 4161 Seminar in Health Care (1 semester credit hour)
Seminar based course covering topics in the Clinical Laboratory Sciences

HS 4170 Special Topics I (1 semester credit hour)
A review of the principles of mathematics and statistics used in the clinical laboratories, this course presentation includes an introduction to the selection and operation of a laboratory information system.

HS 4300 Pathophysiology (3 semester credit hours)
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topic covered includes central concepts of pathophysiology of the cells and tissues and alterations on organs and systems with an emphasis on carcinogenesis. Appropriate diagnostic and treatment procedures are covered.

HS 4310 Medical Microbiology (3 semester credit hours)
This course is the study of the utilization of morphological, biochemical, serological, disease inducing characteristics for microorganism, fungi, mycobacterium and virus identification. Course delivery a blend of lecture and on-line, self-paced activities.

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. It includes management and motivational theories, communication skills, regulatory and accreditation requirements, budget and strategic planning, curriculum design and examination instruction.

Senior Year Course Descriptions

CT 4102 Theory and Practice of Cytopreparatory Techniques I (1 semester credit hour)
The course consists of the basic study and practice of techniques used for handling cytological specimen preparation and fixation and staining of specimens for cytological study, including compliance with laboratory safety, biohazard precautions and HPV testing.

CT 4111 Theory and Practice of Cytopreparatory Techniques II (1 semester credit hour)
The course consists of the advanced study and practice of techniques used for handling specimen preparation, fixation and staining of specimens for cytological study including compliance with laboratory safety and biohazard precautions. Special techniques include Thin-Prep processing, Autoctye preparation, Ficoll-Hypaque technique, cell block preparation and special stains (Gomori's methenamine silver and Diff-quick stains).

HS 3254 Immunohistochemistry (2 semester credit hours)
A comprehensive course that deals with the fundamentals of immunohistochemistry as applied to the theory and practical techniques in histopathology. The students acquire basic knowledge of how immunology is applied in the development of immunohistochemistry reagents and techniques. The course provides hands-on experience in performing immunohistochemistry staining procedures using different detection systems to localize and visualize reactions in histological and cytologic preparations. Emphasis will be placed on the clinical significance of diagnostic and prognostic indicators used in immunohistochemistry techniques. Troubleshooting and standardization of reagents are emphasized in this course.

HS 4300 Pathophysiology (3 semester credit hours)
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topic covered includes central concepts of pathophysiology of the cells and tissues and alterations on organs and systems with an emphasis on carcinogenesis. Appropriate diagnostic and treatment procedures are covered.

HT 4141 Applied Chemistry - Laboratory Operations I (1 semester credit hour)
In this course, students will study the applications of laboratory operations. This course will review the metric system as utilized and applied to histotechnology. General staining considerations, decalcification, solution preparations and safety in the laboratory will be emphasized.

HT 4142 Applied Chemistry - Laboratory Operations II (1 semester credit hour)
This course is a continuation of HT 2141 with emphasis on the laboratory operations as applied to chemistry of special staining techniques in the microscopic identification of carbohydrates, lipids, nucleic acids, enzymes, amyloid, pigments and minerals. Students will prepare reagents to use in performing these special staining techniques. Laboratory management principles will also be discussed.

HT 4312 Theory and Practice of Histotechniques I (3 semester credit hours)
This course consists of the principles of routine histologic techniques and the basic principles, components and use of instruments in the histopathology laboratory. The students will acquire

basic knowledge in the theory of fixation and processing/embedding for routine tissue processing staining Students will also acquire basic knowledge in the theory and practical application of microtomy, cryosectioning, and routine staining. Students will learn to use various chemicals and equipment. Preventive maintenance, troubleshooting and comparison of types of equipment are also discussed. Principles and establishment of quality control methods and maintenance of records are presented. Current federal regulations dealing with accreditation of laboratories and safety procedures are also discussed.

HT4399 Special Topics in Histotechnology (3 semester credit hours)
This course consists of advanced level practicum project of selected phases of tissue embedding; cryosectioning; microtomy; routine and special staining; and immunohistochemistry. Emphasis will be placed on program capstone review in preparation of the ASCP BOC examination.

HT 4413 Theory and Practice of Histotechniques II (4 semester credit hours)
The course is a continuation of HT 4312, and consists of the principles of routine histologic techniques and the basic principles, components and use of instruments in the histopathology laboratory. The students will acquire intermediate to advanced knowledge in the theory of fixation and processing/embedding for routine tissue processing. Students will also acquire intermediate to advanced knowledge in the theory and practical application of microtomy, cryoscectioning, and routine staining. Students will learn to use various chemicals and equipment. Preventive maintenance, troubleshooting and comparison of types of equipment are also discussed. Principles and establishment of quality control methods and maintenance of records are presented. Current federal regulations dealing with accreditation of laboratories and safety procedures are also discussed.

HT 4444 Theory of Special Stains (4 semester credit hours)
This course studies the theory underlying the principles and techniques of special staining as applied to microscopic identification of connective tissue, muscle, neurological tissues, carbohydrates, lipids, proteins, blood elements, pigments and minerals. The clinical significance of these stains in diagnoses will be discussed.

HT 4521 Histotechniques Laboratory Rotation I (5 semester credit hours)
This course consists of supervised beginning-level clinical practice in the histopathology student laboratories. Students will rotate through selected areas of the histopathology laboratory to include tissue processing, embedding, microtomy, routine and special staining.

HT 4522 Histotechniques Laboratory Rotation II (5 semester credit hours)
This course involves supervised intermediate-level clinical laboratory practice at MD Anderson and affiliate sites in selected areas of histopathology to include frozen sectioning, tissue processing and embedding, decalcification, transmission electron microscopy, microtomy and routine and special staining.

HT 4523 Histotechniques Laboratory Rotation III (5 semester credit hours)
This course involves supervised advanced-level clinical laboratory practice at affiliate sites in

specialized areas of histopathology including frozen sectioning, special staining, *in situ* hybridization, microtissue arrays and cytotechnology.

Medical Dosimetry

Medical Dosimetrists work closely with the radiation oncology team: radiation oncologists, medical physicists, and radiation therapists to create customized radiation treatment plans designed to target cancer while sparing normal tissue. Students acquire the professional skills of dose calculation, treatment design and quality assurance through intensive classroom and clinical education.

Degree Offered
Bachelor of Science Degree in Medical Dosimetry

The program is administered by:

- Dean: Shirley Richmond, Ed.D.
- Program Director: Mahsa Dehghanpour, Ed.D., CMD
- Education Coordinator Jamie Baker, M.Ed., CMD
- Medical Advisor: Ritsuko Komaki, M.D.

Roster of Faculty

Faculty	Degree and School	Teaching Assignments
Mahsa Dehghanpour Assistant Professor	Ed.D., University of Houston	• Introduction to Medical Dosimetry • Cross Sectional Anatomy • Aspects of Radiation Oncology • External Beam Dosimetry • Medical Dosimetry Physics I & II • Clinical Education I, II & III • Research Design & Statistics I & II • Clinical Radiation Oncology I & II • Brachytherapy Dosimetry • Radiation Physics
Jamie Baker Education Coordinator	M.Ed., University of Phoenix	• Cross Sectional Anatomy • Medical Dosimetry Physics I & II • Brachytherapy Dosimetry • Aspects of Radiation Oncology

		• Research Design & Statistics I & II • Introduction to Treatment Planning I & II • Introduction to Clinical Medical Dosimetry
Adjunct Faculty		
Peter A. Balter Assistant Professor	Ph.D., The University of Texas Health Science Center at Houston	Radiation Physics
James D. Cox Professor	M.D., University of Rochester School of Medicine	Radiation Oncology
Michael T. Gillin Professor	Ph.D., University of San Francisco	Proton Dosimetry
William F. Hanson Research Professor	Ph.D., University of Tennessee	External Beam Dosimetry
Jennifer Johnson Senior Medical Physicist	M.S., University of Kentucky	Medical Dosimetry Physics
Ritsuko Komaki Professor	M.D., Hiroshima University School of Medicine	Clinical Radiation Oncology

The Program in Medical Dosimetry

Mission
To provide the highest quality of didactic and technologically advanced clinical education in Medical Dosimetry and to graduate professional practitioners who are valued by radiation oncology employers, display precision treatment planning and assessment skills, and remain active in the professional community and learning throughout their careers.

Vision

We shall be the premier educational program in medical dosimetry by providing innovative curricular, clinical and continuing education services to The University of Texas MD Anderson Cancer Center, the State of Texas and the world.

Goals

- Students will be clinically competent.

- Students will display critical thinking skills.
- Students will practice ethically and determine the importance of professional growth.
- Students will display effective communication skills.
- The program will provide the community with entry level medical dosimetrists.

Objectives
The Program in Medical Dosimetry is designed to prepare students for the technical, theoretical and psychological aspects of a career in this field. Students acquire the professional skills of dose calculation, treatment design and quality assurance through intensive classroom and clinical education under the supervision of educated, experienced medical dosimetrists, physicists and radiation oncologists.

Selection Process

Admission is dependent on factors that include:

- Overall undergraduate GPA
- Personal qualities such as maturity and professional goals, as well as academic capability as demonstrated in the interview and described in reference letters.
- Ability to meet the SHP non-academic technical standards.

Race, religion, national origin, veteran status, gender, and disability are not factors considered in the selection process
Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office.

Nonacademic Requirements
For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

The Bachelor of Science in Medical Dosimetry is two-year program with entry at the junior level. Application and supporting documents must be submitted to the Office of the Registrar. Applicants to the Program in Medical Dosimetry must satisfy the following requirements for admission to the Bachelor of Science degree program.

All prerequisite course work must be from a regionally accredited college or university.

The applicant must have satisfactorily completed all prerequisite courses listed prior to graduation. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.

Candidates who completed the prerequisite courses seven or more years before the application

may be required to update their academic skills. For specific information, contact the program director.

A minimum cumulative grade point average of 2.5 on a 4.0 scale is required.

Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites for 2013 admission into the Program
A minimum of 50 semester credit hours (SCH) that include:

- The Texas Core Curriculum – 42 SCH (see table below)
- Anatomy and Physiology – 8 SCH

Prerequisites for 2014 admission into the Program
A minimum of 60 semester credit hours (SCH) that include:

- The Texas Core Curriculum – 42 SCH (see table below)
- Anatomy and Physiology – 8 SCH
- General Physics I and II – 8 SCH
- Calculus I and II – 6 SCH

*Note: 12 SCH of the above 16 SCH of science courses may be satisfied by the Texas Core Natural Sciences course selection as described below

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	**SCH**
COMMUNICATION (6 SCH) • ENGL 1301: English Composition I • ENGL 1302: English Composition II	6
MATHEMATICS (3 SCH) • MATH 1314: College Algebra or higher	3
NATURAL SCIENCES (12 SCH)	12

Courses in biology, chemistry, physics, geology or other natural sciences	
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301: United States History I • HIST 1302: United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301: American Government I • GOVT 2302: American Government II	6
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

About the Texas Core Curriculum: Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

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- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program

faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHP course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHP courses with the results being reported to the Registrar.

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Each candidate for a baccalaureate degree must complete a minimum of 136 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester credit hours of advanced (3000/4000) course work
- At least 25% of the total semester credit hours required must be taken at MD Anderson

If a student has previously taken one or more of the courses in the medical dosimetry curriculum, the student may be exempt from re-taking them in the Medical Dosimetry Program. However, in order to maintain full-time student status in the Medical Dosimetry Program, the student is required to enroll in the offered elective courses at the School of Health Professions

Graduation occurs in August. Upon graduation, students are eligible to take the national certification exam in Medical Dosimetry given by the: Medical Dosimetrist Certification Board (MDCB). Please check with the program director for application deadlines and exam dates. Upon passing the exam, the student is considered a Certified Medical Dosimetrist (CMD). The awarding of the degree is not contingent upon a student passing the national certification exam.

Curriculum

This intensive two-year program is composed of a didactic phase followed by directed clinical training at affiliated hospitals and laboratories. During the didactic phase, formal lectures cover dose calculations, treatment design, and quality assurance. Treatment planning laboratory sessions complement the lecture series.

Current Affiliations
During the clinical phase of instruction, training and supervision are provided in a variety of UT MD Anderson Cancer Center clinical sites at:

- The University of Texas MD Anderson Cancer Center, Houston, TX
- The Proton Therapy Center at MD Anderson Main Campus, Houston, TX
- The MD Anderson Regional Care Center in Nassau Bay, TX
- The MD Anderson Regional Care Center in Katy, TX
- The MD Anderson Regional Care Center in Sugar Land, TX
- The MD Anderson Regional Care Center in the The Woodlands, TX

Additional Affiliation site: Texas Oncology, Presbyterian Cancer Center, Dallas, TX

Accreditation
The Program is accredited by and has conformed its curriculum to the standards and guidelines published and monitored by the:

Joint Review Committee on Education in Radiologic Technology (JRCERT)
20 N. Wacker Drive Suite 2850
Chicago, IL 60606-3182
Phone: (312) 704-5300
Fax: (312) 704-5304
www.jrcert.org
Email: mail@jrcert.org

Course Listings

The table below represents the Required Professional Courses students must take during the two-year program.
Junior/Senior Curriculum

Prefix and Number	Required Professional Courses	SCH
HS 4100	Issues in Health Care Ethics	1
HS 4101	Diversity and Cultural Competence	1
HS 4300	Pathophysiology for Health Professions	3
MD 3201	Introduction to Radiation Treatment	2
MD 3302	Introduction to Treatment Planning I	3
MD 3303	Introduction to Treatment Planning II	3
MD 3404	Introduction to Clinical Medical Dosimetry	4
MD 4102	Anatomy for Radiation Oncology	1
MD 4104	Aspects of Radiation Oncology	1
MD 4210	Radiation Biology	2
MD 4300	Introduction to Medical Dosimetry	3
MD 4301	Medical Dosimetry Physics I	3
MD 4302	Brachytherapy	3
MD 4303	Research Design and Statistics I	3
MD 4305	Medical Dosimetry Physics II	3
MD 4306	Research Design and Statistics II	3
MD 4309	Interstitial and Intracavitary Dosimetry	3
MD 4504	Clinical Education I	5

MD 4617	Clinical Education II	6
RT 4101	Radiation Safety and Protection	1
MD 4211	Clinical Radiation Oncology I	2
MD 4212	Clinical Radiation Oncology II	2
MD 4510	Clinical Education III	5
MD 4508	External Beam Calculations	5
MD 4401	Radiation Physics	4
Sub-Total Jr./Sr curriculum		72

Required Courses

If a student has taken a required course as a pre-requisite prior to entering the program, then that student will not be required to repeat the course, but must substitute the course with a **Free Elective** course with equivalent credit hours in order to fulfill the minimum required SCH for graduation from the Medical Dosimetry program.

Required courses (for students who have **not** taken these courses prior to entering the Medical Dosimetry program)

Prefix and Number	Course	SCH
MD 2108	Physics Lab I for Health Professions	1
MD 2109	Physics Lab II for Health Professions	1
MD 2310	Calculus I	3
MD 2311	Calculus II	3
MD 2312	General Physics I for Health Professions	3
MD 2313	General Physics II for Health Professions	3
Subtotal for Physics/Calculus		**14**
TOTAL SCH for Program		**86**

Free Elective Courses (for students who have already taken the above required courses prior to entering the program, but who need fulfill the minimum SCH required for graduation from the Medical Dosimetry program)

Prefix and Number	Course	SCH
HS 3340	Research Seminar	3
HS 3110	Medical Terminology	1
HS 4111	Medical Law	1

MD 4201	Medical Dosimetry Review	2
RT 4199	Special Projects	1
RT 4309	Special Applications in Radiation Oncology	3
DI 4310	Teaching Strategies in Health Care Education	3
DI 4318	Promotional Strategies in Radiologic Sciences	3
DI 4320	Current Trends in Health Care Management	3
DI 4322	Effective Human Resources Management	3
DI 4323	Management Skills for the New Supervisor	3

NOTE: Additional courses may be used as free electives with the approval of the Program Director.

Course Descriptions

DI 4310 Teaching Strategies in Health Care Education (3 SCH)
This course will teach the student how to analyze learning theories with an emphasis on adult learners and the elements of quality education.

DI 4318 Promotional Strategies in Health Management (3 SCH)
This course will teach the student how to develop patient, physician, and community programs to promote health care services.

DI 4320 Current Trends in Health Care Management (3 SCH)
This course will prepare the student to analyze and manage trends in health care management and delivery systems.

DI 4322 Effective Human Resources Management (3 SCH)
This course will teach the student about staff recruitment, retention techniques, and laws related to resource management. Topics include hiring and terminating personnel and issues of harassment and discrimination.

DI 4323 Management Skills for the New Supervisor (3 SCH)
This course will teach the student about transitioning from a Professional Employee to a Supervisor

HS 3110 Medical Terminology (1 semester credit hours)
This course is an introduction to medical terminology. Emphasis is on word roots, prefixes, suffixes, spelling and analysis of unfamiliar terms. Additional background information on the anatomy that relates to various body systems will be discussed. Included is a review of the principles of mathematics and statistics used in clinical laboratories. Course presentation includes introduction to the operation of a laboratory information system. Course delivery is on-line, interactive, self-paced. (Admission to Program)

HS 3340 Research Seminar (3 semester credit hours)
This course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references and learn how to make an outline and write a literature review on their assigned topic. The curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster. (Admission to Program)

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course content is designed to create an awareness of ethnocentrism and a beginning understanding of cultural similarities and diversity. It provides the student with knowledge of the concepts of cultural relativity, cultural integration and variation in cultural values, organization and institutions.

HS 4111 Medical Law (1 semester credit hour)
This course introduces the student to medical law and case studies in medical imaging and radiation therapy.

HS 4300 Pathophysiology for Health Professions (3 semester credit hours)
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topics covered include central concepts of pathophysiology of the cells and tissues and alterations in organs and systems with an emphasis on carcinogenesis. Appropriate diagnostic and treatment procedures are covered.

MD 2108 Physics Lab I for Health Professions (1 semester credit hour)
This course is a laboratory work for the MD2312 which presents methods of experimental and analysis and prepares students for upper level physics courses.

MD 2109 Physics Lab II for Health Professions (1 semester credit hour)
This course is a laboratory work for the MD2313 which presents methods of experimental and analysis and prepares students for upper level physics courses.

MD 2310 Calculus I (3 semester credit hours)
This course presents the concept of limit, derivations, and integrals.

MD 2311 Calculus II (3 semester credit hours)
Pre-requisite to this course is MD 2310. This course is continuation of MD 2310 which includes the study of integration, emphasizing applications and special techniques.

MD 2312 General Physics I for Health Professions (3 semester credit hours)
This course presents fundamental principles of mechanics, including motion, Newton's laws, work, energy, momentum, rotation, and gravity as well as oscillation and mechanical laws.

MD 2313 General Physics II for Health Professions (3 semester credit hours)
This course presents fundamental principles of electricity, magnetism, electromagnetic waves, light, optics, thermodynamics, and topics in modern physics.
Prerequisite Course: MD 2312

MD 3201 Introduction to Radiation Treatment (2 semester credit hours)
This course will introduce students to different aspects of radiation treatment including machine parameters, treatment administration and patient care issues.

MD 3302 Introduction to TX Planning I (3 semester credit hours)
This is a lab based course which provides students with the hands on experiences. In this course, junior students will be taught about the Pinnacle treatment planning system and learn the procedures needed to develop radiation treatment plan for different disease sites.

MD 3303 Introduction to TX Planning II (3 semester credit hours)
This course is a continuation of MD 3302. In this course students learn the procedures to develop more complex treatment planning for different disease sites. Prerequisite Course: MD 3302

MD 3404 Introduction to Clinical Medical Dosimetry (4 semester credit hours)
In this course students learn about different aspects of the medical dosimetry profession including treatment planning, image fusion, verification calculation, and plan presentation.
Prerequisite Course: MD 3303

MD 4102 Anatomy for Radiation Oncology (1 semester credit hour)
This course presents each student with an anatomical study of the human body in topographical, sagittal, transverse and coronal planes. Treatment planning techniques for the body sections are discussed.

MD 4104 Aspects of Radiation Oncology (1 semester credit hour)
This course presents the student with psychosocial aspects of oncologic patient care. Topics include: thanatology and bereavement, body image and emotions in illness and treatment. Additionally, students are presented with aspects of dosimetry practice other than treatment planning which include: electronic charting, treatment error corrections, and other professional opportunities.

MD 4201 Medical Dosimetry Review (2 semester credit hours)
In this course students attend a 4 day seminar which review the material needed for preparation to medical dosimetry certification exam. Topics include math review, radiation physics, radiobiology, external beam parameters, external beam properties, electron and proton characteristics, quality assurance, brachytherapy, treatment machines, machine calibration, radiation safety, and treatment planning.

MD 4210 Radiation Biology (2 semester credit hours)
This course presents the students with cellular, subcellular and tissue biology. The course requires the students to discriminate between types of cellular damage caused by ionizing radiation. Additionally, students are exposed to proliferation kinetics, fractionated radiotherapy, acute and chronic effects of radiation on human cells and body systems, principles of linear energy transfer and relative biologic effectiveness and the impact of radiosensitizers and radioprotectors on patient treatment.

MD 4211 Clinical Oncology I (2 semester credit hours)
This course presents an in-depth study of multidisciplinary treatment of the cancer patient from the clinician's viewpoint. Students are required to master concepts specific to site-specific disease including: histopathology, etiologic and epidemiology factors, detection and diagnosis, tumor stage and grade, routes of metastases, dose fractionation and prognostic factors. This course is designed to approach each cancer type by anatomic system, addressing treatment factors with increasing degrees of complexity.

MD 4212 Clinical Oncology II (2 semester credit hours)
This course is a continuation of MD 4211.

MD 4300 Introduction to Medical Dosimetry (3 semester credit hours)
This course is an introduction to medical dosimetry which includes introduction to terms used in radiation oncology, math review, characteristics of radiation used for treatment, SSD and SAD techniques of dose calculation, verification calculation, and treatment planning software training. Students are assigned to work individually on a case study and present their findings to their peers in the classroom setting.

MD 4301 Medical Dosimetry Physics I (3 semester credit hours)
This course teaches basic theories and calculations for radiation oncology including laboratory sessions on radiation measurement.

MD 4302 Brachytherapy Dosimetry (3 semester credit hours)
This course teaches the physics of brachytherapy including source characteristics, dosimetry systems and dose calculations.

MD 4303 Research Design and Statistics I (3 semester credit hours)
This course is an introduction to basic research concepts and statistics. Development of a project begins.

MD 4305 Medical Dosimetry Physics II (3 semester credit hours)
This course is a continuation of MD 4301 that teaches basic theories and calculations for radiation oncology.
Prerequisite Course: MD 4301

MD 4306 Research Design and Statistics II (3 semester credit hours)
This course is a continuation of MD 4303, with projects finalized. Students conduct laboratory

experiments to reach a hypothesis of the study at hand.
Prerequisite Course: MD 4303

MD 4309 Interstitial and Intracavitary Dosimetry (3 semester credit hours)
This is a laboratory course that teaches brachytherapy treatment planning techniques.
Prerequisite Course*:* MD 4302.

MD 4401 Radiation Physics (4 semester credit hours)
In this course, students will learn about applications of radiation in medicine. Radiation measurement, different types of radiation detectors, late effects of radiation, dose to non-target structures, impact of treatment modifiers, fetal dose consideration, electronic risk following pace maker irradiation, and different imaging modalities will be discussed.

MD 4504 Clinical Education I (5 semester credit hours)
In this course students are supervised in a clinical practice setting and learn different aspects of advanced medical dosimetry. Students are involved in hands-on activities in the clinical practice setting.
Prerequisite Course*:* MD 3404

MD 4508 External Beam Dosimetry (5 semester credit hours)
This is a continuation of MD 4301 and MD 4305 that teaches basic theories and calculations for radiation oncology.
Prerequisite Courses: MD 4301, 4305

MD 4510 Clinical Education III (5 semester credit hours)
In this course students are supervised in a clinical practice setting and learn different aspects of advanced medical dosimetry. Students are involved in hands-on activities in the clinical practice setting.
Prerequisite: MD 4617

MD 4617 Clinical Education II (6 semester credit hours)
In this course students are supervised in a clinical practice setting and learn different aspects of advanced medical dosimetry. Students are involved in hands-on activities in the clinical practice setting.
Prerequisite Course*:* MD 4504

RT 4101 Radiation Safety and Protection (1 semester credit hour)
This course requires the student to demonstrate a detailed understanding of atomic structure, types of ionizing radiation, radiation detection devices, units of measurement, personal and public radiation safety practices and dose limitations from brachytherapy sources and external beam radiation devices. The course identifies radiation regulatory and advisory agencies and the specific requirements of each.

RT 4199 Special Projects (1 semester credit hour)
This course is designed for individual projects, research, special seminars, or further investigation of topics in radiation oncology.

RT 4309 Special Applications in Radiation Oncology (3 semester credit hours)
This course presents principles of advanced practice, such as fusion imaging, respiratory gating, and stereotactic radiosurgery, as well as current advancements in treatment techniques.

Molecular Genetic Technology

Molecular genetic technologists study the role of genetics in medicine, Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping.

Degree Offered
Bachelor of Science Degree in Molecular Genetic Technology

The program is administered by:
Dean: Shirley Richmond, Ed.D.

Program Director: Peter Hu, Ph.D., MLS(ASCP)^{CM}CG^{CM},MB^{CM}

Education Coordinator: Irene Newsham, Ph.D., MB(ASCP)CM

Senior Health Professions Educator: Mary Coolbaugh-Murphy, Ph.D., MB(ASCP)CM

Senior Health Professions Educator: Vibuhti Srivastava, Ph.D., MB(ASCP)CM

Medical Advisor: Raja Luthra, Ph.D.

Faculty Roster

Faculty	Degree and School	Teaching Assignments
Peter Hu MLS(ASCP)^{CM}CG^{CM},MB^{CM} Associate Professor	Ph.D., TUI University	• Biology • Cytogenetics • Molecular Genetics • Diagnostic Genetics • Statistics • Student Research Projects • Clinical Management Practices
Irene Newsham Assistant Professor	Ph.D., Massachusetts Institute of Technology	• Molecular Techniques • Molecular Biology
Vibhuti Srivastava Senior Health Professions Educator	Ph.D., University of Delhi, India	• Molecular Biology • Molecular Techniques • Bioinformatics

Brandy Greenhill MLS(ASCP)^{cm}, Associate Professor	Dr.PH, The University of Texas School of Public Health, Houston	• Nucleic Acid Testing
Jun Gu CLSp (CG) Assistant Professor	Ph.D., TUI University	• Clinical Genetics • Cytogenetics
Vicki L. Hopwood CLSp (CG) CLSp (MB) CLDir (NCA) Assistant Professor	M.S., The University of Texas Graduate School of Biomedical Sciences	• Clincal Genetics • Cytogenetics • Molecular Genetics
Mary Coolbaugh-Murphy Senior Allied Health Professions Educator	Ph.D., The University of Texas Graduate School of Biomedical Sciences	• Molecular Biology • Medical Genetic • Molecular Laboratory Techniques • Statistics
Adjunct Faculty		
Monica Basehore FACMG Director, Greenwood Genetics	Ph.D., Wake Forest University	• Biochemical Genetics • Diagnostic Genetics
		•
Jianli Dong Associate Professor University of Texas Medical Branch	M.D., Ph.D., University of Toronto	• Molecular Infectious Diseases • Diagnostic Genetics • Genetic Disorders • Clinical Rotation • Student Research Projects
Terrance Dunn Professor Oklahoma	Ph.D., The Queen's University of Belfast	• Diagnostic Genetics • Biochemical Genetics • Clinical Rotation
Laura Gahn Director, DNA Forensic Lab Orchid Cellmark	Ph.D., Louisiana State University Medical Center	• Genetic Disorders • Forensic Testing • Clinical Rotation
Xiang-Yang Han Professor	M.D., Shanghai Medical University Ph.D., Ohio State University	• Diagnostic Molecular Microbiology
Madhuri Hegde FACMG Professor	Ph.D., University of Auckland	• Diagnostic Genetics • Clinical Rotation

Emory Genetics Lab		
Dan Jones Professor Quest Diagnostics	M.D., Ph.D., Case Western Reserve University	• Diagnostic Genetics • Clinical Rotation
Delores Lopez-Terrada Professor	M.D., Ph.D., University of Valencia, Department of Pathology	• Diagnostic Genetics • Clinical Rotation
Raiyalakshmi Luthra Professor	Ph.D., University of Arizona	• Biochemistry • Diagnostic Genetics • Clinical Rotation
Sri Rajagopalan MP (ASCP) Assistant Director	Ph.D., Cancer Research Institute Bombay University	• Diagnostic Genetics
Charles E. Stager Associate Professor Ben Taub Hospital	Ph.D., The University of Texas Graduate School of Biomedical Sciences at Galveston	• Diagnostic Genetics • Clinical Rotation
Erika Thompson DNA Core Lab Co-Director	M.S., Florida International University	• Clinical Rotation • Sanger and Next Generation Sequencing

The Program in Molecular Genetic Technology

Mission
The MD Anderson Cancer Center Program in Molecular Genetic Technology, in conjunction with the mission and vision of The University of Texas MD Anderson Cancer Center, is committed to the education of technically and academically competent graduates prepared to meet the immediate and future needs of the Molecular Genetic Technology profession.

Objectives
The Molecular Genetic Technology program is designed to prepare students to become entry-level clinical molecular genetic technologists. The program provides instruction in major areas of the field such as:

- Pre- and Post-natal genetic disorder testing
- Cancer molecular genetic testing
- Infectious disease testing
- Human identity testing

The curriculum provides didactic training followed by directed clinical training at affiliated hospitals and laboratories. Students may enter the program to pursue a Bachelor of Science degree and program faculty help each student develop a focal point related to the learner's area of interest. In the course of their training, students learn how to detect DNA polymorphisms and interpret molecular tests. They also develop an understanding of the essential elements of statistics in population genetics.

While students study molecular diagnostic procedures such as SNP analysis and its application to the clinical laboratory, their laboratory experiences may include but are not limited to:

- Hybridization methods
- Extraction methods
- PCR, primer design and real-time PCR,RT-PCR, and Melt Curve Analysis
- Sequencing and fragment analysis
- Microarray technology
- Next generation sequencing

Students also focus on the specific applications of molecular techniques within such disciplines as:

- Oncology
- Paternity
- Genetic disease of inheritance
- Forensics
- Infectious disease
- Bacteriology

Professionals in the field have a wide range of career options. As the Human Genome Project leads to the discovery of an increasing number of genes important in human disease processes, molecular genetic technologists will play an ever-increasing role in diagnostic patient care.

Employment opportunities include:

- Cancer centers
- Pediatric clinics
- Chemical industries
- Biotechnology companies
- Research, molecular cytogenetic and pathology laboratories
- Computer imaging sales and development
- Research and teaching institutions

Some molecular genetic technologists combine administrative and managerial talent with their technical background to become laboratory or hospital administrators.

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA, as well as Science and Math GPA
- Professional qualities such as maturity and career goals as expressed in the interview and described in reference letters.
- Ability to meet the SHP non-academic technical standards.
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office. See SHP Academic Calendar for application dates.

Nonacademic Requirements
For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures

Program Admission Requirements

The Bachelor of Science degree is either a one-year or two-year program with entry at either the junior or senior level. Application and supporting documents must be submitted to the Office of the Registrar. http://registrar.uth.tmc.edu/Admissions/admiss_info.htm Qualified students are accepted on a rolling basis.

Applicants to the Program in Molecular Genetic Technology must satisfy the following requirements for admission:

All prerequisite course work must be from a regionally accredited college or university.

The applicant must have satisfactorily completed all prerequisite courses listed prior to graduating. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.

A minimum grade point average of 2.5 on a 4.0 scale both overall and in science and mathematics courses is required to be considered for admission. Special circumstances may be considered, but at the discretion of the Admissions Committee.

Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites

Prerequisites for the two-year program
A minimum of 60 semester credit hours (SCH) that includes:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 18 SCH

Within these 60 hours, the following must be included:

- 8 SCH in Biological Sciences
- 16 SCH hours in Chemistry to include Organic Chemistry and /or Biochemistry

Note: 12 of the above 24 SCH may be satisfied by the Natural Sciences Texas Core course selection

Prerequisites for the one-year program
A minimum of 90 semester credit hours (SCH) that includes:

- The Texas Core Curriculum – 42 SCH (see table below)
- An additional - 48 SCH

Within these 90 hours, the following must be included:

- 12 SCH of upper level division courses (3000, 4000)
- 8 SCH in Biological Sciences
- 16 SCH hours in Chemistry to include Organic Chemistry and /or Biochemistry
- 3 - 4 SCH of Microbiology
- 3 - 4 SCH of Genetics

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	SCH
COMMUNICATION (6 SCH)	6

• ENGL 1301 English Composition I • ENGL 1302 English Composition II	
MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6
SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3

Total Texas Core Curriculum SCH	**42**

http://statecore.its.txstate.edu/

About the Texas Core Curriculum:

Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program faculty is consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHP course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHP courses with the results being reported to the Registrar.

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 135 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester credit hours of advanced (3000/4000) course work
- At least 25% of the total semester credit hours required must be taken at MD Anderson

Graduation occurs in August. Upon graduation, students are eligible to take the national certification exam in molecular biology given by the American Society for Clinical Pathology (ASCP)

Please check with the program director for application deadlines and exam dates. Upon passing the exam, the student is considered a certified molecular genetic technologist. The awarding of the degree is not contingent upon a student passing the national certification exam.

Curriculum

This intensive two-year program is composed of a didactic phase followed by directed clinical training at affiliated hospitals and laboratories. During the didactic phase, formal lectures are presented on the principles of medical genetics, molecular and biochemical basis of genetic disease, hematology, molecular biology, clinical molecular genetics and molecular genetic technology. Laboratory sessions coordinated to lectures and covering the fundamentals of diagnostic laboratory procedures are included in the didactic phase.

Current Affiliations

During the clinical phase of instruction, training and supervision are provided in affiliated clinical laboratories:

- UT MD Anderson Cancer Center (Diagnostic Molecular Science Laboratory), Houston, TX
- UT MD Anderson Cancer Center (HLA Laboratory), Houston, TX
- UT MD Anderson Cancer Center (DNA Analysis Core Facility), Houston, TX
- Baylor College of Medicine (Diagnostic Sequencing Laboratory), Houston
- Baylor College of Medicine (Microarray Laboratory), Houston, TX
- Baylor College of Medicine (Mitochondria Laboratory), Houston, TX
- Baylor College of Medicine (John Walsh Cardiovascular Diagnostic Laboratory), Houston, TX
- Baylor College of Medicine (Whole Genome Sequencing Laboratory), Houston, TX
- Center for Medical Genetics, Houston, TX
- De Novo Diagnostics, Houston, TX
- Ben Taub Hospital (Molecular Diagnostic Laboratory) Harris County Hospital District, Houston,TX
- Gene by Gene (FTDNA/DNATraits - Sequencing, NGS and Microarray Laboratory), Houston, TX
- Texas Children's Hospital (Molecular Pathology Laboratory), Houston, TX
- The Methodist Hospital (Clinical Laboratory Medicine), Houston, TX
- Applied Diagnostic Laboratory, Houston, TX
- Gulf Coast Regional Blood Center, Houston, TX
- Companion DX, Houston, TX
- MolecularHealth, The Woodlands, TX
- Clinical Pathology Laboratories, Inc. (Molecular Diagnostic Laboratory), Austin, TX
- UT Medical Branch in Galveston (Molecular Diagnostic Laboratory), Galveston, TX

- UTHSC San Antonio (Molecular Pathology Laboratory), San Antonio, TX
- Delta Pathology Group, LLC. (Molecular Diagnostic Laboratory), Shreveport, LA
- Massachusetts General Hospital – Harvard University Medical School (Department of Pathology), Boston, MA
- Duke University (Department of Pathology), Durham, NC
- Emory University (Department of Human Genetics), Atlanta, GA
- Oklahoma State Department of Health, Oklahoma City, OK
- Greenwood Genetics Laboratory, Greenwood, SC
- The University of Pennsylvania School of Medicine (Department of Genetics), Philadelphia, PA
- The University of Chicago (Department of Human Genetics), Chicago, IL
- Yale University School of Medicine, New Haven, CT
- Albert Einstein School of Medicine, Bronx, NY
- Quest Diagnostics (Molecular Oncology Laboratory), Chantilly, VA
- ARUP Laboratories (Molecular Diagnostic Laboratory), Salt Lake City, UT
- Propath, Dallas, TX
- Orchid Cellmark, Dallas, TX
- Queens Medical Center, Honolulu, HI

Accreditation

The Molecular Genetic Technology program is accredited and has conformed its curriculum to the standards published and monitored by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)

5600 N. River Rd., Suite 720
Rosemont, IL 60018-5119
Phone: 773-714-8880
Fax: 773-714-8886

Course listings

Junior Year

The Laboratory Sciences programs admit students at the Junior Year level who share a Junior Year curriculum consisting of:

- Laboratory sciences core courses
- Program-specific core courses
- Program-specific elective courses

Molecular Genetic Technology (MGT): Junior Year Courses	
Laboratory Sciences: shared core courses	
HS 3102 Basic Molecular Techniques Laboratory I	1
HS 3210 Laboratory Mathematics	2

HS 4310 Medical Microbiology	3
HS 4100 Issues in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
TOTAL CORE COURSES SCH	**8**
MGT Program CORE	
HS 3203 Basic Molecular Techniques Laboratory II	2
HS 3270 Critical Thinking in Health Professions	2
HS 3254 Immunohistochemistry	2
HS 3320 Medical Genetics	3
HS 3330 Pathology of Body Fluids	3
HS 4300 Pathophysiology	3
HS 3300 Immunology	3
HS 3201 Molecular Biology	2
TOTAL MGT CORE COURSES SCH	**20**
MGT Program Electives: 2 hrs required, choose from list below	**2**
HS 3110 Medical Terminology	1
HS 3333 Statistics	3
HS 3340 Research Methods	3
HS 3370 Fundamentals of Writing and Critical Thinking	3
HS 4111L Medical Microbiology Lab	1
HS 4160 Critical Scientific Analysis	1
HS 4161 Seminar in Healthcare	1
DI 4310 Teaching Strategies in Health Care Education	3
TOTAL MGT JUNIOR YEAR SCH	**30**

Senior Year**

Course	Hours
CC 4120 Introduction to G-band Karyotyping	1
GT 4300 Advanced Medical Genetics	3
GT 4330 Genetics of Hematological Disease	3
HS 4110 Intro to Clinical Molecular Genetics Technology	1
HS 4371 Management and Education	3
MG 4160 Genetic Technology Journal Club	1
MG 4300 Bioinformatics in Diagnostic Genetics I	3
MG 4301 Bioinformatics in Diagnostic Genetics II	3
MG 4280 Concepts in Molecular Diagnostics	2

MG 4310 Molecular Diagnostic Techniques	3
MG 4510 Molecular Diagnostic Techniques Lab	5
MG 4290 Clinical Applications of Molecular Biology	2
MG 4320 Advanced Concepts in Molecular Genetics	3
MG 4390 Advanced Molecular Diagnostic Techniques	3
MG 4560 Molecular Diagnostics Clinical Rotation I	5
MG 4570 Molecular Diagnostics Clinical Rotation II	5
Total	46**

Students entering the School of Health Professions for the first time at the Senior level must take the following additional required courses that are described in the Junior Year for Laboratory Sciences section of the catalog:HS 4100 Issues in Health Care Ethics (1)** HS 4101 Diversity and Cultural Competence (1) **

Course listings

Junior Lab Sciences HS series classes with some exceptions

DI 4310 Teaching Strategies in Health Care Education (3 semester credit hours)
This course will teach the student how to analyze learning theories with emphasis on adult learners and the elements of quality education.

HS 3102 Basic Molecular Techniques Laboratory I (1 semester credit hour)
This course serves a dual purpose in solidifying the basic laboratory fundamentals before introducing the student to the basic techniques of the molecular lab. First, the student is provided with a practical foundation in proper laboratory safety practices, pipetting, micropipetting, serial dilution and solution preparation before introducing them to the basic molecular techniques of genomic DNA extraction, quantitation, and gel electrophoresis. Also included in this course are various applications related to other laboratory science disciplines such as basic microscopy, slide preparation, Hematological cell identification, as well as an introduction to karyotyping and commercial FISH. Effectively, the student sees a more comprehensive introduction to the basic lab with an emphasis on those bench skills foundational to performing the most basic techniques of the molecular lab.
(Admission to Program)

HS 3110 Medical Terminology (1 semester credit hour)
An introduction to medical terminology. Emphasis on word roots, prefixes, suffixes, spelling and analysis of unfamiliar terms. Additional background information on the anatomy that relates to various body systems will be discussed.

HS 3120 Introduction to Cytogenetics (1 semester credit hours)
A detailed study of human G-banded chromosomes. Includes instruction in banding pattern recognition and polymorphic variation. Includes classroom instruction and hands-on experience.

HS 3201 Molecular Biology (2 semester credit hours) This course covers the principals behind basic molecular techniques used in a clinical molecular laboratory. This may include but not limited to DNA extraction, quantitation, gel electrophoresis, and PCR.

HS 3203 Basic Molecular Techniques Laboratory II (2 semester credit hours)
A continuation of the HS3102 Basic Molecular Techniques Laboratory I course where basic techniques introduced in the previous course are reinforced and built upon through an objective based approach schema in which students presented with a scenario simulating either the clinical or research molecular lab are required to process samples from receipt to report. At the bench, students learn the effective organizational and technical skills for processing multiple samples for gDNA extraction from a variety of specimen types, DNA quantitation, PCR amplification, gel electrophoresis, and proper visualization and documentation of results. There is a greater focus on carrying out experimental objectives in accordance with proper quality assurance and quality control guidelines while placing a stronger emphasis on delivering timely, accurate, and reproducible results. Proper documentation habits are adhered throughout the experimental process from sample receipt to final analysis and reporting of experimental results. Also included in this course are further applications in the molecular lab such as RNA isolation, purification and re-isolation techniques for limited samples, introduction to Real-Time (qPCR), PCR troubleshooting basics, restriction digestion and restriction mapping, as well as an introduction to molecular cloning. Effectively, the student solidifies a very strong foundation in all the basic techniques of the molecular lab with an introduction to those further applications that will be reinforced and built upon in the Senior Year.

HS 3210 Laboratory Math (2 semester credit hours)
The basic principles and theory of clinical, biochemical, and analytical laboratory math related calculations. It includes basic operations such as problem solving using percentiles, rates, ratios, mole ratios, molality, pH, conversions, solving for proportions and more.

HS 3254 Immunohistochemistry (2 semester credit hours)
A comprehensive course that deals with the fundamentals of immunohistochemistry as applied to the theory and practical techniques in histopathology. The students acquire basic knowledge of how immunology is applied in the development of immunohistochemistry reagents and techniques. Emphasis will be placed on the clinical significance of diagnostic and prognostic indicators used in immunohistochemistry techniques. Troubleshooting and standardization of reagents are emphasized.

HS 3270 Critical Thinking in Health Professions (2 semester credit hours)
This course is designed to provide health professions students with resources for improving critical thinking skills. The course will introduce basic concepts of critical thinking through integration into interactive case studies, problem based scenarios, and project design assignments. The specific objectives of this course coincide with the University of Texas MD Anderson Cancer Center School of Health Professions' definition of critical thinking.

HS 3300 Immunology (3 semester credit hours)
This course focuses on the basic concepts in immunology, and covers general properties of immune responses; cells and tissues of immune system; lymphocyte activation and specificity;

effector mechanisms; immunity to microbes; immunodeficiency and AIDS; autoimmune diseases; transplantation. Course delivery is a blend of lecture and on line, self-paced activities.

HS 3320 Medical Genetics (3 semester credit hours)
This course is a study of the role of genetics in medicine including: Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping. A comprehensive review of the cell cycle, mitosis, and meiosis and pedigree analysis is incorporated as well. (Admission to Program)

HS 3330 Pathology of Body Fluids (3 semester credit hours)
This course is a study of the anatomy and physiology of the kidney and the formation, elimination and composition of urine. Various body fluids (CSF, Synovial, Plural, Serous, etc.) will be study and associations made with various disease states. Interpretation of urinary and body fluids elements, chemical assays and the correlation with normal and abnormal physiology: Course delivery is a blend of lecture and on line, self-paced activities. (Admission to Program)

HS 3333 Statistics (3 semester credit hours)
This course provides an introduction to statistical techniques. Emphasis will be placed on probability and probability distributions, sampling and descriptive measures, inference and hypothesis testing, linear regression, and analysis of variance. (Prerequisite HS 3101)

HS 3340 Research Methods (3 semester credit hours)
This research methods course will introduce the basic language and concepts of empirical research with emphasis on the applicability of research methodology in the area of clinical laboratory sciences. Students will have the opportunity to learn how to search the peer-reviewed journal databases available to them through the Research Library. They will then critique and review their references, learn how to make an outline, and write a literature review on their assigned topic. Curriculum will include a blend of lectures, group work, presentations by guest researchers and development of a group research poster. (Admission to Program)

HS 3370 Fundamentals of Writing and Critical Thinking (3 semester credit hours)
This basic writing course stresses both reading and writing skills and is designed to teach students to improve their ability to write logically and develop short essays, brief formal summaries, and reports.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course content is designed to create an awareness of ethnocentrism and a beginning understanding of cultural similarities and diversity. It provides the student with knowledge of the concepts of cultural relativity, cultural integration and variation in cultural values, organization and institutions.

HS 4111L Medical Microbiology Student Laboratory (1 semester credit hour)
The course utilizes biochemical, morphological, and serological techniques to illustrate concepts from the lecture course relating to microbial structure, metabolism, virulence, and transmission. Students also receive instruction on proper technique and procedures for a number of different tests, including culturing, staining, carbohydrate utilization, immunoassays, and microscopy.

HS 4160 Critical Scientific Analysis (1 semester credit hour)
Students will analyze current scientific publications for research questions, hypothesis, study design and statistical analysis and the application of proper scientific formats in the clinical laboratory professions. Students will complete pre-session assignments, participate in group discussion & present their group findings.

HS 4161 Seminar in Health Care (1 semester credit hour)
Seminar based course covering topics in the Clinical Laboratory Sciences

HS 4300 Pathophysiology (3 semester credit hours) SENIOR YEAR
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topic covered includes central concepts of pathophysiology of the cells and tissues and alterations on organs and systems with an emphasis on carcinogenesis. Appropriate diagnostic and treatment procedures are covered.

HS 4310 Medical Microbiology (3 semester credit hours) SENIOR YEAR
This course is the study of the utilization of morphological, biochemical, serological, disease inducing characteristics for microorganism, fungi, mycobacterium and virus identification. Course delivery a blend of lecture and on-line, self-paced activities.

HS 4371 Management and Education (3 semester credit hours)
This course covers laboratory management and educational methodologies. Students will learn the importance of educational objectives, communication skills, roles and responsibilities of management, regulatory and accreditation such as CAP and CLIA, and professionalism in the clinical laboratory and radiologic sciences. The contents are delivered online and are self-directed.

Senior Year Course Descriptions (for Senior Year HS courses, please see above)

CC 4120 Introduction to G-band Karyotyping (1 semester credit hour)
A detailed study of human G-banded chromosomes. Includes instruction in banding pattern recognition, polymorphic variation, determination of band level and the International System for Human Cytogenetic Nomenclature (ISCN). Includes classroom instruction and hands-on experience.

GT 4300 Advanced Medical Genetics (3 semester credit hours)
A general look at the eukaryotic chromosome and their changes, gene regulation, somatic mutation and genetics of cancer, evolution at the molecular level, system biology and the future

of medicine.

GT 4330 Genetics of Hematological Disease (3 semester credit hours)
This course is a comprehensive study of the principles and procedures used in the cytogenetic analysis of peripheral blood and bone marrow in the study of malignant processes, especially hematological ones. The course emphasizes the chromosome abnormalities and the affected gene/s occurring in leukemias and lymphomas and their clinical significance.

HS 4110 Intro to Clinical Molecular Genetics Technology (1 semester credit hour)
The study of clinical laboratory molecular diagnostic procedures utilizing recombinant DNA technology and its application to the many aspects of the clinical laboratory.

MG 4160 Genetic Technology Journal Club (1 semester credit hour)
Seminar-based course that covers topics in genetics and related fields.

MG 4280 Concepts in Molecular Diagnostics (2 semester credit hours)
The focus of this course is on the role of genetics in medicine and related molecular testing methodologies. The course aims to highlight the importance of genetics and its role in disease by providing a link between disease diagnosis, prognosis, prevention, and treatment with molecular testing options and applications through case-based analysis. Topics may include diseases or disorders in the area of oncology, inherited, and infectious disease.

MG 4300 Bioinformatics in Diagnostic Genetics I (2 semester credit hour)
This course will introduce the students to the clinical applications of information technology and computer-based science. Students will learn how to access, manage, and analyze biological information using computer applications for purposes such as obtaining biological sequences and performing clinical research and development, assay design, and data analysis.

MG 4301 Bioinformatics in Diagnostic Genetics II (2 semester credit hour)
This course will be a continuation of Bioinformatics in Diagnostic Genetics I. The course will build upon the information learned in the first course with more application. Students will learn more about clinical applications as they apply to Next Generation Sequencing, by observing, managing, aligning, and annotating data. Students will learn how to access and manage computer applications to determine the clinical implications and significance of the data as they apply to human genomics.

MG 4231 Independent Research Project II (WR) (2 semester credit hours)
Continuation of an independent study that may be a case study analysis, laboratory test procedure evaluation or investigation of a laboratory problem. This is an intensive writing course requiring producing a written paper, a poster and an oral presentation.

MG 4280 Concepts in Molecular Diagnostics (2 semester credit hours)
An advanced study of the role of genetics in medicine, Mendelian genetics, multifactorial inheritance, DNA structure, chromosome structure, population genetics, mutation rates, ethnicity of disease and genetic mapping. A comprehensive review of the cell cycle, mitosis, meiosis and pedigree analysis is incorporated as well.

MG 4290 Clinical Applications of Molecular Biology (2 semester credit hours)
Focuses on the specific applications of molecular techniques within a variety of disciplines. The disciplines covered include cytogenetics, hemostasis, hematology, immunology, infectious diseases, forensic science, oncology, paternity and transplantation immunology. The course will provide hands-on, introductory laboratory experience with some of these techniques and participants will develop a focal problem of interest towards their research project.

MG 4310 Molecular Diagnostic Techniques (3 semester credit hours)
This course will provide participants with a didactic understanding of laboratory processes and procedures. The topics covered may include information related to sample storage and transport requirements for integrity, purpose of reagents and parameters used in molecular applications, and theoretical understanding of platform methodologies, data analysis, and troubleshooting.

MG 4320 Advanced Concepts in Molecular Genetics (3 semester credit hours)
This lecture/laboratory course will introduce the student to human identity testing. The course provides an application of skills such as extraction, amplification, quantitation, capillary electrophoresis, fragment analysis, and population genetics for forensic DNA analysis and / or paternity testing.

MG 4390 Advanced Molecular Diagnostic Techniques (3 semester credit hours)
This lecture/laboratory course focuses on the specific applications of newer molecular techniques. Participants will have hands-on experience which may include Real Time PCR using various detection methods, microarray technology, sequencing, blotting,HLA and molecular flow cytometry.

MG 4560 Molecular Diagnostic Clinical Rotation I (5 semester credit hours)
This clinical laboratory rotation includes the study of molecular diagnostic procedures utilizing recombinant DNA technology and its application to the many aspects of the clinical laboratory. Laboratory experiences include DNA specimen handling and processing, DNA extraction, DNA purification, Southern blot analysis, probe preparation and utilization, PCR, primer design and Real-Time PCR.

MG 4570 Molecular Diagnostic Clinical Rotation II (5 semester credit hours)
This clinical laboratory rotation is a continuation of MG 4560. This clinical laboratory rotation may include the study of molecular diagnostic procedures utilizing recombinant DNA technology and its application to the many aspects of the clinical laboratory. Laboratory experiences may include DNA specimen handling and processing, DNA extractions, DNA purification, Southern blot analysis, probe preparation and utilization, PCR, primer design and Real-Time PCR.

MG 4510 Molecular Diagnostic Techniques Lab (5semester credit hours)
The course will provide participants with hands-on laboratory experience in: performing molecular techniques such as DNA extraction, purification and quantification; preparing and viewing gel electrophoresis; conducting PCR and Real-Time PCR experiments; and designing primers and performing Sanger sequencing with assay optimization and troubleshooting.

Radiation Therapy

Radiation therapy involves the administration of ionizing radiation for the treatment of cancer and other related conditions. The field of Radiation Therapy presents the professional with the unique opportunity to blend the knowledge of mathematics, medical science, psychology, and critical thinking while providing hands-on patient care.

Degree Offered
Bachelor of Science in Radiation Therapy

The program is administered by:

- Dean: Shirley Richmond, Ed.D.
- Program Director: Shaun T. Caldwell, M.S., RT(R)(T)
- Education Coordinator: Kameka Rideaux, M.B.A., RT(R)(T)
- Senior Health Professions Educator: Delores Whiteing-Williams, M.A.,RT(T)
- Senior Health Professions Educator: Sandra John-Baptiste, BS,RT(T),CMD
- Medical Advisor: Eric A. Strom, M.D., MD Anderson Cancer Center

Faculty Roster

Faculty	Degree and School	Teaching Assignments
Shaun T. Caldwell M.S., RT(R)(T)	M.S. Utah State University	• Radiation Physics and Medical Imaging • Problem Solving, Decision Making and Radiation Therapy • Medical Law • Research Techniques in Radiologic Sciences • Research Project • Instructional Design • Diversity and Cultural Competence
Kameka Rideaux RT (R) (T)	M.B.A. University of Phoenix	• Anatomy for Radiation Oncology • Introduction to Radiation Therapy • Advanced Pathophysiology • Directed Readings • Technical Radiation Oncology • Clinical Radiation Oncology I and II • Clinical Radiation Oncology Lab II • Individual Projects

		• Quality Management in Radiation Oncology
Delores Whiteing-Williams M.A.,RT (T)	M.A. Texas Women's University	• Patient Care in Radiation Oncology • Simulation and Treatment Techniques, I & II • Clinical Education I - III • Adaptive Radiation Therapy
Sandra John-Baptiste BS, RT (T), CMD	B.S. McMaster University B.A. Brock University	• Clinical Education IV-VI • Clinical Radiation Oncology I Lab • Radiation Therapy Physics • Treatment Planning and Dosimetry • Special Applications in Radiation Therapy
Scroggins, Deborah RT (R) (CV) (M) (CT)	M.S.R.S. Midwestern State University	• Introduction to Computed Tomography • Sectional Anatomy
Adjunct faculty		
Mary Ann Ball Lecturer	M.S. University of Texas at Tyler	• Diversity and Cultural Competence
Harry R. Gibbs Associate Professor	M.D Harvard Medical School	• Diversity and Cultural Competence
Laurel R. Hyle Lecturer	M.P.H., J.D. The University of Houston Law Center	• Medical Law
William Undie RT (R)(T) Assistant Professor	Ed.D. Clark Atlanta University	• Radiation Safety and Protection
Peter Balter Associate Professor	Ph.D. University of Texas Houston Graduate School of Biomedical Sciences	• Digital Imaging
Laurence Court Assistant Professor	Ph.D. University College London	• Digital Imaging
Eric A. Strom	M.D.	• Clinical Radiation Oncology

Associate Professor	Northwestern University Medical School	• Technical Radiation Oncology

The Program in Radiation Therapy

Mission
The mission of the Radiation Therapy Program is to provide the highest quality of education to radiation therapy students through formal didactic and state-of-the -art clinical experiences that prepare the student to deliver superior patient care and treatment in all aspects of radiation therapy.

Vision
We shall be the premier provider of education for radiation therapy professionals based on best practices and research in radiation oncology.

Objectives
The University of Texas MD Anderson Cancer Center Program in Radiation Therapy is designed to prepare students for a challenging career in cancer treatment through formal education including: human anatomy, physiology, radiation therapy physics, radiation oncology, pathology, radiation biology, treatment planning, medical dosimetry, quality assurance and patient care.

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA, and pre-requisite GPA
- Personal qualities such as maturity and professional goals as expressed in the interview and described in reference letters.
- Clinical site visit evaluation, call the RT Program Office to receive the required Clinical Site Visit form and the HIPAA consent form.
- Ability to meet the SHP non-academic technical standards.
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admission section of the Student Catalog's Policies and Procedures.

Program Admission Requirements

The Bachelor of Science in Radiation Therapy is a two-year program for certification and degree completion, with entry at the junior level. Application and supporting documents must be submitted to the Office of the Registrar.

Applicants to the Program in Radiation Therapy must satisfy the following requirements for admission to the Bachelor of Science degree program.

All prerequisite course work must be from a regionally accredited college or university.

The applicant must have satisfactorily completed all prerequisite courses listed prior to graduating. These courses must be lecture and laboratory courses acceptable toward a degree by majors in those fields and cannot be survey courses.

Candidates who completed the prerequisite courses seven or more years before admission may need to update their academic skills. For specific information, contact the program director.

Clinical site visit evaluation Download and print the Clinical Site Visit Form, Download and print the HIPAA Consent Form

Minimum overall grade point average of 2.5 on a 4.0 scale.

Texas Success Initiative (TSI) - All applicants must provide proof of successful assessment of the Texas Success Initiative (TSI). Applicants who have graduated with an associate or baccalaureate degree from an accredited Texas College or University are exempt from TSI. Proof of an applicant's readiness to enroll in college level course work will be determined by the Registrar's Office based upon review of official transcripts from previously attended institutions.

Test of English as a Foreign Language (TOEFL) - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prerequisites

Prerequisites for the two-year program
A minimum of 42 semester credit hours (SCH) that includes:

- The Texas Core Curriculum (see table below)
- Anatomy & Physiology I and *Physics must be included in the 42SCH Texas Core Curriculum
- *Radiographic Physics is acceptable to meet the RT physics program requirement, however the Radiographic Physics credit hours **may not** count toward the Texas Core Curriculum's 42 Semester Credit Hours (SCH)

The Texas Core Curriculum – 42 Semester Credit Hours (SCH) that must include courses from the following specific areas as indicated	SCH
COMMUNICATION (6 SCH) • ENGL 1301 English Composition I • ENGL 1302 English Composition II	6
MATHEMATICS (3 SCH) • MATH 1314 College Algebra or higher	3
NATURAL SCIENCES (12 SCH) Courses in biology, chemistry, physics, geology or other natural sciences	12
HUMANITIES (3 SCH) Courses in literature, philosophy, modern or classical language/literature, cultural studies or equivalent	3
VISUAL AND PERFORMING ARTS (3 SCH) Courses in arts, dance, music appreciation, music, drama or equivalent	3
HISTORY (6 SCH) • HIST 1301 United States History I • HIST 1302 United States History II	6
GOVERNMENT (6 SCH) • GOVT 2301 American Government I • GOVT 2302 American Government II	6

SOCIAL SCIENCES (3 SCH) Courses in anthropology, economics, criminal justice, geography, psychology, sociology, social work or equivalent	3
Total Texas Core Curriculum SCH	42

http://statecore.its.txstate.edu/

About the Texas Core Curriculum Each institution's Core Curriculum applies to all academic degrees. They range from 42 to 48 credit hours, depending on the college or university. Each Core Curriculum is divided into 8 or 9 categories that are common across the state. If you take the approved Core natural science courses at institution A, they are annotated on your transcript with a Core code by A and must be accepted as fulfilling that portion of the Core at institution B or any other Texas public institution. If Astronomy is a Core natural science at A and is not at B, it must still be accepted at B. This is a whole new way of doing things because the school where you take the course decides how it will transfer. And that decision is binding on any Texas school to which you transfer.

Advanced Placement

The School of Health Professions accepts and/or awards credit through the following examination programs:

- College level examination program of the College Board
- Comprehensive departmental examinations
- Regionally accredited military training programs

Recommendations from the School's academic departments are followed with regard to minimum score requirements, level of credit and amount of credit to be awarded. Program faculty are consulted to determine if credit recommendations equate to specific School of Health Professions (SHP) courses. The internal comprehensive departmental examination program provides a local means for establishing knowledge of SHS course content in areas not covered by the above examination program. Programs may elect to administer examinations that cover material specific to SHS courses with the results being reported to the Registrar.

Graduation

Each candidate for a baccalaureate degree must complete a minimum of 130 semester credit hours of course work. Within this requirement, students must complete the following at MD Anderson:

- At least 40 semester credit hours of advanced (3000/4000) course work
- At least 25% of the total semester credit hours required must be taken at MD Anderson

Upon completion of formal didactic and clinical education, students will have demonstrated the professional skills necessary to plan, deliver and record a prescribed course of radiation including proton therapy.

Graduation occurs in August. Upon graduation, students are eligible to take the national certification exam administered by the American Registry of Radiologic Technologists (ARRT) Please check with the program director for application deadlines and exam dates. Upon passing the exam, the student is considered a certified Radiation Therapist. The awarding of the degree is not contingent upon a student passing the national certification exam.

Curriculum

The curriculum meets or exceeds the curriculum recommendations of the American Society of Radiologic Technologists (ASRT). This intensive two-year program is composed of a didactic phase followed by directed clinical training at affiliated hospitals and laboratories. During the didactic phase, formal lectures cover human anatomy, physiology, radiation therapy physics, radiation oncology, pathology, radiation biology, treatment planning, medical dosimetry, quality assurance and patient care.

Current Affiliations
During the clinical phase of instruction, training and supervision are provided in a variety of clinical sites at:

- The University of Texas MD Anderson Cancer Center in Houston's Radiation Therapy clinics, including: Main Building, Mays Clinic and Proton Treatment Center
- The University of Texas MD Anderson Cancer Center's satellite Radiation Therapy treatment facilities, including:
    - Radiation Treatment Center – Bay Area, Nassau Bay, TX
    - Radiation Treatment Center – Katy, TX
    - Radiation Treatment Center – Sugar Land, TX
    - Radiation Treatment Center – The Woodlands, TX
    - Radiation Treatment Center – Presbyterian Kaseman Hospital Albuquerque, New Mexico

Accreditation

The Radiation Therapy Program is accredited by and has conformed its curriculum to the standards and guidelines published and monitored by the:
The Joint Review Committee on Education in Radiologic Technology (JRCERT)
20 North Wacker, Suite 2850
Chicago, IL 60606-3182
Phone: 312-704-5300
Fax: 312-704-5304

Course listings

Two Year Program Curriculum	Hours
Junior Year	
DI 4350 Introduction to Computed Tomography	3
HS 3370 Fundamentals of Writing and Critical Thinking	3
HS 4100 Issue in Health Care Ethics	1
HS 4101 Diversity and Cultural Competence	1
HS 4300 Pathophysiology for Health Professions	3
HS 4303 Advanced Pathophysiology	3
RT 3101 Simulation and Treatment Techniques I	1
RT 3103 Simulation and Treatment Techniques II	1
RT 3205 Introduction to Radiation Therapy	2
RT 3220 Clinical Education I	2
RT 3221 Clinical Education II	2
RT 3222 Clinical Education III	2
RT 4101 Radiation Safety and Protection	1
RT 4210 Radiobiology	2
RT 4302 Anatomy for Radiation Oncology	3
RT 4305 Patient Care in Radiation Oncology	3
RT 4306 Technical Radiation Oncology	3
RT 4310 Radiation Therapy Physics	3
RT 4312 Quality Management in Radiation Oncology	3
RT 4315 Radiation Physics and Medical Imaging	3
Total Junior Courses	**45**
Senior Year	
RT 3342 Digital Imaging for Radiation Therapy	3
DI 4300 Research Techniques in Radiologic Sciences	3
DI 4301 Research Project	3
DI 4304 Sectional Anatomy	3
HS 4111 Medical Law	1
RT 4111 Clinical Radiation Oncology Lab I	1
RT 4112 Clinical Radiation Oncology Lab II	1
RT 4211 Clinical Radiation Oncology I	2
RT 4212 Clinical Radiation Oncology II	2
RT 4309 Special Applications in Radiation Oncology	3
RT 4311 Radiation Therapy Treatment Planning and Dosimetry	3
RT 4320 Clinical Education in Radiation Therapy IV	3
RT 4321 Clinical Education in Radiation Therapy V	3
RT 4322 Clinical Education in Radiation Therapy VI	3
RT 4356 Individual Projects	3
RT 4390 Adaptive Radiation Therapy	3

RT 4395 Problem Solving and Decision Making in Radiation Therapy	3
Total for 2yr Program	**88**

Course Descriptions

DI 3345 Directed Readings (1-3 semester credit hours) Directed reading and research, followed by the writing of a report or the creation of a project. Credit hours are based on size, length and depth of paper or project.

DI 3346 Professional Development (Conferences, Workshops, Lectures, Competitions) - Repeatable (1-3 semester credit hours)
Attendance of educational sessions at district, state, regional or national conferences. Consent of instructor required. 12 documented contact hours per each (32 CE) credit for a maximum of 3 credits.

DI 4300 Research Techniques in Radiologic Sciences (3 semester credit hours)
This course will teach the student the principles and methods of conducting practical research in health care.

DI 4301 Research Project (3 semester credit hours)
This course will prepare the student to complete a research project.

DI 4304 Sectional Anatomy (3 semester credit hours) (3 semester credit hours)
This course will provide a review of the gross anatomy of the entire body. Detailed study of gross anatomical structures will be conducted systematically for location, relationship to other structures and function. Structures are located and identified in axial (transverse), sagittal, coronal and orthogonal (oblique) planes. Illustrations and anatomic images will be compared with MR, ultrasound and CT images in the same imaging planes and at the same level when applicable. The characteristic appearance of each anatomical structure as it appears on CT, MR and ultrasound, when applicable, will be stressed.

DI 4310 Teaching Strategies in Health Care Education (3 semester credit hours)
This course will teach the student how to analyze learning theories with emphasis on adult learners and the elements of quality education.

DI 4311 Instructional Design (3 semester credit hours)
This course will instruct the student in the theory and application of instructional design in health care education and training.

DI 4312 Patient Education (3 semester credit hours)
This course will teach the student how to plan, develop and assess patient education products and methods.

DI 4322 Effective Human Resources Management (3 semester credit hours)
This course will teach the student about staff recruitment, retention techniques, and laws related

resource management. Topics include hiring and terminating personnel, and the issues of harassment and discrimination.

DI 4350 Introduction to Computed Tomography (3 semester credit hours)
This course will teach the Radiation Therapy student how to produce quality Computed Tomography images while ensuring the well-being and safety of patients. The course content will allow the student to understand basic CT physics so that they are able to identify deficiencies in images and how to take corrective actions. The Student will develop an understanding between the connections of choices they make when selecting scan parameters and the radiation dose delivered to the patient. CT simulated laboratory sessions will be included as part of the course content.

HS 3370 Fundamentals of Writing and Critical Thinking (3 semester credit hours)
This basic writing course stresses both reading and writing skills and is designed to teach students to improve their ability to write logically and develop short essays, brief formal summaries, and reports.

HS 4100 Issues in Health Care Ethics (1 semester credit hour)
This course content is designed to establish a foundation and set parameters of professional practice for health care professionals. The emphasis will be on developing the background for the resolution of ethical dilemmas through ethical reasoning, ethical obligations in health professional-patient relationships and just allocation of scarce health care resources.

HS 4101 Diversity and Cultural Competence (1 semester credit hour)
This course is designed to provide each student with a fundamental understanding of the concepts of cultural competency, diversity, and inclusion. The course content of each module emphasizes the following seven culturally competent areas of diversity: Building Relationships across Culture; Communication Across Differences; Conflict resolution Across Cultures ; Microinequities within the Workplace;. Diversity and Inclusion; Abilities: A Journey from Exclusion to Inclusion; Spirituality and health care practices.

HS 4111 Medical Law (1 semester credit hour)
This course introduces the student to medical law and case studies in medical imaging and radiation therapy.

HS 4300 Pathophysiology (3 semester credit hours)
This course is designed to provide basic knowledge in pathophysiology in preparation for professional studies in the health sciences. Topic covered includes central concepts of pathophysiology of the cells and tissues and alterations on organs and systems with an emphasis on carcinogenesis.

HS 4303 Advance Pathophysiology (3 semester credit hours) (Offer for 08-09 for Juniors)
This course presents the imaging disease process and its effects on image quality.

RT 4199 Special Topics in Radiation Therapy
This course is designed for individual projects, research, special seminars, or further

investigation of emerging technology or treatment in radiation therapy. Semester credit hours are assigned in relationship to the complexity of the individual student's goals.

RT 3101 Simulation and Treatment Techniques I (1 semester credit hour)
This course is taught in the laboratory setting. Students are required to demonstrate accurate simulation and/or treatment set-up procedures and patient immobilization for basic to immediate radiation therapy treatment protocols.

RT 3103 Simulation and Treatment Techniques II (1 semester credit hour)
This course is taught in the laboratory setting. Students are required to demonstrate accurate simulation and/or treatment set-up procedures for intermediate to advanced radiation therapy treatment protocols.

RT 3205 Introduction to Radiation Therapy (2 semester credit hours)
This course includes roles and responsibilities of radiation oncology personnel, medical terminology, basic patient care, practice standards of a radiation therapist and the hospital staff hierarchy.

RT 3220 Clinical Education I (2 semester credit hours)
This course provides supervised clinical education in which students are assigned to a specific patient. The student will observe the patients from consultation through treatment. Students are required to present in a formal setting the educational findings related to their patient's treatment regime. Students must demonstrate competency in block fabrication, patient immobilization, patient transfer techniques, bolus, vital signs and basic patient care. Students are assigned a mentor for the development of a master-apprentice relationship.

RT 3221 Clinical Education II (2 semester credit hours)
This course provides supervised clinical education in which students are required to demonstrate basic to intermediate ARRT and Programmatic competencies in treatment planning and delivery, quality assurance, patient care, brachytherapy and professional growth. Students are assigned a mentor for the development of a master-apprentice relationship.

RT 3222 Clinical Education III (2 semester credit hours)
Continuation of RT 3321.

RT 3342 Digital Imaging for Radiation Therapists
This course will teach the student about digital imaging in routine and specialized 2-D and 3-D images, data management and fusion practices

RT 3345 Directed Readings (1-3 semester credit hours) Directed reading and research, followed by the writing of a report or the creation of a project. Credit hours are based on size, length, and depth of paper or project.

RT 4101 Radiation Safety and Protection (1 semester credit hour)
This course requires the student to demonstrate a detailed understanding of atomic structure, types of ionizing radiation, radiation detection devices, units of measurement, personal and

public radiation safety practices and dose limitations from brachytherapy sources and external beam radiation devices. The course identifies radiation regulatory and advisory agencies and the specific requirements of each.

RT 4111 Clinical Radiation Oncology I Lab (1 semester credit hour)
Hands on practical application of treatment concepts covered in RT 4211 Clinical Radiation Oncology I.

RT 4112 Clinical Radiation Oncology II Lab (1 semester credit hour)
Hands on practical application of treatment concepts covered in RT 4212 Clinical Radiation Oncology II

RT 4199 Special Topics in Radiation Therapy (1 SCH)
This course is designed for individual projects, research, special seminars, or further investigation of emerging technology or treatment in radiation therapy. Semester credit hours are assigned in relationship to the complexity of the individual student's goals.

RT 4210 Radiobiology (2 semester credit hours)
This course presents the students with cellular, subcellular and tissue biology. The course requires the students to discriminate between types of cellular damage caused by ionizing radiation. Additionally, students are exposed to proliferation kinetics, fractionated radiotherapy, acute and chronic effects of radiation on human cells and body systems, principles of linear energy transfer and relative biologic effectiveness and the impact of radiosensitizers and radioprotectors on patient treatment.

RT 4211 Clinical Radiation Oncology I (2 semester credit hours)
This course presents an in-depth study of multidisciplinary treatment of the cancer patient from the clinician's viewpoint. Students are required to master concepts specific to site-specific disease including: histopathology, etiologic and epidemiology factors, detection and diagnosis, tumor stage and grade, routes of metastases, dose fractionation and prognostic factors. This course is designed to approach each cancer type by anatomic system, addressing treatment factors with increasing degrees of complexity.

RT 4212 Clinical Radiation Oncology II (2 semester credit hours)
Continuation of 4211 Clinical Radiation Oncology I
Prerequisite for Radiation Therapy students: RT 4211

RT 4302 Anatomy for Radiation Oncology (3 semester credit hours)
This course addresses the anatomical study of the human body in topographical, sagittal, transverse and coronal planes.

RT 4305 Patient Care in Radiation Oncology (3 semester credit hours)
The focus of this course is providing the student with advanced skills in oncologic patient care and assessment. Students are required to demonstrate, under varying patient conditions, physical and psychological assessment, cause and effect of clinical laboratory values, management of oncologic emergencies and treatment regimens of radiation induced site-specific treatment side

effects. This course contains a laboratory component.

RT 4306 Technical Radiation Oncology (3 semester credit hours)
Students master basic concepts of radiation therapy and the technical aspects of radiation oncology, including: custom block, mold and immobilization fabrication, B-mode acquisition and targeting, intensity modulated radiation therapy, stereotactic radiosurgery, intraoperative radiotherapy and brachytherapy. Principles of surgery and chemotherapy along with routine simulation procedures in radiation oncology are presented. Students are required to participate in hands-on simulation laboratory activities.

RT 4309 Special Applications in Radiation Oncology (3 semester credit hours)
This course presents principles of advanced practice -- such as fusion imaging, respiratory gating, stereotactic radiosurgery -- and current advancements in treatment techniques.

RT 4310 Radiation Therapy Physics (3 semester credit hours)
This course reviews atomic structure, interactions with matter and inverse square law. A detailed study is presented of the operation and function of radiotherapeutic equipment to include linear accelerators, cobalt units, superficial and orthovoltage units. Students are required to identify equipment faults and the appropriate responses to clearing faults. Equivalent Square and interpolation of data are introduced. Acquisition of radiation beam data, parameters required in accurate dose calculation, the effects of wedges, blocking, filters and beam configuration are discussed. Students are required to demonstrate accurate dose calculations for various beam configurations.

RT 4311 Radiation Therapy Treatment Planning and Dosimetry (3 semester credit hours)
This course stresses the application of brachytherapy calculative techniques, evaluation of distributions to calculate implant duration, analysis of emerging technology and terminology as they relate to current practice, comparing and contrasting hand calculations and combinations to computer output and applying formula calculations to advanced and complex treatment problems. Specific disease and site-specific concepts of treatment planning and medical dosimetry are presented. Students demonstrate their understanding of external photon and electron beam treatment planning in the production and analysis of treatment plans for head and neck, central nervous system, thoracic, breast, abdominal and pelvic tumors.
Prerequisite: RT 4310

RT 4312 Quality Management in Radiation Oncology (3 semester credit hours)
This course is an in-depth study of quality management and quality assurance components in radiation oncology. Students are required to demonstrate the knowledge and skills to develop a quality management program that includes: allocation of human and physical resources; quality assurance and acceptance testing of linear accelerators, simulators and brachytherapy sources; patient and personnel
protection policies; and patient and professional satisfaction. Data collection and analysis of quality indicators are required. Students are required to complete a hands-on laboratory component.

RT 4315 Radiation Physics and Medical Imaging (3 SCH)
This course will address basic concepts of radiation sciences, atomic structure, radiations interaction with matter, radiographic techniques used in image production, production of therapeutic radiation, electron and proton beams.

RT 4320 Clinical Education in Radiation Therapy IV (3 semester credit hours)
This course provides supervised clinical education in which students are required to demonstrate ARRT competency in treatment planning and delivery, quality assurance, patient care, block and mold fabrication, brachytherapy procedures along with advanced program competencies and professional growth. Students are assigned a mentor for the development of a master-apprentice relationship.

RT 4321 Clinical Education in Radiation Therapy V (3 semester credit hours)
This course provides supervised clinical education in which students are required to demonstrate ARRT competency in treatment planning and delivery, quality assurance, patient care, block and mold fabrication, brachytherapy procedures along with advanced program competencies and professional growth. Students are assigned a mentor for the development of a master-apprentice relationship.
Prerequisite: RT 4320

RT 4322 Clinical Education in Radiation Therapy VI (3 semester credit hours)
This course is a continuation of RT 4321. Students are assigned a mentor for the development of a master-apprentice relationship and will be responsible for a demonstration of final competency.
Prerequisite: RT 4321

RT 4356 Individual Projects
This course is designed to provide a review of knowledge in clinical oncology in preparation for the registry examination. Topics cover the concepts of various cancers, staging, and treatment techniques. Appropriate diagnostic and treatment procedures are also covered. Students are required to design, develop and present specific individualized projects.

RT 4390 Adaptive Radiation Therapy (3 semester credit hours)
Students will demonstrate problem-solving and critical thinking skills related to the daily issues of a radiation oncology department.
Situations presented will require technical and professional judgment as they relate to accuracy of patient treatment. Continued professional development through national certification, state licensure and life-long learning opportunities will be emphasized.

RT 4395 Problem and Solving and Decision Making in Radiation Therapy (3 semester credit hours)
This course will require students to demonstrate problem-solving and critical thinking skills related to real life radiation therapy challenges. Situations involving patient care, patient set-up and treatment, simulation and issues of a psychosocial nature are covered. The course serves as a capstone in the curriculum and prepares the student for national certification and professional employment.

Master of Science in Diagnostic Genetics

The Graduate Program in Diagnostic Genetics concentrates on the mastery of interpretive skills in major areas of the field including:

- Pre and Post-natal genetic disorder testing
- Cancer genetics testing
- Infectious disease testing
- DNA forensic science testing
- Prokaryotic and eukaryotic Genomics
- Molecular evolution and Bioinformatics

The program is administered by:

Dean: Shirley Richmond, Ed.D.
Program Director: Peter Hu, Ph.D., MLS(ASCP)^{CM} CG^{CM}, MB^{CM}
Education Coordinator (Molecular Genetics): Awdhesh Kalia, Ph.D.
Education Coordinator (Cytogenetic Technology): Jun Gu, MD.Ph.D., CG(ASCP)^{CM}

Roster of Faculty

Participating Faculty	Degree and School	Clinical Certification	Teaching Assignments
Peter Hu Associate Professor pchu@mdanderson.org	Ph.D., TUI University Postgraduate: The University of Texas MD Anderson Cancer Center	• MLS(ASCP) • CG(ASCP) • MB(ASCP) • CLSp(MB) CLSp(CG)	• Medical Genetics • Cytogenetics • Molecular Biology • Statistics • Management in Healthcare • Student Research Projects • Thesis Advisor
Awdhesh Kalia Assistant Professor akalia@ mdanderson.org	PhD., All India Institute of Medical Sciences Postdoc: Yale University, CT Washington University in St. Louis, MO		• Bioinformatics • Genomics • Molecular Microbiology • Student Research Projects • Thesis Advisor
Jun Gu Assistant Professor	Ph.D., TUI University	• CLSp(CG)	• Medical Genetics • Cytogenetics

jungu@mdanderson.org			• Thesis Advisor
Raiyalakshmi Luthra Professor rluthra@mdanderson.org	Ph.D., University of Arizona Postdoc: University of Arizona, AZ		• Biochemistry • Molecular Biology • Thesis Advisor
Ruth Ann Luna Instructor raluna@bcm.edu	Ph.D., Virginia Commonwealth University	• CLSp(MB)	• Clinical preceptor • Student Research • Thesis Advisor
Jing Wang Assistant Professor Jwang7@bcm.edu	M.D., Sun Yat-Sen University of Medical Sciences, China Postdoc: Baylor College of Medicine, TX	• FACMG	• Clinical Preceptor • Student Research • Thesis Advisor
Daniel Penny Professor djpenny@texaschildrens.org	M.D., University of London, England Postdoc: National University of Ireland	• MB(ASCP) • BCh • BAO • FRACP • FCSANZ	• Clinical Preceptor • Student Research • Thesis Advisor
Yuxin Fan Assistant Professor yuxinf@bcm.edu	Ph.D., Fudan University, China Postdoc: University of Washington, WA	• FACMG	• Clinical Preceptor • Student Research • Thesis Advisor
Jianli Dong Associate Professor jidong@utmb.edu	M.D., Ph.D., University of Toronto Postdoc: Yale University School of Medicine, CT	• FACMG	• Clinical Preceptor • Student Research • Thesis Advisor
Charles E. Stager Associate Professor Cstager@bcm.edu	Ph.D., The University of Texas Graduate School of Biomedical Sciences at Galveston Postdoc: Baylor College of Medicine, TX		• Clinical Preceptor • Molecular Infectious Disease • Thesis Advisor
Mary Coolbaugh-Murphy	Ph.D., The University of Texas	• MB(ASCP)	• Molecular Biology • Molecular Lab

toddnmary@gmail.com	Graduate School of Biomedical Sciences Postdoc: MD Anderson		Techniques • Biostatistics
Erika Thompson Co-Director ejthomps@mdanderson.org	M.S., Florida International University		• Genomics • Under-graduate Research • Clinical Preceptor
Clayton Morrison Field Application Specialist ROCHE Diagnostics	Ph.D., Baylor College of Medicine		• Diagnostic Genetics • Next Generation • Sequencing

Mission

The University of Texas MD Anderson Cancer Center Master's Program in Diagnostic Genetics, in concert with the mission and vision of The University of Texas MD Anderson Cancer Center, is committed to the education of technically and academically outstanding graduates prepared to meet the immediate and future needs of molecular diagnostic laboratories and allied health teaching.

Objectives

The Human Genome Project continues to identify the role of an increasing number of genes as playing a significant role in human disease. As a result, a MS degree in the related field of Diagnostic Genetics offers a wide range of career options, including leadership roles in:

- Diagnostic labs within a hospital setting
- Pharmaceutical industry including R&D and sales
- Biotechnology companies, R&D and sales
- Research, laboratories, including Lab manager and research associate positions
- Teaching institutions: including Instructor/Faculty positions

Selection Process

Admission is dependent on factors that include:

- Cumulative GPA
- Science and Math GPA

- GRE (must include analytical section score) or current clinical certification through the American Society for Clinical Pathology (ASCP) in one of the following MB, CG, or MLS, unless waiver approved by admissions committee
- Applicant's personal qualities such as maturity, ethical integrity, ability to handle stressful situations, and the applicant's long-term professional goals.
- Reference letters
- Assessment scores (taken on the date of the interview)
- Ability to meet the SHP non-academic technical standards
- Race, religion, national origin, veteran status, gender, or disability are not factors considered in the selection process

Applicants should begin the application process three to six months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office.

Nonacademic Requirements

For a description of the non-academic technical standards requirements for admission, visit the admission section of the SHP Catalog.

Admission to the graduate program is highly competitive. The program may accept 6-8 qualified students from among the applicant pool in any given academic year. Applicants are encouraged to begin the application process three to nine months prior to the application deadline to ensure all documents are received and processed by the UTHSC-Houston Registrar's office.

Program Admission Requirements

The Master of Science degree is a full-time two-year program with entry at the post-baccalaureate level.
The School of Health Professions is served by the Office of the Registrar for The University of Texas Health Science Center at Houston (UTHSCH).

To review application deadlines and access the admissions application, visit the "How to Apply" section of this website.

Please contact the Diagnostic Genetics Program Director, Dr.Peter Hu, for more information and to communicate your interest in applying for this program.

Applicants to the Program in Diagnostic Genetics must satisfy the following requirements for admission:

- **Bachelor degree** in biological sciences, biochemistry, chemistry, or related majors with emphasis on genetics/biochemistry courses..
- **All prerequisite course work** must be from a regionally accredited college or university. Physical education and military science courses are not acceptable for prerequisite credit.

- **Minimum grade point average of 3.0 on a 4.0 scale** is required to be considered for admission. GPA may be evaluated by the following: overall, science and mathematics course work, and last 60 hours or combinations of all of the above. Special circumstances may be considered, but at the discretion of the Admissions Committee.
- **Applicants holding current Clinical Certification** through the American Society for Clinical Pathology (ASCP) in MB, CG, or MLS are exempt from taking the Graduate Record Exam (GRE). Proof of ASCP Certification should be submitted in order to claim this exemption from taking the GRE.
- **Applicants without ASCP Clinical Certification in the above fields** must take the General Test of the Graduate Record Examinations (GRE) that includes the analytical portion. NOTE: The GRE Designated Institution Code for The University of Texas MD Anderson Cancer Center is **0490**
- **Applicants with previous graduate degrees**, e.g. PhD or MS, may request a waiver of the GRE at the discretion of the Admission's Committee.
- **Three reference letters** from individuals who are in a position to evaluate the applicant's personal attributes and their academic and laboratory skills.
- **Personal interview**
- **Test of English as a Foreign Language (TOEFL)** - Applicants from countries where English is not the native language may be required to take the TOEFL. Internet-based TOEFL is now available and a total test score ranging from 74-78 with a minimum score of 18 in each section is required.

Prior Course work and Experience

The following courses are strongly recommended:

- Prior Undergraduate or graduate course work in:
  - Molecular Biology
  - Biology
  - Genetics
  - Microbiology
  - Chemistry/ Organic Chemistry
  - Basic Research Techniques
  - Human Physiology
  - Evolutionary Biology
- Prior research experience during undergraduate study

Graduation

Each candidate for a Master's degree must complete:

- A minimum of 46 semester credit hours of course work
- Presentation of a poster at a local, state, or national conference
- The successful defense of a written applied research project

Upon graduation, students are eligible to take the national certification exam in either molecular biology or cytogenetics given by the American Society for Clinical Pathology (ASCP) depending upon the curriculum track for which the student is seeking certification. (Once the student is admitted to the program, the Program Director will meet with the student to discuss the certification eligibility routes.) In some instances, students may be eligible for dual certification.

Curriculum

An integral part of the MS curriculum is pursuing applied (clinical and basic translational) research. Students are required to select and identify their program mentors and related research laboratories during the first semester of the program. The curriculum includes didactic course work followed by directed clinical training at affiliated hospitals and laboratories. For further details about the curriculum, please refer to the Course work section below, or contact Program Director, Dr. Peter Hu at pchu@mdanderson.org

Affiliations for Clinical Rotation

During the clinical phase of instruction, training and supervision are provided in affiliated clinical laboratories, including:

- UT MD Anderson Cancer Center (Diagnostic Molecular Imaging Laboratory), Houston, TX
- UT MD Anderson Cancer Center (HLA Laboratory), Houston, TX
- UT MD Anderson Cancer Center (DNA Analysis Core Facility), Houston, TX
- UT MD Anderson Cancer Center (Array-CGH Center), Houston, TX
- Baylor College of Medicine (Diagnostic Sequencing Laboratory), Houston
- Baylor College of Medicine (Microarray Laboratory), Houston, TX
- Baylor College of Medicine (Cytogenetic Laboratory), Houston, TX
- Baylor College of Medicine (Mitochondria Laboratory), Houston, TX
- Baylor College of Medicine (John Walsh Cardiovascular Diagnostic Laboratory), Houston, TX
- Baylor College of Medicine (Whole Genome Sequencing Laboratory), Houston, TX
- Center for Medical Genetics (Molecular Laboratory), Houston, TX
- Ben Taub Hospital (Molecular Diagnostic Laboratory). Harris County Hospital District, Houston,TX
- Gene by Gene (FTDNA/DNATraits: Sequencing, NGS & Microarray Laboratory), Houston, TX
- Texas Children's Hospital (Molecular Pathology Laboratory), Houston,TX
- The Methodist Hospital (Clinical Laboratory Medicine), Houston, TX
- UT Medical Branch in Galveston (Molecular Diagnostic Laboratory), Galveston, TX
- Northwestern University, ACL Laboratories, Chicago, IL

Applied Research in Basic and Clinical Sciences

The Diagnostic Genetics Program aims to make an important contribution to improving health care through applied research. With a variety of participating Principal Investigators who share a wide range of research interests, these goals are attainable through collaborative, interdisciplinary, and outcome- based clinical research and clinical applications

Funding Opportunities

Working through the financial aid office of the University of Texas Health Science Center at Houston, prospective students may be funded through a variety of sources including federal, state, and departmental funds. These funds come in the forms of loans, grants, and scholarships

Accreditation

The Molecular Genetic Technology program is accredited and has conformed its curriculum to the standards published and monitored by:
National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)
5600 N. River Rd., Suite 720
Rosemont, IL 60018-5119
Phone: 773-714-8880
Fax: 773-714-8886

Course Listings

STUDENTS must maintain an overall 3.0 average to graduate

Track 1 – Non-Diagnostic Molecular Genetic Technology Majors

Course	
DG 6100 Clinical Research Seminar I	1
DG 6101 Clinical Research Seminar II	1
DG 6102 Clinical Investigative Design/Analysis	1
DG 6280 Concepts in Molecular Diagnostics	2
DG 6290 Clinical Diseases and Applications of Molecular Genetics	2
DG 6301 Advanced Practice I	3
DG 6320 Bioinformatics I	3
DG 6333 Quantitative Research and Advanced Statistics	3
DG 6340 Bioinformatics II	3
DG 6390 Applied Molecular Diagnostic Techniques	3
DG 6401 Advanced Practice II	4
DG 6501 Advanced Practice III	5
DG 6510 Diagnostic Molecular Laboratory Techniques Lab	5

DG 6560 Clinical Molecular Rotation I	5
DG 6570 Clinical Molecular Rotation II	5
Total	**46**

Track 2 – Diagnostic Molecular Genetic Technology Majors

Course	
DG 6100 Clinical Research Seminar I	1
DG 6101 Clinical Research Seminar II	1
DG 6102 Clinical Investigative Design/Analysis	1
DG 6120 Intermediate Karyotyping	1
DG 6152 Clinical Prenatal Cytogenetics	1
DG 6240 Advanced Clinical Cytogenetics Techniques	2
DG 6301 Advanced Practice I	3
DG 6333 Quantitative Research and Advanced Statistics	3
DG 6340 Bioinformatics II	3
DG 6350 Clinical Laboratory Cytogenetics	3
DG 6391 Advanced Topics in Clinical Cytogenetics	3
DG 6401 Advanced Practice II	4
DG 6501 Advanced Practice III	5
DG 6521 Clinical Cytogenetics Rotation I	5
DG 6530 Clinical Cytogenetic Laboratory Techniques	5
DG 6531 Clinical Cytogenetics Rotation II	5
Total	**46**

Course Descriptions

All syllabi below open in Adobe PDF format. Download the latest version of Adobe PDF Reader.

DG 6100 Clinical Research Seminar I (1 semester credit hour)
Seminar based course that covers topics in genetics and related fields.

DG 6101 Clinical Research Seminar II (1 semester credit hour)
This is a continuation from Research Seminar I course that covers topics in genetics and related fields.

DG 6102 Clinical Investigative Design/Analysis (1 semester credit hour)
The purpose of this course is to guide the students through the process of writing the first draft of their applied research project.

DG 6120 Intermediate Karyotyping (1 semester credit hour)
A continuation of CC4120, this intermediary course in human G-banded chromosome identification will be a case-based approach to the analysis of chromosome abnormalities commonly seen in constitutional and oncologic cases. Students will apply the International System for Human Cytogenetic Nomenclature (ISCN) and be prepared to perform literature reviews and in class case discussions.
Laboratory fee of $30.00.

DG 6152 Clinical Prenatal Cytogenetics (1 semester credit hour)
Cytogenetic analysis is the single most frequent test used in laboratory prenatal diagnostic studies. This course summarizes the current status of the field, including diagnostic problems in the laboratory and the clinical problems associated with communicating unexpected laboratory findings. Students will correlate cytogenetic analysis with fetal loss, biochemical screening, ultrasonography, prenatal genetic profiling and fluorescence in situ hybridization. Hands-on laboratory activities included POC dissection, in situ culture set up and harvesting and chromosome analysis of abnormal prenatal cases. Case study analysis will include abnormality identification and drafting of mock written clinical reports.

DG 6240 Advanced Clinical Cytogenetics Techniques (2 semester credit hour)
This two-hour comprehensive course is designed for the study of cancer cytogenetics including solid tumor analysis. Course covers the history of cancer cytogenetics, carcinogenic transformation, random versus nonrandom cytogenetic findings in most common human solid tumors, complex karyotype analysis, result interpretation and composite ISCN writing. The student will also study the mutagenic effects derived from lifestyle and environmental factors as they relate to malignant disease. Cytogenetic characterization of tumor cell lines using G-banding, Q-band, and other special staining is required through case study and presentation. This course combines both lecture and laboratory experience into one integrated learning experience.
Lab fee of $30.00.

DG 6280 Concepts in Molecular Diagnostics (2 semester credit hour)
An advanced study on theories of diagnostic molecular science with respect to specimen handling and processing, framework for quality assurance, summary, result reporting, verification of molecular assays, standards, and standardization; in relation to: extraction, blotting, labeling, PCR, alternative amplification techniques, microarray, and bioinformatics. This course will challenge students with case-based scenarios.

DG 6290 Clinical Disease and Applications of Molecular Genetics (2 semester credit hour)
Focuses on the specific applications of molecular techniques within a variety of disciplines. The

disciplines covered include molecular cytogenetics, immunology, infectious diseases, oncology, prenatal and postnatal disorders, and transplantation immunology. Participants will be evaluated by both theoretical and application knowledge through exams and a written paper.

DG 6301 Advanced Practice I (3 semester credit hour)
This is a hypothesis-based original research study. Student must fulfill the requirements of a Master's level applied research work including an approved proposal by the faculty advisor and the Diagnostic Genetics core committee 1 month before the beginning of the term. Graduation with an applied research project is subject to approval by the applied research committee and program core committee, and requires the student to present their projects to a faculty committee both orally and in writing.

DG 6320 Bioinformatics I (3 semester credit hour)
This course will introduce the students to information technology and computer science to the field of molecular biology with special emphasis on molecular evolution. Students will learn how to access, manage and analyze biological information using computer applications for purposes such as assay design, data analysis, data mining, and clinical research and development. Graduate students are assigned independent project to demonstrate their aptitude in acquired skills through development of a bioinformatics pipeline for single gene analyses.

DG 6333 Quantitative Research and Advanced Statistics (3 semester credit hour)
An overview of inferential statistics, including but not limited to: correlation, regression, t-test, Chi square, and ANOVA as a foundation of experimental design, various models, correlation analysis, multiple regression, and factor analysis that emphasizes on clinical research implications and applications.

DG 6340 Bioinformatics II (3 semester credit hour)
This course continues from DG 6320 Bioinformatics I and builds on the concepts introduced in DG 6320 and develop further computational and analytical skills targeted to analysis of genomes. Students are introduced to whole genome analyses with particular focus on Human and pathogen genomes. Students acquire skills in transcriptome and miRNA analyses and are introduced to script development using PERL AND R. Graduate students are assigned independent project to demonstrate their aptitude in acquired skills through development of a bioinformatics pipeline for whole genome or transcriptome analyses.

DG 6350 Clinical Laboratory Cytogenetics (3 semester credit hour)
A blended learning experience of lecture instruction, class discussion, and hands-on clinical laboratory practice on general principles of clinical cytogenetic study. Students will be exposed to numerical and structural chromosome abnormalities, embryogenesis & meiotic outcomes, sex chromosome abnormalities & translocations, congenital versus acquired abnormalities & mosaicism, ethical and counseling issues, and reporting issues & ISCN. Students will gain diagnostic and interpretive skills in a variety of cytogenetic problems. The course requires student to complete a case report of an assigned topic with a brief literature search and review. Laboratory fee of $30.00.

DG 6390 Applied Molecular Diagnostic Techniques (3 semester credit hour)
This lecture/laboratory course focuses on the specific applications of newer molecular techniques. Participants will have hands-on experiences which may include Real Time PCR using various detection methods, microarray technology, sequencing, and next generation sequencing. Participants in this course will also be challenged at a higher critical thinking level of trouble shooting various diagnostic molecular problems. This course also includes a review for the (ASCP) certification exam.
Lab fee of $30.00

DG 6391 Advanced Topics in Clinical Cytogenetics (3 semester credit hour)
This capstone course integrates learning from all previous taught courses. It is a student-centered course aim to develop critical thinking and knowledge synthesis skills as a cytogenetic technologist. Students will work on case studies to develop their problem solving skills in a clinical cytogenetic environment. Students will also participate in a national review in clinical cytogenetics and a mock CAP inspection. Finally, students will show mastery of the field of cytogenetics through completing essays, written scenarios, practice exams and eventually taking a comprehensive cytogenetic exam.

DG 6401 Advanced Practice II (4 semester credit hour)
This is a continuation of DG6301 Advanced Practice I course. All rules and regulations for completion of the thesis project apply.
Lab fee of $30.00.

G 6501 Advanced Practice III (5 semester credit hour)
This is a continuation of DG6401 Advanced Practice II course. All rules and regulations for completion of the thesis project apply.
Lab fee of $30.00.

DG 6510 Diagnostic Molecular Diagnostic Techniques Lab (5 semester credit hour)
A comprehensive study of maintaining laboratory quality control in accordance with federal, state, and local regulations, as well as College of American Pathologists on-site inspections and proficiency testing. Also, a study of the laboratory skills involved in transporting, preparing, and reporting final results of specimens that include blood, bone marrow, and solid tissue samples. Participants will have hands-on laboratory experiences performing molecular techniques such as but not limited to: DNA extraction, purification, and quantification. Gel electrophoresis preparation and viewing. PCR and Real Time PCR experiments and various calculations for dilutions and concentrations of processing molecular related techniques.
Lab fee of $30.00.

DG 6521 Clinical Cytogenetics Rotation I (5 semester credit hour)
This laboratory rotation involves in-depth study of the different cytogenetic techniques and methods used in constitutional chromosome disorders diagnosis. This laboratory rotation also provides the students an opportunity to observe and participate in the testing algorithms and reflex testing that occur in prenatal and postnatal cytogenetic testing environment. Student is required to perform case studies and prepare a presentation to the laboratory host rotation.
Lab fee of $30.00.

DG 6530 Clinical Cytogenetic Laboratory Techniques (5 semester credit hour)
This course will provide a comprehensive overview of all types of traditional cytogenetic techniques as well as molecular cytogenetic studies by fluorescence in situ hybridization. The course goal is to achieve entry level competency in the workup of patients with constitutional chromosome abnormalities through both didactic and hand-on instruction. Various aspects of quality control and assurance associated with good laboratory practice for most routine cytogenetic methods will be performed and discussed. Students will maintain laboratory notebooks documenting the standard operating procedures with troubleshooting notations.
Lab fee of $30.00.

DG 6531 Clinical Cytogenetics Rotation II (5 semester credit hour)
This laboratory rotation provides the student with intensive study of test procedures and practical application of theory topics in all aspects of the hematological malignant cytogenetic study. Analytical methodologies, as well as the correlation of cytogenetic and molecular cytogenetic tests with hematologic disorders are emphasized. Quality control procedures and safety considerations are incorporated to the process of problem-solving and troubleshooting. The course also competency tests students regarding to microscopic cell analysis, photographic techniques, karyotype preparation, evaluation, FISH signal quantitation, and ISCN issues. Student is required to perform case studies and prepare presentations to the laboratory host rotation.

DG 6560 Clinical Molecular Rotation I (5 semester credit hour)
This clinical laboratory rotation includes the study of molecular diagnostic procedures utilizing recombinant DNA technology and its application to the many aspects of the clinical laboratory. Laboratory experiences may include but not limited to: DNA specimen handling and processing, DNA extraction, DNA purification, Southern blot analysis, probe preparation and utilization, PCR, primer design, Real-Time PCR, microarray, FISH, and DNA sequencing.
Lab fee of $30.00.

6570 Clinical Molecular Rotation II (5 semester credit hour)
This clinical laboratory rotation is a continuation of DG6560. This clinical laboratory rotation includes the study of molecular diagnostic procedures utilizing recombinant DNA technology and its application to the many aspects of the clinical laboratory. Laboratory experiences may include DNA specimen handling and processing, DNA extraction, DNA purification, Southern blot analysis, probe preparation and utilization, PCR, primer design, Real-Time PCR, microarray, FISH, and DNA sequencing.
Lab fee of $30.00.