2023-2024

Catalog

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™

Graduate School *of* Biomedical Sciences

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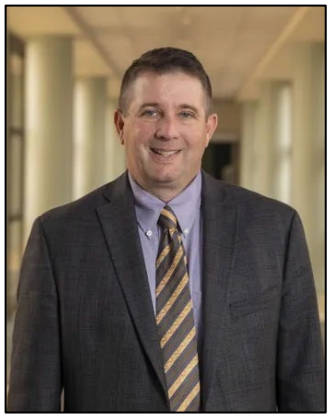
Message from the Dean

Brandt Schneider, Ph.D.

Dean, Graduate School of Biomedical Sciences
Co-Director, Institute of Anatomical Sciences



Welcome to the TTUHSC Graduate School of Biomedical Sciences (GSBS)! As one of six schools at the Texas Tech University Health Sciences Center (TTUHSC), GSBS offers graduate degree programs on the Abilene, Amarillo, and Lubbock campuses. Our school plays an integral role in education and research as the university seeks to transform health care through innovation and collaboration.

In GSBS, we are training the next generation of scientists and health-related professionals in a dynamic, diverse, and productive research environment. From researchers with international acclaim to experienced medical practitioners and renowned professors, you will learn from a premier and accomplished faculty. You will have access to a wide variety of health science research opportunities, state-of-the-art facilities, and student-run organizations.

This is a formidable, yet exciting, time in your life as a scientist, and we are here to help you along your journey. As a graduate student, your knowledge, professionalism, and skills will flourish in a research environment that fosters creativity and discovery.

Because TTUHSC values teamwork, kindness, integrity, vision, and service, we are committed to treating one another with respect and compassion. We also seek to promote an environment that values diversity of people and ideas. Our goal is to make your graduate school experience rewarding, productive, and memorable. Please reach out to me, our faculty, or staff members if you have any questions. We are here to help you succeed!

3601 4th Street, Mail Stop 6206
Lubbock, Texas 79430

(806) 743-2556

graduate.school@ttuhsc.edu

www.ttuhsc.edu/biomedical-sciences

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Catalog Statement

The provisions of this catalog do not constitute a contract, expressed or implied, between any applicant, student, or faculty member and the TTUHSC Graduate School of Biomedical Sciences (GSBS), including any of the institution's campuses or sites. GSBS expressly reserves the right to make revisions, as needed, when considered to be in the best interests of the school. Changes will become effective when so determined by the proper school authorities, in accordance with state requirements and institutional accreditation standards. Students are advised to communicate regularly with faculty and staff to remain aware of any changes which may impact program requirements.

Equal Opportunity

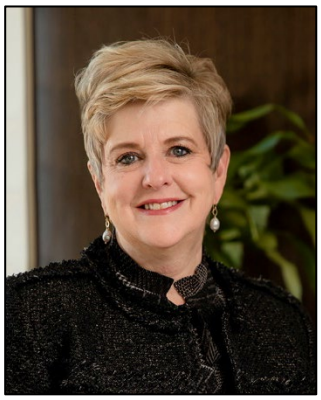
TTUHSC does not tolerate discrimination or harassment based on or related to sex (including pregnancy), race, color, national origin, religion, age, disability, protected veteran status, genetic information, sexual orientation, gender identity, gender expression, or other protected categories, classes, or characteristics.

Notice of the Annual Security Report

The Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act is a federal statute requiring all colleges and universities participating in federal financial aid programs to maintain and annually disclose campus crime statistics and security information. Copies of the Annual Security Report (ASR) may be obtained in person from the TTUHSC Office of Student Affairs or the Texas Tech Police Department (TTPD) during normal business hours, 8:00 AM to 5:00 PM, Monday through Friday, on the Lubbock campus. You may also request a copy via electronic or U.S. mail by contacting the TTPD during normal business hours, 8:00 AM to 5:00 PM, Monday through Friday, at (806) 742-3931. Additionally, the ASR can be found online.

About TTUHSC

Overview



With a growing shortage of physicians in West Texas, the state legislature authorized the Texas Tech University School of Medicine in 1969. The school charter was expanded a decade later to the Texas Tech University Health Sciences Center (TTUHSC), and the institution began preparing future healthcare professionals and researchers in multiple disciplines. In 2020, Dr. Lori Rice-Spearman was appointed the university's ninth president and became the first female president in the Texas Tech University System.

Today TTUHSC offers undergraduate, graduate, and professional academic programs across six schools: (1) Graduate School of Biomedical Sciences, (2) Jerry H. Hodge School of Pharmacy, (3) Julia Jones Matthews School of Population and Public Health, (4) School of Health Professions, (5) School of Medicine, and (6) School of Nursing. These academic programs are delivered across multiple campuses—Amarillo, Abilene, Dallas, Lubbock, and Odessa—as well as formal sites at Covenant Health System-Lubbock, Mansfield, and Midland. In addition, TTUHSC enrolls a significant population of students in distance education programs.

Vision

Transform health care through innovation and collaboration. TTUHSC is committed to creating an environment that fosters internal and external collaborations and boldly inspires innovation across all campuses and clinics to improve patient care, research and education.

Mission

As a comprehensive health sciences center, our mission is to enrich the lives of others by educating students to become collaborative health care professionals, providing excellent patient care, and advancing knowledge through innovative research.

Values

Through our values-based culture, TTUHSC is committed to cultivating an exceptional community for all constituents—faculty, staff, students, patients, and community members. These core values are integral to our purpose and describe how we seek to live our vision and mission on a daily basis.

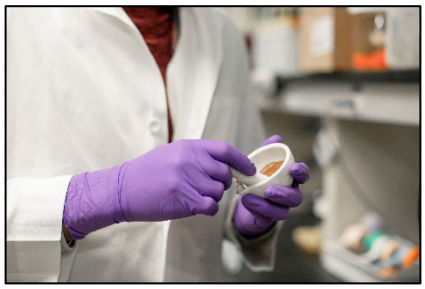
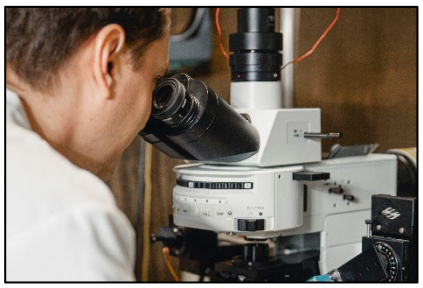
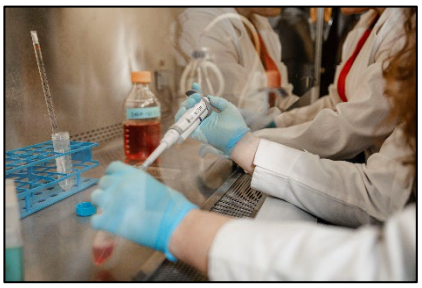
- **One Team:** Unite and include diverse perspectives to achieve our mission.
- **Kindhearted:** Exceed expectations with a kind heart, helping hands and a positive attitude.
- **Integrity:** Be honorable and accountable even when no one is looking.
- **Visionary:** Nurture innovative ideas, bold explorations and a pioneering spirit.
- **Beyond Service:** Create and deliver positive defining moments.

Accreditation

Texas Tech University Health Sciences Center is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) to award baccalaureate, masters, doctoral, and professional degrees. Degree-granting institutions also may offer credentials such as certificates and diplomas at approved degree levels. Questions about the accreditation of Texas Tech University Health Sciences Center may be directed in writing to the Southern Association of Colleges and Schools Commission on Colleges at 1866 Southern Lane, Decatur, GA 30033-4097, by calling (404) 679-4500, or by using information available on SACSCOC's website (www.sacscoc.org).

TTUHSC has been accredited by SACSCOC as separate institution from Texas Tech University since 2004 and was last reaffirmed by SACSCOC in 2019.

About Our School

GSBS Mission

In support of the institutional mission, the Graduate School of Biomedical Sciences strives to provide superior graduate education as well as leadership in increasing knowledge and understanding through scholarship and research. The mission of the Graduate School of Biomedical Sciences is to educate the next generation of scientists and health-related professionals in a dynamic and productive research environment that fosters creativity and discovery. In order to accomplish the mission, the faculty and staff of the Graduate School of Biomedical Sciences are committed to:

- Providing the larger academic community, as well as future employers, with graduates who are highly competent, independent, and ethical researchers and teachers;
- Demonstrating in all pursuits honesty, integrity, trustworthiness, and commitment to academic freedom;
- Ensuring that GSBS faculty, staff, and students are supported in their efforts with state-of-the-art resources, facilities, and training opportunities;
- Serving as leaders in the community for the advancement of knowledge related to the basic biomedical and related health sciences; and
- Ensuring an environment that values a diversity of people and ideas.

Oath

I acknowledge that the mission of scientific research is a true and noble calling to discover truths that are hidden and to reveal wisdom yet unknown, always for the greater good. I welcome the privilege and opportunity to join in this mission, and to dedicate the talents that I have and the education I have gained in this higher purpose. Moreover, I pledge to use this knowledge and wisdom I have achieved only for the improvement of life. In this journey of discovery, I promise to always be honest, accurate, and fair, in all things and in all matters, and to always conduct my affairs with excellence and ambition.

Symbol

The shield of the GSBS represents our dedication to protect life through scientific advancements in research. The double helix divides the shield into four quadrants and connects all forms of life.

At the top left, the tree symbolizes the scientific process, where knowledge has deep roots and a strong base, and the thin branches of solitary ideas give rise to seeds, which leave the tree and start new lines of thought. The star at the right represents the direction a scientist must follow as new avenues of research are revealed to us.

At the bottom left, a microscope shows the scientist's commitment to look for deeper explanations. The double T at the bottom right represents Texas Tech University Health Sciences Center, the institution that has taught us these lessons.

Programs and Campuses

Academic Programs

The Graduate School of Biomedical Sciences (GSBS) is one of six schools within the Texas Tech University Health Sciences Center (TTUHSC). The school offers the following graduate degree programs:

Doctor of Philosophy (Ph.D.)	Master of Science (M.S.)
• **Biomedical Sciences** *Areas of Concentration:* (1) Biochemistry, Cellular and Molecular Biology (2) Immunology and Infectious Diseases (3) Molecular Biophysics (4) Translational Neuroscience and Pharmacology • Pharmaceutical Sciences	• Biomedical Sciences[1] • Biotechnology • Graduate Medical Education Sciences • Pharmaceutical Sciences [1] *Students cannot be admitted directly into this program.*

Cooperative Academic Programs

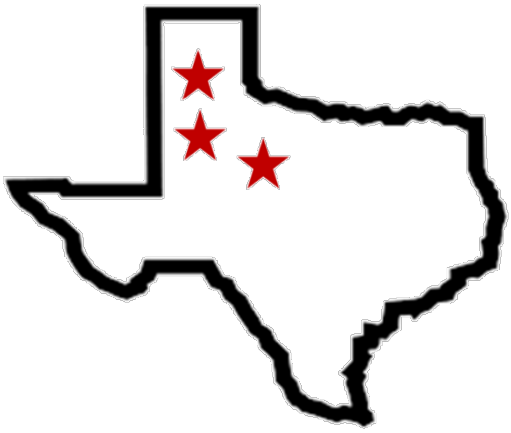
An agreement by two or more institutions to grant **dual degrees** is one whereby students study at two or more institutions, and each institution grants a separate academic award. These programs, which are formally recognized by the institution's accrediting body (SACSCOC), typically require a sharing of limited credit hours across institutions and result in two degrees at the same level. An **internal dual degree** is an agreement within the same institution to grant separate degrees. These programs, which are not recognized formally by SACSCOC, typically require a sharing of limited credit hours across programs and result in two degrees at the same level or different levels. Other academic arrangements may also exist which are not formally recognized by SACSCOC but are available to interested students.

	GSBS Program	Partner
Dual Degree		
M.S./MBA	M.S., Biotechnology	TTU Rawls College of Business
Internal Dual Degree		
M.D./M.S.	M.S., Biomedical Sciences or M.S., Biotechnology	TTUHSC School of Medicine
M.D./Ph.D.	Ph.D., Biomedical Sciences	TTUHSC School of Medicine
Other		
J.D./M.S.	M.S., Biotechnology	TTU School of Law
Ph.D./MBA	Ph.D., Biomedical Sciences	TTU Rawls College of Business

Students must apply to each school and/or program separately. For more information about the application process, email graduate.school@ttuhsc.edu.

Campuses

Abilene	M.S., Biotechnology Ph.D., Pharmaceutical Sciences
Amarillo	M.S., Pharmaceutical Sciences Ph.D., Pharmaceutical Sciences
Lubbock	M.S., Biomedical Sciences M.S., Biotechnology M.S., Graduate Medical Education Sciences Ph.D., Biomedical Sciences



Organizational Structure

Administration

The Graduate School of Biomedical Sciences (GSBS) is led by the Dean in collaboration with a team of administrative staff and faculty. All GSBS faculty have a primary appointment in the School of Medicine or Jerry H. Hodge School of Pharmacy and faculty membership in a specific GSBS academic program and/or concentration, as applicable. The GSBS Graduate Council serves as a governing body of elected representatives acting on behalf of the GBSB faculty and as an advisory body to the Dean. In addition to faculty representation from each academic program, including concentrations, student Presidents elected by the GSBS Graduate Students Associations in Abilene, Amarillo, and Lubbock serve on Graduate Council.

NAME	POSITION	PRIMARY CAMPUS
Brandt Schneider, Ph.D.	Dean	Lubbock
Michael Blanton, Ph.D.	Sr. Associate Dean	Lubbock
Thomas Abbruscato, Ph.D.	Sr. Associate Dean	Amarillo
Sanjay Srivastava, Ph.D.	Associate Dean	Abilene
Kari Dickson, Ph.D.	Associate Dean	Lubbock
Pamela Johnson, MBA	Assistant Dean/Managing Director	Lubbock
Terri Lloyd	Director of Admissions	Lubbock
Tres Boren, MBA	Sr. IT Support Technician	Lubbock
Ashlee Rigsby	Associate Director, Outreach and Engagement	Lubbock
Teresa Carlisle	Unit Manager	Amarillo
Leslie Fowler	Business Manager	Lubbock
D'Ann Holubec, M.A.	Program Manager	Lubbock
Jerri Jones, MBA	Program Manager	Abilene
Debbie Martinez	Sr. Administrative Assistant	Lubbock

Academic Program Leaders

A Department Chair leads each doctoral program and/or concentration, as applicable. A Graduate Advisor handles the daily management of each doctoral program and/or concentration. Each concentration also has departmental staff to assist with administrative responsibilities. Every master's level program is led by a Program Director with daily management assigned to a Graduate Advisor. A Student Affairs Advocate (SAA) from the GSBS office is assigned to each master's and doctoral program to serve as a general student resource in navigating our academic programs successfully.

NAME	POSITION	PRIMARY CAMPUS
M.S., Biotechnology		
Sanjay Srivastava, Ph.D.	Program Director—Abilene	Abilene
Ina Urbatsch, Ph.D.	Program Director—Lubbock	Lubbock
Irene La-Beck, PharmD	Graduate Advisor—Abilene	Abilene
Komaraiah Palle, Ph.D.	Graduate Advisor—Lubbock	Lubbock
Jerri Jones, MBA	Student Affairs Advocate—Abilene	Abilene
Leslie Fowler	Student Affairs Advocate--Lubbock	Lubbock

M.S., Graduate Medical Education Sciences		
Dan Webster, Ph.D.	Program Director	Lubbock
Gurvinder Kaur, Ph.D.	Graduate Advisor	Lubbock
Leslie Fowler	Student Affairs Advocate	Lubbock

Academic Program Leaders (continued)

NAME	POSITION	PRIMARY
M.S., Pharmaceutical Sciences (Amarillo only) and Ph.D., Pharmaceutical Sciences		
Thomas Abbruscato, Ph.D.	Chair, Pharmaceutical Sciences	Amarillo
Sanjay Srivastava, Ph.D.	Chair, Immunotherapeutics & Biotechnology	Abilene
Abraham Al-Ahmad, Ph.D.	Graduate Advisor	Amarillo
Laurence Wood, Ph.D.	Assistant Graduate Advisor	Abilene
Jerri Jones, MBA	Student Affairs Advocate—Abilene	Abilene
Teresa Carlisle	Student Affairs Advocate—Amarillo	Amarillo
Ph.D., Biomedical Sciences (Concentration: Biochemistry, Cellular and Molecular Biology)		
Jannette Dufour, Ph.D.	Department Chair	Lubbock
Jeffrey Thomas, Ph.D.	Graduate Advisor	Lubbock
Sharla Cook	Department Support Staff Representative	Lubbock
Terri Lloyd	Student Affairs Advocate (Undeclared Students)	Lubbock
D'Ann Holubec, M.A.	Student Affairs Advocate	Lubbock
Ph.D., Biomedical Sciences (Concentration: Immunology and Infectious Diseases)		
Afzal Siddiqui, Ph.D.	Department Chair	Lubbock
Joe Fralick, Ph.D.	Graduate Advisor	Lubbock
Valerie Sosa	Department Support Staff Representative	Lubbock
Terri Lloyd	Student Affairs Advocate (Undeclared Students)	Lubbock
D'Ann Holubec, M.A.	Student Affairs Advocate	Lubbock
Ph.D., Biomedical Sciences (Concentration: Molecular Biophysics)		
Michael Wiener, Ph.D.	Department Chair	Lubbock
Pablo Artigas, Ph.D.	Graduate Advisor	Lubbock
Lisa Castillo/Christy Gresham	Department Support Staff Representative(s)	Lubbock
Terri Lloyd	Student Affairs Advocate (Undeclared Students)	Lubbock
D'Ann Holubec, M.A.	Student Affairs Advocate	Lubbock
Ph.D., Biomedical Sciences (Concentration: Translational Neuroscience and Pharmacology)		
Volker Neugebauer, M.D., Ph.D.	Department Chair	Lubbock
Josee Guindon, DVM, Ph.D.	Graduate Advisor	Lubbock
Lisa Moran	Department Support Staff Representative	Lubbock
Terri Lloyd	Student Affairs Advocate (Undeclared Students)	Lubbock
D'Ann Holubec, M.A.	Student Affairs Advocate	Lubbock

Admissions

Admission to a Master's or Doctoral Program

Admission to any graduate degree program is granted by the Dean of the Graduate School of Biomedical Sciences (GSBS), or appointed delegate, upon the recommendation of the GSBS Admissions Committee and the program/concentration faculty. Program committees review completed applications, conduct interviews with selected applicants, and then determine which applications to forward to the GSBS Admissions Committee. All applicants must be in good standing with the last school attended. Only prospective students with completed application files will be considered for admission.

In general, three categories of criteria are used to evaluate all applicants for admissions:

- **Academic Records:** All academic records may be considered.
- **Test Scores:** Scores on the Graduate Record Examination (GRE) General Test: (a) verbal reasoning, (b) quantitative reasoning, and (c) analytical writing. Each score is considered separately and in comparison, within broad graduate major fields.
- **Individual Profile:** Profiles may include recommendations, research background, motivation, multilingual proficiency, undergraduate institution, presentations, portfolios, and interviews. Admission committees may also consider work experience, demonstrated commitment to a particular field or study, and community involvement.

Applicants will be notified when an admission decision has been made. Matriculation generally occurs in the fall semester across all GSBS programs/concentrations.

Any exceptions to the admissions criteria described below will be considered on an individual basis with support from a faculty mentor, upon review and recommendation by the GSBS Admissions Committee, and with final approval by the GSBS Dean.

A completed application consists of the following:

1. **Application to TTUHSC Graduate School of Biomedical Sciences**
   Applications must be submitted online at BioRaider.com. Falsification of application information will void admission to Texas Tech University Health Sciences Center (TTUHSC). All sections of the online application must be completed and submitted prior to the application closing date. All required supplemental documents must also be received by the application deadline. Application deadlines and instructions are available on the GSBS Admissions website.

2. **Official GRE General Test Score Report**
   GRE General Test scores must be no more than five years old. This is a requirement for all international applicants for all degree programs regardless of educational background. The GRE is optional for domestic applicants to the following degree programs: (a) Ph.D., Biomedical Sciences, and (b) M.S, Biotechnology. The GRE is required for both domestic and international applicants to the following degree programs: (a) Ph.D., Pharmaceutical Sciences, (b) M.S., Pharmaceutical Sciences, and (c) M.S., Graduate Medical Education Sciences.

   Information about the GRE may be accessed online through the Educational Testing Service (ETS) at www.gre.org. All test scores must be sent directly from ETS to the TTUHSC Office of the Registrar. Photocopies or scanned copies of GRE scores will not be accepted. The institution code for Texas Tech University Health Sciences Center is 6851. Occasionally, the MCAT may be submitted in lieu of GRE scores for applicants to the M.S., Biotechnology, and M.S., Graduate Medical Education Sciences, programs. Doing so requires additional approval. Email graduate.school@ttuhsc.edu for specific instructions.

In accordance with *Texas Education Code, §51.842*, an applicant's performance on a standardized test may not be used in the admissions or competitive scholarship process for a graduate or professional program as the sole criterion for consideration of the applicant or as the primary criterion to end consideration of the applicant.

3. Proof of English Proficiency

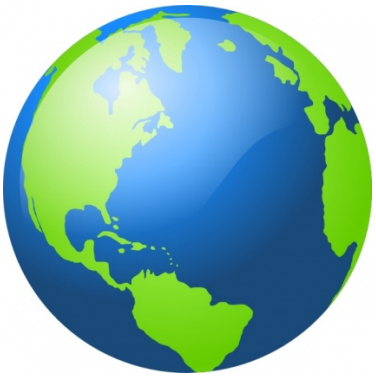
International applicants who can provide a passport from one of the following countries is exempt from the English proficiency requirement:

American Samoa	Liberia
Anguilla	Micronesia, Federated States of
Antigua and Barbuda	Montserrat
Australia	New Zealand
Bahamas	Nigeria
Barbados	Saint Kitts and Nevis
Belize	Saint Lucia
Bermuda	Saint Helena
Canada (except Province of Quebec)	South Africa
Cayman Islands	St. Vincent and the Grenadines
Dominica	Trinidad and Tobago
Falkland Islands (Islas Malvinas)	Turks and Caicos Islands
Ghana	United Kingdom—England
Gibralter	United Kingdom—Northern Ireland
Grenada	United Kingdom—Scotland
Guam	United Kingdom—Wales
Guyana	United States of America
Ireland, Republic of	Virgin Islands
Jamaica	Zimbabwe

Testing Waivers

- Degree earned from an accredited college or university from one of the countries listed above; or
- Completion of four (4) consecutive long semesters of credit-bearing, non-development/non-ESL courses at an accredited college or university school in the U.S.

International applicants who do not qualify for an exemption or testing waiver must submit one of the following as proof of English proficiency:



a. **Test of English as a Foreign Language (TOEFL):** The minimum total TOEFL iBT score, including the Home Edition and Paper Edition, is 79. The minimum overall score for TOEFL Essentials is an 8.5. TOEFL scores must be received directly from the Educational Testing Service (ETS). TTUHSC's institutional code is 6851. TOEFL scores are valid for two years only. *(Note: Due to the limited timeframe for accessing test scores, GSBS will accept a score as official if TTUHSC has previously received a test score that is now over two years old.)*

b. **International English Language Testing Service (IELTS):** The minimum required score on the IELTS Academic test is an overall band score of 6.5 or greater. The IELTS General Training test is not accepted at TTUHSC. There is no IELTS institutional code for TTUHSC. IELTS scores are valid for two years only. *(Note: Due to the limited timeframe for accessing test scores, GSBS will accept a score as official if TTUHSC has previously received a test score that is now over two years old.)*

c. **Duolingo English Test:** The minimum overall Duolingo score is 100. There is no institutional code for Duolingo. Scores are reported within 48 hours and are valid for two years. *(Note: Due to the limited timeframe for accessing test scores, GSBS will accept a score as official if TTUHSC has previously received a test score that is now over two years old.)*

4. Official Transcripts

Applicants to the Graduate School of Biomedical Sciences (GSBS) must have earned a bachelor's degree from a regionally accredited institution in the United States or the equivalent of a U.S. bachelor's degree from a foreign institution, which typically requires at least 120 U.S. equivalent credit hours. Domestic and international applicants must submit an official transcript from each U.S. college or university attended. All degrees earned must appear on official transcripts. For domestic and international applicants who have not yet completed a bachelor's degree or the equivalent, at least six semesters of coursework must be submitted to be eligible for admission consideration with the understanding that final transcripts or transcript evaluations must be submitted prior to enrollment. Each applicant must also be in good standing with all schools attended.

All prospective students applying to GSBS are expected to adhere to the highest level of academic integrity. This includes listing all postsecondary institutions attended or currently attending on the application for admission, including institutions for which transfer credit was received toward an undergraduate or graduate degree. Applicants must also submit official U.S. transcripts or course-by-course transcript evaluations for international institutions for all institutions attended and/or currently attending. Failure to provide this information on the application and/or failure to submit all U.S. transcripts or course-by-course transcript evaluations is considered a falsification of academic records and will result in the admission application being voided.

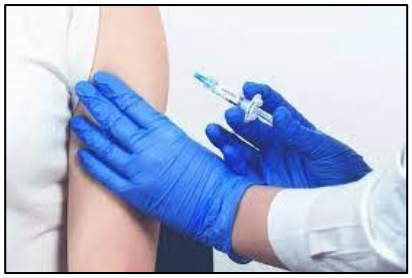
International applicants must provide a course-by-course transcript evaluation of all coursework taken at degree-granting institutions recognized by their government/governmental ministry. If the transcript evaluation states that an applicant has less than 120 U.S. equivalent credit hours and lacks a U.S. bachelor's degree equivalent, then the applicant has the option to seek an alternative evaluation from another GSBS-approved evaluation company. GSBS will accept the evaluation which supports admission.

An international applicant who, because of current enrollment, cannot provide a final course-by-course transcript evaluation at the time of application must submit transcript evaluations of all completed studies. Consideration may then be given for admission upon the condition that a final course-by-course transcript evaluation will be provided prior to enrollment. TTUHSC requires course-by-course transcript evaluations and diploma information from the list of services provided on the application checklist. Do not send international transcripts (aka marksheets) to TTUHSC.

5. Reference Letters

Applicants must submit names and email addresses of at least two, but no more than four, recommenders using the online application system. Recommenders will receive a link to complete the form and upload their recommendation letter.

6. Immunization Record



All applicants are required to provide documentation of the following: (a) two vaccine doses for varicella (chicken pox) **or** an immunity titer; (b) two vaccine doses of measles, mumps, and rubella (MMR) **or** an immunity titer; (c) 2-step tuberculosis (TB) skin test **or** IGRA test; (d) three doses of the hepatitis B-series **or** hepatitis B surface antibody test; (e) adult one-time dose of Tdap (tetanus, diphtheria, and acellular pertussis); (f) tetanus/diphtheria (Td) booster **or** Tdap within the last ten years; (g) meningococcal vaccine (MCV) within the last 5 years for adults 22 and younger; and (h) current flu vaccine (October through March). The COVID-19 vaccine is strongly recommended, but it is not a TTUHSC requirement. Refer to the immunization form on the admission application website for more information. Applicants must submit the immunization form with a copy of the immunization record or physician's letter at least 10 business days prior to the start of the semester. Provisions for immunization requirements and implementation procedures for all TTUHSC employees, volunteers, and students are covered under HSC OP 75.11 (Health Surveillance Program for TTUHSC).

7. **Bank Statement and Sponsor Financial Affidavit/Statement**
   International F-1 applicants are required to submit a bank statement from an account(s) belonging to the applicant and/or applicant's sponsor showing a minimum balance in United States dollars (USD) or an equivalent, which is the estimated amount for one year of tuition/fees and living expenses. If the applicant has a sponsor, we also require a financial statement letter from the sponsor stating their intent to support the applicant financially. Contact the appropriate International Student Services website or Designated School Official (DSO) for specific information. Documents may be uploaded to the supplemental item associated with the application or emailed to graduate.school@ttuhsc.edu.

8. **Oath of Residency**
   All applicants must complete an Oath of Residency form provided through the online application system.

9. **Essay**
   All applicants must submit a written essay through the online application system.

10. **Application Fee**
    A one-time, nonrefundable application fee of $50 is required for domestic and international applicants interested in pursuing graduate studies. Please email graduate.school@ttuhsc.edu for more information.
    Application fee waivers are available for:
    - U.S. active duty military and U.S. military veterans;
    - McNair Scholars, which requires documentation from the appropriate institution;
    - Current GSBS students;
    - TTUHSC and TTU full-time staff, excluding faculty;
    - Applicants who spoke to a GSBS representative and provided contact information at one of these events—ABRCMS, SACNAS, or a graduation fair;
    - Attendees at the annual GSBS Open House;
    - Participants in GSBS's summer internship programs—ABRI, BRIA, or SABR;
    - Applicants who were offered and accepted admission but deferred enrollment to a later term and with approval by the program/concentration admissions committee *(Note: The application fee waiver is only valid once for deferrals.)*; and
    - At the discretion of the Senior Associate Dean under very limited circumstances.

11. **Passport**
    A copy of an international applicant's passport assists in processing the I-20.

12. **Placement Fee**
    A $50 placement guarantee fee is required upon an offer and acceptance of admission.

13. **VISA**
    International students in a degree-seeking program are required to have an F-1 visa. Most employment visas require coursework to be incidental to employment and such visas are generally not acceptable for most of our degree programs. Prospective students who are considering a visa change are encouraged to seek the advice of an immigration attorney with any concerns.

14. **SEVIS**
    International students, exchange visitors, and scholars attending school or conducting research in the United States are required to pay a SEVIS fee prior to obtaining their visas. The fee is associated with the Student and Exchange Visitor Information System (SEVIS), which took effect September 1, 2004. The SEVIS fee is not reimbursable by TTUHSC.

Enrollment

Registration information is provided to new students during new student orientation prior to the beginning of the semester. New students must register for coursework in the term for which admission is granted. Failure to do so will require the student to reapply for admission. Returning students may register at any time beginning the first day of advance registration but before the stated deadline. Those who register past the deadline may incur a financial penalty. Instructions for registration and add/drop procedures are located on the Office of the Registrar's website.

Students are required to register for appropriate courses every semester, including summer, in which they expect to receive assistance, use university facilities, or take comprehensive examinations. The number of hours for which students must enroll each semester depends on their level of involvement in research and use of university facilities or faculty time.

Auditing a Course

Individuals who wish to audit a course for no academic credit must obtain written permission from the course director and GSBS office using the *Permission to Audit a Course* form, which can be accessed by current students online and/or obtained from the GSBS office. Those who audit a course do so for the purpose of listening and observing only and will not participate in class discussions, complete assignments, or take exams. Individuals auditing a course will not be listed on the class roster, and no notation of the audit will be made on a student's transcript.

Excessive Hours

The State of Texas will not provide funds to state institutions of higher education for doctoral students who exceed the allowable number of semester credit hours (SCH). *Texas Education Code, §61.059(l),* limits the fundable semester credit hours generated by a doctoral student to 99 SCH unless the student or program has been granted an exception. Students attending health-related institutions, like TTUHSC, are granted program exceptions up to 130 SCH. Thus, as permitted according to *Texas Education Code, §54.012*, students not making timely progress toward completion of a doctoral degree may be required to pay of out-of-state tuition regardless of residence status. As doctoral students approach the maximum SCH limits, the following should be considered:

1. Once a student has been admitted to doctoral candidacy and accumulated 120 SCH, the student may register for 3 SCH each semester for up to one year (e.g., Fall-3 SCH, Spring-3 SCH, Summer-3 SCH). If the student elects the 3-3-3 enrollment option but does not complete the degree requirements within that timeframe, the student must resume full-time status (i.e., 9 SCH per long semester). Reduced enrollment may affect financial aid status and/or payroll FICA exemptions. Students are encouraged to contact the appropriate offices before taking reduced hours. International students should also check with the TTUHSC DSO to verify hours for compliance with the Department of Homeland Security.
2. Students accumulating >130 SCH may be charged out-of-state tuition and forfeit any GSBS state-funded Research Assistantship. The faculty mentor will be responsible for the student's salary once the student exceeds 130 SCH and/or the student exceeds 5 years within the program.
3. Out-of-state tuition may be waived for students exceeding 130 SCH if those students entered the doctoral program with excessive graduate hours from a private institution or non-Texas university. Courses taken at the master's level will not count toward the SCH doctoral limit. For students admitted into a doctoral program directly from a bachelor's degree, the SCH count begins after 30 SCH of graduate coursework. Requests for out-of-state tuition waivers must be approved by the GSBS office.

Full-Time Study

GSBS fall and spring semesters are approximately 15-16 weeks, and there are about 45-48 total contact hours (i.e., 3 contact hours per week) for a traditional 3 semester credit hour (SCH) lecture course. This equates to one (1) contact hour each week per one (1) SCH. In a laboratory-based course, however, there are approximately three (3) contact hours each week for per one (1) SCH.

In general, per Title 19 Texas Administrative Code, §4.6, students should not enroll in more courses in any term which would allow them to earn more than one (1) SCH per week over the course of the term. For example, in a 16-week term, students

are generally not allowed to enroll for more than 16 SCH total. Any exceptions to this rule must have the prior approval of the GSBS office.

Typical full-time enrollment in GSBS varies between 9-13 SCH for doctoral students and 9-16 SCH for master's/temporary students during the regular semester. Thus, the minimum enrollment for full-time graduate status in fall/spring is nine (9) SCH. Full-time enrollment for the summer term is six (6) SCH. Please note if devoting full time to research using university facilities and faculty time, the student should enroll in at least nine (9) SCH in fall/spring or six (6) hours in summer. During the final semester, a doctoral student may register for one (1) SCH while maintaining full-time status.

Registration by Faculty and Staff

Full-time members of the TTU or TTUHSC faculty and staff may enroll for courses by permission of the course director and upon completion of the GSBS application. In registering for graduate work, they become subject to GSBS policies and procedures. However, no member of the faculty who has held a rank higher than instructor at TTUHSC is eligible to pursue a graduate degree program at this institution without prior approval of the GSBS office. Eligible TTUHSC employees may also utilize the tuition assistance program, as outlined in HSC OP 70.14 (Employee Training and Development), to waive statutory and designated tuition and mandatory fees for one course per term, not to exceed three courses in an academic year.

Registration by Undergraduates

With the exception of participants in approved early acceptance programs, undergraduate students may not enroll for courses carrying graduate credit unless they are within 12 semester credit hours (SCH) of graduation and have at least a B average in their major subject. The *Approval for Graduate Credit* form, which is available via the GSBS office, must be approved by the appropriate individuals prior to registration. Courses taken without this approval will not be granted graduate credit. Students may also take graduate courses for undergraduate credit with prior approval of the GSBS office and the authorization of the undergraduate advisor.

The maximum SCH that may be scheduled by an undergraduate who is taking courses for graduate credit is 16 SCH in a long semester (i.e., fall, spring) or 6 SCH in the summer term. This includes undergraduate and graduate coursework. Undergraduates who are permitted to enroll in graduate courses are expected to receive their bachelor's degree within one year of the first semester of graduate enrollment. In addition, an undergraduate may not receive credit for more than 12 SCH of GSBS coursework prior to admission to the GSBS as an applicant for a graduate degree program. This does not apply to students in approved early acceptance programs.

Residence Requirement

The intent of doctoral residency is to ensure that doctoral students benefit from, and contribute to, the complete spectrum of educational and professional opportunities provided by the graduate faculty. When establishing residency, the student should interact with faculty and peers by regularly attending courses, conferences and seminars, and utilize the resources needed to support excellence in graduate education. Doctoral candidates must complete at least three (3) years of full-time graduate level work beyond the baccalaureate degree (or one year beyond the master's degree). At least one academic year—the residency year—must be spent in residence on the TTUHSC campus. The residence requirement is fulfilled by the completion of at least nine (9) semester credit hours of coursework in each of the two long terms and six (6) semester credit hours in the summer. Other patterns for fulfilling residency requirements require approval of the GSBS office.

Schedule Changes

A graduate student who wishes to add or drop a course must initiate such action with their graduate advisor and the assigned Student Affairs Advocate (SAA) for the academic program. Students should follow the academic calendar for deadlines associated with adding/dropping a course or withdrawing from all courses. A student who no longer attends a course without officially dropping it will receive an "F" in that course. Failure to notify the SAA of any changes in registration may also result in additional fees which are not covered by the tuition scholarships for doctoral students.

General Information

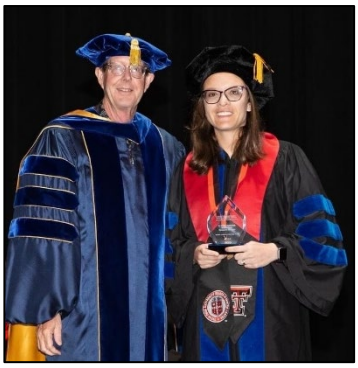
Administrative Offices

The primary GSBS administrative office is located on the Lubbock campus on the first floor of the University Center (Suite 115). The GSBS office in Abilene is located in the School of Pharmacy building (Room 2504), and the GSBS office in Amarillo is in the School of Pharmacy building (Suite 217). The offices are regularly open Monday through Friday, 8 a.m. to 5 p.m., excluding weekends and TTUHSC holidays. These hours of operation constitute a typical "business day" for purposes of this catalog. On occasion, the administrative offices may be closed temporarily for special events or inclement weather. Some personnel may also work remotely on certain days of the week, so TTUHSC email is always an excellent method to communicate with specific individuals.

Attendance

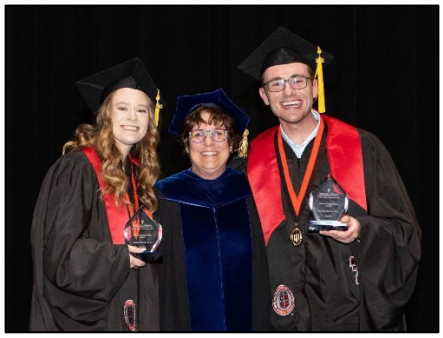
Whenever attendance and/or participation constitutes a portion or all of a course grade, students must be provided with explicit written information about attendance expectations during the first week of classes. Such information is often included in the course syllabus and should be specific with regard to the penalty incurred for each absence and the means, if any, to compensate for the absence. It should be recognized that there may be certain situations where the student may not be permitted to make up the absence(s). Excused absences are determined by the course director.

Awards



Outstanding student achievement in GSBS is recognized through a variety of student awards each year. The two highest awards are announced at the commencement ceremony in May. The **Dean's Recognition Award** is awarded to a highly qualified master's student, and the **K. Wyatt McMahon Outstanding Graduate Student** is awarded to an outstanding doctoral student. To qualify, students are nominated by faculty in their respective concentration/program, selected by the department chair or program director, and then evaluated by a final selection committee according the following criteria:

- Educational merit (e.g., GPA, coursework, course load);
- Contributions to TTUHSC, GSBS, and the student body;
- Contributions to teaching and/or the assigned research laboratory, as applicable;
- Contributions to the academic and/or scientific discipline, as evidenced by peer-reviewed publications and meeting presentations;
- Research funding and/or scholarships;
- Community service; and
- Other awards.



Once identified by the department chair or program director, nominees are expected to submit a current CV/resume, two letters of recommendation, and a brief narrative describing significant accomplishments during their graduate school career. Upon receipt of the nominations and all application materials, the Dean will appoint a selection committee composed of seven members—five faculty members and two students. The final selection committee will choose the two award recipients based on the criteria listed above. The Sr. Associate Dean in Lubbock will serve as a non-voting member to represent the GSBS office.

Each award recipient must attend the GSBS commencement ceremony. The recipient of the *Dean's Recognition Award* reads the description of the GSBS seal during the ceremony. The recipient of the *K. Wyatt McMahon Outstanding Graduate Student* award serves as a commencement speaker. The award recipient's script must be approved by the GSBS office in advance of the ceremony.

Calendars

The current academic calendar contains key dates for each semester of the academic year, including the beginning of classes, end of term, graduation, important university deadlines, and official TTUHSC holidays.

The GSBS also maintains an online administrative calendar, which is intended to provide more detailed information about GSBS-specific courses, events, meetings, and other TTUHSC dates which might be of interest to GSBS students, faculty, and staff.

Changing Concentrations or Programs

Students who seek to transfer from one concentration or academic program to another within GSBS should first notify the current graduate advisor of their intent. Once notification has been given, the student should contact the graduate advisor of the new concentration/program they seek to enter. If the concentration/program is willing to accept the student, the student should have the new graduate advisor and department chair/program director approve the transfer by signing the *Application for Change in Major/Declare Concentration* form, which is available to current students on the website. Once the form has been signed by the new graduate advisor, the form must also be approved by the GSBS office.

Only students in good standing may transfer into another concentration/program within GSBS. Students can change their academic major at any time during a term; however, it will not be effective until the beginning of the following term. Students who have been dismissed may reapply to another graduate program through the application process. They are not eligible to utilize the *Application for Change in Major/Declare Concentration* form.

Complaints

It is the policy of the Texas Tech University Health Sciences Center (TTUHSC) to affirm the rights of its students to a prompt and fair resolution of a complaint or grievance involving allegations of inappropriate behavior by other TTUHSC students or by TTUHSC personnel toward students. When an issue arises, every effort should be made to resolve the issue informally prior to engaging in TTUHSC's formal complaint process. Appropriate steps include:

1. The student must attempt to resolve the issue with the individual(s) involved.
2. If dissatisfied with the outcome of step (1), the student must contact the Graduate Advisor or Program Director, as applicable. The Graduate Advisor/Program Director will investigate the complaint, attempt to reconcile differences, and find an acceptable solution. If the grievance is against the Graduate Advisor, however, the student should contact the Department Chair. If the complaint originates in Amarillo or Abilene, the student must contact the appropriate Associate Dean on that campus. A complaint against the Associate Dean, moreover, should be filed with the Sr. Associate Dean-Lubbock.
3. If dissatisfied with the outcome of steps (1) and (2), the student must contact the Assistant Dean, who also serves as the Student Affairs Officer of the school. The Assistant Dean will investigate the complaint, attempt to reconcile differences, and find an acceptable solution. The Assistant Dean will provide a written statement of his/her recommendation to all parties, who will then have ten (10) business days to respond. If the grievance is against the Assistant Dean, however, the student should contact the Sr. Associate Dean-Lubbock.
4. If the grievance is satisfactorily resolved during any steps listed above, the terms of the resolution shall be summarized in writing and signed by the student, respondent, and administrative leader involved in the resolution process.

If a grievance is not resolved informally using the process outlined above, then a student may submit a formal written complaint following the policies and procedures on the TTUHSC Student Affairs website and in Part XI of the TTUHSC Student Handbook: Code of Professional Conduct. Complaints may relate to the general or academic misconduct of another student, discrimination, student records, employment, other types of mistreatment, and other institutional-level complaints. For complaints about grades, refer to the *Grade Appeal* sub-section in the current catalog. The Dean of each school has the final authority in resolving disputes related to academic issues, such as grading and promotion, and in non-academic issues involving the school's faculty and staff.

Dismissal

Every student enrolled in the Graduate School of Biomedical Sciences (GSBS), whether degree-seeking or not, is required to maintain a high level of performance and to comply fully with policies of the GSBS and the institution. The GSBS reserves the right to place on probation, suspend, or dismiss any graduate student who does not maintain satisfactory academic standing or who fails to conform to the regulations of TTUHSC. Other sanctions may also be imposed, as appropriate.

The following conditions may provide sufficient cause for dismissal of a student from a specific GSBS academic program:

- Failure to maintain a 3.0 GPA in each succeeding semester after being placed on academic probation;
- Failure to make adequate academic progress as defined by the program and/or concentration;
- Engaging in academic or research misconduct;
- Engaging in illegal, fraudulent, or unethical behavior, as defined in the TTUHSC Student Handbook: Code of Professional Conduct; and/or
- Other circumstances not otherwise specified.

In each case, the dismissal should follow the following procedures:

Poor Academic Performance/Inadequate Academic Progress. Failure to maintain an acceptable GPA each semester (i.e., 3.0) will result in probation or dismissal, if appropriate. Furthermore, students who are not making adequate academic progress will be warned in writing about the possibility of dismissal. They will be given clear parameters by which to alleviate the problem within a specified time period. These expectations must be reasonable and consistent with the expectations for all students. Failure to meet the requirements within the specified timeframe may result in dismissal. If the situation cannot be rectified, the program director or graduate advisor will send justification for the dismissal to the GSBS office. If warranted, the GSBS office will notify the student in writing of the grounds for dismissal and the effective date of the dismissal. This will normally coincide with the end of the semester in which the student is currently enrolled, but the specific circumstances of the dismissal will be important in determining the effective date.

Students may appeal the dismissal following the procedures outlined in the *Complaints* sub-section of the current catalog.

Academic or Research Misconduct/Illegal, Fraudulent, or Unethical Behavior. All students must adhere to the TTUHSC Student Handbook: Code of Professional Conduct, the published policies and procedures of the department, school, and university; any provisions of federal, state, and local laws; and widely accepted standards of professionalism. Students are also expected to demonstrate conduct that embodies the core values of TTUHSC. These values include one team, kindhearted, integrity, visionary, and beyond service.

Various disciplinary sanctions, such as dismissal, may be imposed as a result of academic or research misconduct or as a result of illegal, fraudulent, or unethical behavior. Refer to the *Misconduct*, *Disciplinary Procedures*, and *Sanctions* sections in the TTUHSC Student Handbook: Code of Professional Conduct for additional information, including the appeals process for such decisions.

Please note allegations of research misconduct will be investigated by the TTUHSC Research Integrity Officer per HSC OP 73.07 (Honesty in Research and Allegations of Scientific Misconduct.) Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. It does not include honest error or differences of opinion.

Dissertations and Theses

Doctoral dissertation and thesis defenses are generally open to the public and considered open meetings. Defenses must be scheduled during the official term dates for a current semester, not between terms or during extended break periods.

Dissertation. A dissertation is required of every candidate for a doctoral degree. The dissertation work must earn a grade of at least B in order to qualify the student for graduation. The Graduate School of Biomedical Sciences (GSBS) strongly recommends that each student be required to present and defend a dissertation proposal to his or her committee early in

the course of the research. The subject of the dissertation must be approved by the advisory committee and the GSBS office at least four months before the candidate's proposed date of graduation.

The dissertation must demonstrate a mastery of research techniques, a thorough understanding of the subject matter and its background, and a high degree of skill in organizing and presenting the materials. The dissertation, which is presented in a scholarly manuscript, should embody a significant contribution of new information to a subject or a substantial reevaluation of existing knowledge. The dissertation work is continually under the supervision of the advisory committee and any other faculty members the committee or the GSBS office deem necessary. A copy of the dissertation should be presented to the committee members and the Dean's representative at least two weeks prior to the defense.

Thesis. The master's thesis, which is also conducted under the supervision of a committee, is expected to be written in a clear and concise manner and to represent independent work by the student. Once the student's research topic for the thesis has been determined, an advisory committee will be appointed by the GSBS office upon the recommendation of the advisory chair. The committee must consist of at least three members of the TTUHSC graduate faculty.

A copy of the thesis should be presented to the committee members and the Dean's representative at least two weeks prior to the defense. More than one disapproving vote from the committee members shall constitute failure of the examination, and the student must earn a grade of B or better on thesis work to qualify for graduation.

Hours. Registration for at least 6 semester credit hours of 6000 is required for the master's thesis. At least 12 semester credit hours of 8000 is required for a doctoral dissertation. Once thesis/dissertation hours have begun, a student must be enrolled in such courses every semester until graduation unless granted an official leave of absence. Students may not enroll in thesis or dissertation courses before formal admission to a degree program by the GSBS office.

Grading. Dissertation and thesis hours are graded with a "CR" (Credit) except for the last semester in which a letter grade is assigned. At the instructor's discretion, a letter grade may be assigned to the last 12 hours of dissertation (6 hours of thesis). For doctoral students, the letter grade assigned for the written dissertation and oral defense is based upon evaluation by committee members using a dissertation rubric, which is available online for current students. All members of the advisory committee must approve or disapprove the dissertation defense. More than one vote for disapproval shall constitute failure of the defense.

Reference Manual. Students work collaboratively with the committee chair to determine the appropriate style manual to use in preparing the written manuscript. The final copy of the manuscript must be submitted electronically to the GSBS office. Dissertations/theses must be accompanied by an abstract of no more than 350 words. GSBS does not require a bound copy although additional copies may be required by the advisory committee. The GSBS office recommends utilizing www.thesisondemand.com to purchase bound copies; however, other printing and binding services are acceptable.

ETD – Electronic Thesis & Dissertations. The final copy of the dissertation or thesis must be submitted electronically to the GSBS office along with the *ETD Information for HSC Students* form, which is available online to current students. Detailed instructions for completing the ETD account information is available on the GSBS website. The GSBS will forward the documents to the TTU library for archival purposes on the ETD website.

Fees. In the semester of graduation, the candidate will pay a document fee through the TTUHSC Student Business Services office to cover the cost of uploading and storing the thesis in the ETD website.

Dissertation Announcements. Department coordinators should notify all GSBS faculty and the GSBS office of all defenses at least six (6) weeks prior to the defense. Faculty members interested in attending the defense at an off-site location should notify coordinators at least four (4) weeks prior to the defense in order for the appropriate room, TechLink, and/or Zoom arrangements to be made. Two (2) weeks prior to the defense, coordinators should prepare and forward a copy of the dissertation announcement template to all GSBS faculty and students.

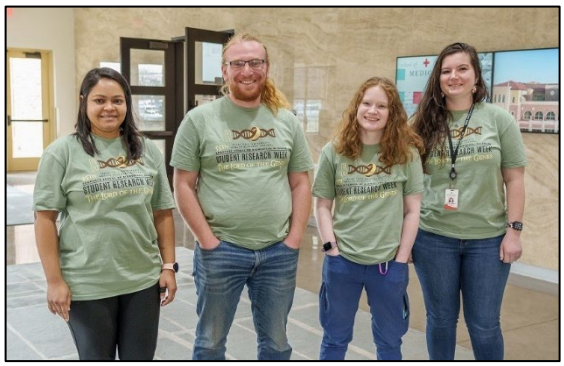
Email

GSBS utilizes the TTUHSC-assigned email account to facilitate formal communication with students. It is the student's responsibility to check this account for important information and notifications on a regular basis.

Extracurricular Activities

Graduate students may participate in extracurricular activities in accordance with university policies. The TTUHSC Student Government Association (SGA) is an institutionally recognized governing body with representation from all TTUHSC schools—Biomedical Sciences, Health Professions, Medicine, Nursing, Pharmacy, and Population & Public Health. Through collaboration with students, faculty, student organizations, administration, and the community, SGA strives to promote a campus climate that is inclusive, supportive, and student-centered.

GSBS-specific organizations also offer many opportunities for student involvement—Graduate Student Association (GSA), Graduate Student Association in Amarillo (GSAA), and Immunotherapeutics and Biotechnology Graduate Student Association in Abilene (IBGSA). A variety of other student organizations that align with specific student interests also exist at TTUHSC.



Students are also encouraged to participate in the annual Student Research Week during the spring semester. This event, which is planned and led by GSBS students, is a long-standing tradition that highlights student research across TTUHSC and provides opportunities to learn from respected scholars in various disciplines. Faculty are strongly encouraged not to plan classes or exams during this week. Exceptions must be granted by the GSBS Dean before the spring semester begins. Doing so allows GSBS students on each campus to participate in the event and gain valuable presentation experience.

Many other social activities, interprofessional education events, and student development workshops are communicated to students throughout the year. Get involved today!

Family Educational Rights and Privacy Act (FERPA)

Overview. The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education.

FERPA gives parents certain rights with respect to their children's education records. These rights transfer to the student when he or she reaches the age of 18 or attends a school beyond the high school level. Students to whom the rights have transferred are "eligible students."

- Parents or eligible students have the right to inspect and review the student's education records maintained by the school. Schools are not required to provide copies of records unless, for reasons such as great distance, it is impossible for parents or eligible students to review the records. Schools may charge a fee for copies.

- Parents or eligible students have the right to request that a school correct records which they believe to be inaccurate or misleading. If the school decides not to amend the record, the parent or eligible student then has the right to a formal hearing. After the hearing, if the school still decides not to amend the record, the parent or eligible student has the right to place a statement with the record setting forth his or her view about the contested information.

- Generally, schools must have written permission from the parent or eligible student in order to release any information from a student's education record. However, FERPA allows schools to disclose those records, without consent, to the following parties or under the following conditions (34 CFR § 99.31):
    - School officials with legitimate educational interest;
    - Other schools to which a student is transferring;
    - Specified officials for audit or evaluation purposes;
    - Appropriate parties in connection with financial aid to a student;
    - Organizations conducting certain studies for or on behalf of the school;

- Accrediting organizations;
- To comply with a judicial order or lawfully issued subpoena;
- Appropriate officials in cases of health and safety emergencies; and
- State and local authorities, within a juvenile justice system, pursuant to specific State law.

Directory Information. TTUHSC or specific schools may disclose, without consent, "directory" information such as a student's name, address, telephone number, date and place of birth, honors and awards, and dates of attendance. However, schools must tell parents and eligible students about directory information and allow parents and eligible students a reasonable amount of time to request that the school not disclose directory information about them. TTUHSC must notify parents and eligible students annually of their rights under FERPA. The actual means of notification is left to the discretion of TTUHSC.

For additional information or technical assistance, you may call (202) 260-3887 (voice). Individuals who use TDD may call the Federal Information Relay Service at 1-800-877-8339. Or you may contact the following address:

Family Policy Compliance Office
U.S. Department of Education
400 Maryland Avenue, SW
Washington, D.C. 20202-5920

Grades

The following grades are used to compute individual grade point averages in GSBS. Instructors may NOT add a plus or a minus to the grade. Graduate credit is given for courses completed with grades of A, B, and C. However, individual concentrations/programs may require a student to retake courses in which a "C" was earned.

Grade	Description	Grade Points Per Semester	Pass/Fail Equivalent
A	Excellent	4.0	Pass*
B	Good	3.0	
C	Average	2.0	Fail**
D	Poor	1.0	
F	Fair	0.0	

* *Not included in the calculation of GPA*

** *Included in the calculation of GPA at 0.0 grade points*

Pass/Fail. Faculty have the option to choose a Pass/Fail grading system for some courses if pre-approved and stated in the course syllabus. Student committees and/or the graduate advisor/program director may also approve graduate students to take elective courses as Pass/Fail. The graduate advisor/program director will decide whether courses taken as Pass/Fail will satisfy degree requirements.

Students seeking to take a course Pass/Fail must obtain the appropriate approvals in consultation with the Student Affairs Advocate (SAA) no later than the last day on which a grade of "W" is given for dropped courses as stated on the academic calendar. A student who has chosen to take a course Pass/Fail may not subsequently change to a letter grade. The names of students taking a course Pass/Fail will not be known to the instructor. Finally, no more than one-fourth of a student's coursework may be graded as Pass/Fail.

Credit. The symbol "CR" is typically assigned for enrollment in a master's thesis or doctoral dissertation section until the completed manuscript has been approved by the student's committee and accepted by the GSBS office. At that time, a letter grade will be entered for the final enrollment period. Faculty members may elect to grade the last 6 hours of thesis, or 12 hours of dissertation, by preparing a grade change form if a portion of those hours were taken in a previous semester.

In Progress. A grading symbol of "PR," which implies satisfactory performance, is given only when the work for a course extends beyond the semester or term. Assigned work must be completed, and a change of grade must be recorded by the end of the following term from which the "PR" was assigned. Failure to do so will result in the school requesting either a "F" (Failure) be assigned by submitting a *Change of Grade Form* or an "I" (Incomplete) by submitting the *Grade of Incomplete Form* to the Registrar's office.

Incomplete. An "I" is given only when a student's work is satisfactory in quality, but due to reasons beyond the student's control, the work has not been completed. It is not used as a substitute for an "F." Only the Registrar's office can enter a grade of "I." The course director must provide appropriate justification for the grade via the *Grade of Incomplete Form*, which requires signatures by the student, instructor, chair/director/advisor, and GSBS dean. The assigned work must be completed and a *Change of Grade Form* must be submitted within one calendar year from the date the "I" was assigned. Failure to do so will result in the Registrar's office assigning an "F" for that course and causing the course to become ineligible for any subsequent grade changes. A grade of "I" will not be replaced with a "W" or "WF," as described below.

Withdraw. When a student officially drops a course by the specified date on the academic calendar, a grade of "W" will be assigned. A withdrawal after the specified date will result in a grade of "W" or "WF" (i.e., withdrew when failing), according to the assessment of the student's work in the course up to the time of the official withdrawal. The grade of "W" does not impact a student's GPA, but "WF" is calculated into the GPA. In addition, a student who no longer attends a course without an official withdrawal will receive an "F" in that course.

Grade Appeal

The grade appeal process seeks to provide a student with a safeguard against receiving an unfair final grade, while respecting the academic responsibility of the faculty. It is the policy of the TTUHSC Graduate School of Biomedical Sciences (GSBS) to affirm the right of its students to a prompt and fair resolution of any complaint or grievance. Thus, this policy recognizes the following:

- Every student has a right to receive a grade based on a fair and unprejudiced evaluation of the student's performance using a method that is neither arbitrary nor capricious; and
- Faculty have the right to assign a grade based on any method that is professionally acceptable, submitted in writing to all students, and applied equally.

The following procedure provides students with a system by which to file an appeal of a final grade they believe was based on arbitrary or capricious action by the faculty. Only the final course grade as entered into the official TTUHSC system may be appealed. The burden of proof that such an influence has affected a final grade rests with the student.

Prior to filing an official grade appeal, the student must meet with the course director to review how the faculty arrived at the final grade. After the meeting with the course director, if the student wishes to pursue filing a final grade appeal, the following procedures shall be followed.

A. GRADE APPEAL

1. Students must file a *Grade Appeal* form within three (3) business days of the date the final grade is posted in Banner. The *Grade Appeal* form, which is available online to current students, should be filed with the GSBS office. All documents to support the appeal must accompany the *Grade Appeal* form. Documents received after the log-in date of the *Grade Appeal* form will not be accepted.
2. The GSBS office will forward the appeal and all supporting documents to the appropriate programmatic graduate advisor or program director. *Note: If the course director is also the graduate advisor/program director, the appeal will go directly to the GSBS Assistant Dean*.
3. The graduate advisor/program director shall meet with the faculty and student separately and review all materials pertinent to the grade appeal.
4. After review of all materials, the graduate advisor/program director shall render a decision within five (5) business days from receipt of the formal grade appeal. The student shall be notified of the decision via electronic correspondence to the student's TTUHSC email address. A copy of the decision is forwarded to the GSBS Assistant Dean. The grade appeal decision is deemed received by the student when received electronically by the student at his/her TTUHSC email address. It is the student's responsibility to keep the university advised of any change in contact information.
5. If unsatisfied with the decision of the graduate advisor/program director, the student may appeal to the GSBS Assistant Dean by submitting a detailed written explanation outlining every reason why the grade is perceived to be unjust. Any reason not set forth in writing will not be considered. Such explanation must be submitted within two (2) business days from the receipt of the written decision of the graduate

advisor/program director. The Assistant Dean will review the written responses from the student, course director and graduate advisor/program director. The Assistant Dean must provide a written response to the student via the student's TTUHSC email account within two (2) business days from receipt of the appeal. The decision of the academic substantive review by the GSBS Assistant Dean is final.

6. All records related to the appeal are retained by the GSBS office for a period of three (3) years.
7. The student may only appeal issues of procedural due process to the GSBS Sr. Associate Dean.

B. PROCEDURAL APPEAL

1. The student may file an appeal on procedural grounds following receipt of the final decision on the grade appeal. A procedural appeal should be filed with the GSBS office within two (2) business days of the student receiving the GSBS Assistant Dean's decision on the grade appeal. A memo stating justification for the procedural appeal should be emailed to the GSBS Sr. Associate Dean.
2. Upon review of all materials and meeting with the student, course director, graduate advisor/program director, GSBS Assistant Dean, the GSBS Sr. Associate Dean shall render a decision on the procedural appeal within three (3) business days from receipt of the procedural appeal.
3. The decision of the GSBS Sr. Associate Dean will be sent to the student via electronic correspondence to the student's TTUHSC email address. The decision of the GSBS Sr. Associate Dean is final.
4. All records related to the appeal are retained by the GSBS office for a period of three (3) years.

Graduation

Grade Requirement for Graduation. The minimum requirement for graduation is a cumulative GPA of 3.0 in all courses taken for graduate credit, excluding credits for the thesis and/or dissertation. Procedures to appeal a grade may be found under *Grade Appeal* in the current catalog. No final grade assigned for a graduate-level course may be raised unless an error has been made. Substituting a low course grade for another course is not permitted. Finally, work completed at another graduate school with a grade less than B will not be accepted, nor will grades of *Pass* or *Satisfactory*. Grades on transferred work will not contribute to the grade point average at TTUHSC. Refer to *Transfer Credit from Other Colleges and Universities* in the current catalog for additional information.

Semester of Graduation. There are three official graduation dates: December, May, and August. However, there is only one commencement ceremony in May. Every GSBS candidate for a graduate degree must be registered in the semester of graduation. Failure to graduate at the expected time requires additional registration, as necessary, until all graduation requirements are met. Unless otherwise specified, all students must enroll full-time during the last semester.

A doctoral student who has been admitted to candidacy and accumulated 120 SCH may be eligible to reduce hours during the last year. Off-campus students may also register for one (1) semester credit hour of thesis, dissertation, or research until graduation. Reduced enrollment may affect financial aid status and/or payroll FICA exemptions. Students are encouraged to contact the appropriate offices before taking reduced hours. International students should also check with the TTUHSC DSO to verify hours for compliance with the Department of Homeland Security.

Statement of Intent to Graduate. A student planning to graduate must file a *Statement of Intent to Graduate* with the GSBS office. This form is available online for current students. No candidate's name will be placed on a tentative list for graduation for any graduation date unless this statement has been received in the GSBS office by the specified deadline. Important graduation deadlines are provided on the official academic calendar. A candidate who fails to graduate at the expected time is required to file a new *Statement of Intent to Graduate* for any subsequent graduation. Students are also required to complete a graduation application at the institution-level. Refer to the TTUHSC Commencement website for additional information.

Graduation Fee. In the semester of graduation, the candidate will pay a graduation fee. This fee must be paid again if the student does not graduate in the intended semester.

Internships for Doctoral Students

Definition. An internship is an experiential learning opportunity in which students acquire transferable knowledge and/or skills relevant to their research endeavors through a short-term rotation in a private or public pharmaceutical or biotechnology company, institution, or federal government agency.

Eligibility Criteria. A doctoral student who is interested in pursuing an internship must meet the following eligibility requirements in the TTUHSC Graduate School of Biomedical Sciences (GSBS):

- Good academic standing;
- In alignment with professionalism expectations per the GSBS Catalog;
- Admission to candidacy;
- Verbal approval by the research mentor before applying for an internship;
- Completion of an official internship proposal;
- Final approvals by designated individuals upon an internship offer;
- Enrollment in ≥1 SCH of research (i.e., GBCM/GIID/GMBP/GTNP/GPSC 7000) in the spring semester before the summer internship;
- Enrollment in 1 SCH of seminar (i.e., GBCM/GIID/GMBP/GTNP/GPSC 7101) in the fall semester after the summer internship; AND
- Fulfillment of internship requirements prior to the oral dissertation defense.

Internship Guidelines

- Internships can be performed remotely (i.e., remote internship) or via temporary relocation to an off-campus site (i.e., on-site internship).
- Remote and on-site internships must occur during the summer semester only.
- Student participation in internships is voluntary for all GSBS doctoral students.
- Internships should enhance a student's existing knowledge and skills in alignment with his/her overall educational goals.
- Internships must include clearly defined student learning outcomes and expected deliverables, as outlined in the appropriate course syllabi.
- An experiential learning opportunity conducted at one of the TTUHSC campuses will be considered a lab rotation, not an internship.

Administration

***Prior to Internship*.** In the spring semester before the proposed internship experience, students must enroll in at least 1 SCH of research (i.e., GBCM/GIID/GMBP/GTNP/GPSC 7000). The student will enroll in a designated section of this course if an internship offer is received before the spring registration deadline. If an internship offer has not yet been received, then the student will be moved into the designated section upon receipt of an internship offer. Various internship requirements must be fulfilled as part of the research course, as outlined in the *Evaluation* section below.

Internship. Upon approval of the internship, the student will not be required to enroll in courses over the summer semester. The GSBS office will waive the requirement for consecutive enrollment in dissertation hours for that semester.

Students participating in summer internships will be ineligible to receive Research Assistantship (RA) benefits, which include tuition scholarships and fee waivers. The RA appointment will resume upon return to TTUHSC.

The tuition scholarships and fee waivers will resume in the fall semester following completion of the internship. If a student fails to return to TTUHSC by the 12th class day of the fall semester, then tuition scholarships and fee waivers will not resume until the spring semester.

If a student chooses to register for coursework during the summer term of the internship, payment of tuition and fees will be the student's responsibility. This includes out-of-state tuition, if applicable.

Financial hardships arising due to participation in an internship may be evaluated on an individual basis. In such cases, alternate sources of funding to assist a student may be available but not guaranteed. These sources of funding may come

from a combination of sources, but the student should work with department personnel to identify and process such funding in alignment with all applicable federal and state requirements and in accordance with TTUHSC policies and procedures.

Completion of Internship. In the fall semester after the summer internship, the student must enroll in 1 SCH of seminar (i.e., GBCM/GIID/GMBP/GTNP/GPSC 7101). The student will enroll in a designated seminar section for the dual purpose of (a) fulfilling seminar expectations, and (b) completing internship requirements. Refer to the *Evaluation* section in the current policy for additional information.

Evaluation. As part of the research course (i.e., 7000) requirements, the student must complete the GSBS Internship Proposal form, which is available online to current students. Upon receipt of an official internship offer, the student must obtain final approvals by the following individuals: (1) student's research mentor; (2) graduate advisor; (3) department chair; (3) an authorized representative from the GSBS administrative office; and (4) the institution's Designated School Official (DSO), as applicable, for F-1 international students1. The proposal form and approvals will be used, in part, to determine the final grade for the research course.

Upon completion of the internship experience, the student's research mentor will solicit feedback about the student from the internship site supervisor using a standardized form. In addition, each student will be expected to complete: (1) a written evaluation of the internship site, supervisor, and overall experience; and (2) an oral/visual presentation which provides an overview of the internship and highlights the student's significant accomplishments in relation to the intended learning outcomes. The final grade for the fall seminar course (i.e., 7101) will be determined, in part, by the site supervisor's feedback, student's written internship evaluation, and presentation.

Other Experiential Learning. Other types of experiential learning that may not be classified as an internship will be considered on a case-by-case basis. The student should discuss the proposed experience with the research mentor, graduate advisor, and Student Affairs Advocate as soon as possible to determine feasibility.

Interprofessional Practice and Education (IPE) Core Curriculum

All TTUHSC students, regardless of school affiliation, are required to complete the IPE core curriculum prior to graduation. The IPE core curriculum includes two components, including (a) successful completion of a non-credit online course (>70% accuracy on the knowledge post-test); and (b) successful participation in at least one registered IPE learning activity. Failure to complete the IPE core curriculum will result in delayed graduation.

Additional information is provided to new GSBS students during orientation. In general, new students must register for *GSBS 5000: Interprofessional Collaborative Practice* in the first semester of coursework and are required to complete the self-paced online modules at the beginning of the semester. Refer to the specific deadline in the course syllabus. GSBS students may complete the registered IPE learning activity at any time during the academic program but prior to graduation. Certificates of completion should be sent to the program's Student Affairs Advocate via email.

Leave of Absence

Full-time students must be registered every semester. In extreme circumstances, it may be necessary for a student to be absent from their studies or research for an extended time. The following leaves of absence may be requested:

- **Personal and Planned Educational Leaves of Absence:** Defined as a planned interruption or pause in a student's regular education during which the student temporarily ceases formal studies. Such activities may be for the purpose of clarifying or enriching educational goals or to allow time to address personal matters and thus enhance the prospect of successful completion of the student's academic program. The student must plan to return to the GSBS at the end of the approved leave period.

- **Medical Leave of Absence:** The student must provide documentation from a health care professional confirming that the student is unable to engage in graduate study; such documentation should include a statement as to when

the student may be expected to resume classes. Students on medical leave are not allowed to attend GSBS classes or participate in student organizations, programs, and/or activities.

In addition, any student who fails to register for three consecutive semesters (12 months) and who does not have an official leave of absence from study is subject to review for readmission by the standards in effect at the time of reconsideration. Typically, leaves of absence will not exceed one year and do not extend the maximum time allowed for degree completion. If extended leave is taken that is not officially approved by the Assistant Dean or is not medically necessary, a student employee is subject to disciplinary actions, including but not limited to, termination.

Misconduct

Part II-D of the TTUHSC Student Handbook: Code of Professional Conduct describes various examples of misconduct and prohibited behaviors by a student or student organization. Any TTUHSC faculty, staff, or student may file a complaint against a student or student organization for violation of the student code. The disciplinary procedures related to allegations of such misconduct are clearly delineated in Part II-F. Any student or student organization found to have engaged in misconduct is subject to disciplinary sanctions, conditions, and/or restrictions, as outlined in Part II-G.

It is the policy of the Texas Tech University Health Sciences Center (TTUHSC) to affirm the rights of its students to a prompt and fair resolution of a complaint or grievance involving allegations of inappropriate behavior. When an allegation of misconduct occurs, the GSBS will attempt to resolve the issue informally through a preliminary discussion and/or investigation with the appropriate parties. If a basis for a formal complaint exists, then a grievance may be filed following the policies and procedures on the TTUHSC Student Affairs website and in Part XI of the TTUHSC Student Handbook: Code of Professional Conduct.

Probation

Every student enrolled in the Graduate School of Biomedical Sciences (GSBS), whether degree-seeking or not, is required to maintain a high level of performance and to comply fully with policies of the GSBS and the institution. The GSBS reserves the right to place on probation, suspend, or dismiss any graduate student who does not maintain satisfactory academic standing or who fails to conform to the regulations of TTUHSC. Other sanctions may also be imposed, as appropriate.

Each student is expected to earn a 3.0 grade point average (GPA) or higher in each semester of enrollment. If a student's GPA for a particular semester falls below 3.0, the student will be placed on academic probation. Failure to maintain a 3.0 GPA in each succeeding semester may result in academic dismissal from GSBS. Regulations governing probation are based on the semester GPA and will be applied regardless of the cumulative GPA.

Students placed on academic probation will lose their tuition and fee scholarships, as applicable, for the semester immediately following the term in which the student’s GPA was insufficient. The student must earn a 3.0 GPA or better in the semester in which the scholarships are forfeited to regain the tuition and fee scholarships. Students on academic probation are not eligible for any other scholarships.

Academic programs or concentrations may apply standards for probation higher than those established by GSBS. Such standards should be approved by the GSBS office, and actions based thereon are to be recommended by the program director or graduate advisor, as applicable, and forwarded to the GSBS office.

Professionalism

All students must adhere to the TTUHSC Student Handbook: Code of Professional Conduct, as well as the policies and procedures of the department, school, and university. Examples of professional conduct include, but are not limited to, prompt payment of tuition, arriving on-time to classes or meetings, maintaining a clean campus environment, responsiveness to email messages, respectful interactions with others, and adherence to deadlines. Students are also expected to embody the core values of TTUHSC to cultivate an exceptional community across each campus for faculty, staff, students, patients, and community members. Our values include one team, kindhearted, integrity, visionary, and beyond service.

Progress Meetings

All students, regardless of academic program, will participate in annual advising meetings. Typically, these are scheduled by the Student Affairs Advocate (SAA) for the program and includes the student, graduate advisor, SAA, and research mentor, if feasible. The purpose of these meetings is to evaluate student progress and determine the courses to take in upcoming semesters.

Doctoral students should also participate in annual committee meetings to enable the student and committee members to evaluate student progress towards degree completion. Students must prepare meeting minutes, obtain appropriate signatures, and submit to the assigned SAA within 7 days of the meeting. Any student not making satisfactory progress toward the degree may be placed on probation and given conditions to remain in the GSBS program. Continued unsatisfactory progress in any area of a student's work may be cause for dismissal.

Publication of Student Work

Every doctoral student is required to publish an original peer-reviewed research paper to demonstrate that the student has made a significant contribution to science. While students are encouraged to contribute to science via review articles, they are not a substitute for original peer-reviewed research publication(s). The manuscript must be accepted (or accepted pending minor revisions), in press, or published before submission of the *Approval to Schedule Defense* form, which is available online to current students. The manuscript must be in a journal indexed by PubMed or Web of Science. The student must be the "first author" or share "first authorship" with a co-author of the manuscript, and the work must be completed during the current degree program.

Waivers. If there are compelling reasons that the student will not have a published first-author manuscript when the *Approval to Schedule Defense* form is submitted, the dissertation committee chair may request a waiver to schedule the defense, defend the thesis, and graduate. The GSBS Dean, in considering the waiver request, will review three stipulations:

1. By a majority vote of consent, the dissertation committee must approve that the doctoral candidate has completed sufficient research to schedule the dissertation defense;
2. The student's mentor and advisory committee must clearly state that a manuscript draft has been submitted and is suitable for a first-author (or co-first author) publication; and
3. The mentor must provide an explanation for the publication delay and assurances that every effort will be made to have the submitted manuscript published.

Research Assistantships

Per *Texas Education Code, §54.212*, a teaching assistant or research assistant of any institution of higher education and the spouse and children of such a teaching assistant or research assistant are entitled to register in a state institution of higher education by paying the tuition fees and other fees or charges required for Texas residents under *Texas Education Code, §54.051*, without regard to the length of time the assistant has resided in Texas, if the assistant is employed at least one-half time in a teaching or research assistant position which relates to the assistant's degree program under rules and regulations established by the employer institution.

Enrollment. Students on research assistantships must be full-time students. The minimum enrollment for full-time graduate status is nine (9) semester credit hours in the regular semester and at least six (6) semester credit hours in the summer term. Students on assistantships must matriculate every semester, or the assistantship will be temporarily suspended until the next semester of matriculation.

Upon matriculation into GSBS, all doctoral students will be employed as a research assistant funded by either the GSBS or department. The research assistantship will be funded for a maximum of five (=5) years, for which the GSBS will pay 2 ½ years. (Students who matriculated prior to 6/1/2019 are funded at 40 months from GSBS and 20 months from the Principal Investigator (PI), or 34% of the total funding.) Any funding past the fifth year for a doctoral student or students accumulating more than 130 semester credit hours will be the responsibility of the department/PI. For continuation of the research assistantship from year to year, the student must be in good academic standing and continue making satisfactory progress toward a degree.

Fee Waivers. Students must be appointed before the 12th class day of the fall or spring semester (4th class day of the summer term) as a benefits eligible research assistant with employment of at least one-half time to be eligible for fee waivers. The student must be employed for 4 ½ months in a semester to qualify for the waivers. If the student leaves early or does not meet the 4 ½ month criteria, the fee waivers will be revoked, and the student will be required to pay the balance due. GSBS students who are employed as research assistants and who are also taking courses at Texas Tech University (TTU) will not be eligible for waivers for the TTU tuition and fees. Fee waivers are only guaranteed for GSBS courses. Waivers include the following:

- **Graduate Student Fee Assistance Program:** Exempts, by Board of Regents action, the student from the payment of certain fees (e.g., institutional tuition, student services fee, information technology fee, recreation center fee, and course fees);
- **Non-Resident State Tuition Exemption:** Exempts a student from payment of nonresident tuition over and above the state resident rate.
- **Medical Services Waiver:** Waives the student from payment of the medical services fee.

Work Expectations. Research assistants are expected to work in the lab twenty (20) hours per week. Additional hours (>20) in the lab are required for fulfillment of coursework and/or dissertation preparation. Research assistant positions are not entitled to vacation or sick leave because student employment is governed by 6 Tex. Gov't. Code § 661.152 and § 661.201. See below for relevant excerpts:

Sec. 661.152. Entitlement to Annual Vacation Leave
(a) A state employee is entitled to a vacation in each fiscal year without a deduction in salary, except for a state employee who is:
(1) an employee of an institution of higher education as defined by Section 61.003, Education Code, who:
(A) is not employed to work at least 20 hours per week for a period of at least four and one-half months; or
(B) is employed in a position for which the employee is required to be a student as a condition of the employment.

Sec. 661.201. Applicability
(b) An employee of an institution of higher education as defined by Section 61.003, Education Code, is eligible to accrue or take paid sick leave under this subchapter only if the employee:
(1) is employed to work at least 20 hours per week for a period of at least four and one-half months; and
(2) is not employed in a position for which the employee is required to be a student as a condition of the employment.

Upon approval by the research mentor and Assistant Dean, research assistants can make special arrangements to be out of the lab up to ten (10) business days per academic year for personal reasons. However, the time spent away from the lab must be made up either before or after the missed time. Documentation of that time, as confirmed by the research mentor's signature, must be provided to the appropriate Student Affairs Advocate (SAA) upon completion. Any time taken beyond

10 business days each year will occur without pay. The time permitted each academic year (i.e., 10 business days) cannot be accumulated and will not be carried forward to the next academic year.

Any time planned away from the lab must be approved by the advisor/mentor and Assistant Dean before that time has been taken. Students planning any time away from the lab should promptly consult with their faculty mentor/advisor, meet with the assigned Student Affairs Advocate (SAA), and submit appropriate paperwork for approval. Resident assistants must not take time away from the lab during the fall, spring, or summer semesters unless medically necessary. Any time away from the lab should be taken between semesters, which is defined as any time after the last day of class and before the first day of class for the next semester. It is the student's responsibility to notify their mentor of any time out of the lab.

For additional information on student employment, you may also refer to HSC OP 70.27 (Appointment of Student Employees).

Responsible Conduct of Research

All GSBS students, regardless of academic program, are required to complete an ethics course as part of their program curriculum—*GSBS 5101: Responsible Conduct of Research*. The course addresses the regulatory environment, as well as the normative ethics of conducting biomedical research.

Scholarly Activities

GSBS maintains current records of each student's scholarly activities, such as publications and presentations, for various reporting purposes and to celebrate students' accomplishments. On an annual basis, students are required to submit either an updated curriculum vitae (CV) or an updated list of publications and/or presentations, as applicable, to the Student Affairs Advocate. The timing and method of submission differs across academic programs.

Scholarships

GSBS offers various scholarships throughout the year in an effort to recruit and retain the best quality students. Information about all GSBS scholarships can be found on the scholarships page of the GSBS website. Students must be in good academic standing and have a FAFSA or TASFA on file with Financial Aid to receive scholarships, including tuition scholarships.

Student Health

Student Health Services. Each TTUHSC campus has a facility that students can use when needing health care services. Each location offers a range of services from medical checkups and mental health services to wellness support and health education. Each campus has identified facilities which are available to all students who have paid the medical services fee. Refer to the TTUHSC Student Affairs website for additional information. All master's students in GSBS are required to pay the TTUHSC medical services fee each semester. Doctoral students may opt-in to pay the fee. The medical services fee is automatically waived for students who hold research assistantships. For doctoral students to gain access to student health services, they must opt-in to pay the fee.

Student Health Insurance. Per HSC OP 77.19 (Mandatory Student Health Insurance), all GSBS students must obtain and maintain health insurance coverage that is Affordable Care Act (ACA) compliant while enrolled at TTUHSC. The student health insurance requirement differs from the medical services fee, which gives the student inexpensive access to basic services. The medical services fee does not cover emergency room visits, hospitalizations, laboratory services, radiology, and certain procedures. The ACA-compliant health insurance will cover such services. Refer to the TTUHSC Student Affairs website for additional information. Related information will also be communicated to students via their official TTUHSC email accounts.

In order to ensure health insurance coverage, all TTUHSC students are automatically enrolled in the university-sponsored student health insurance plan unless an approved waiver is submitted. Currently, Academic Health Plans (AHP) administers the student health insurance plan for TTUHSC. This plan will be charged to each student's tuition and fee bill. If students do not have alternative health insurance coverage, they must pay the insurance premium through the student account by the institutional due dates to avoid additional fees.

If students have alternative health insurance coverage (e.g., coverage by a parent, guardian, spouse, or employer) that is Affordable Care Act (ACA) compliant, they have the option to submit a request to waive the student health insurance plan on the AHP website. Alternative health insurance coverage must be active during the duration of the academic term. Travel plans, short-term plans, cost sharing plans, or plans that require an individual to pay for treatment and then apply for reimbursement will NOT be accepted. Please note GSBS students who are research assistants are also eligible to pay for employee health benefits and should contact Human Resources to explore that coverage as an alternative health insurance option.

If a waiver is approved, the student health insurance plan charge will be removed or refunded on the student's account. If the request for a waiver is denied, the student will need to pay the charge for the student health insurance plan billed to the student's account. If the student thinks the waiver was denied in error, contact the Office of Student Life for assistance at (806) 743-2302 or student.life@ttuhsc.edu. **Students are required to submit a new waiver each fall semester.**

Screening and Immunization Fee. Each fall students are assessed a screening and immunization fee that provides funds for the screening and maintenance of student immunization records and to cover the cost of providing vaccinations. Immunization records are kept up-to-date through the Office of Institutional Health. Annual services include TB screening, influenza vaccine, and completion of Hepatitis B vaccine post-matriculation, as well as follow up to current students for any blood-borne pathogen exposures that may occur as a TTUHSC student.

Student Legal Services

Texas Tech University provides legal advice, counsel, and limited representation for currently enrolled TTUHSC students. Refer to the TTU Student Legal Services website for additional information.

Time to Degree

The maximum time to degree for GSBS students is six (6) years for master's degrees. The maximum time to degree is eight (8) years for doctoral degrees, or four (4) years from admission to candidacy, whichever comes first. Any student who does not complete all requirements within the given timeframe will be dismissed from the program. Please note the State of Texas will also not provide funds to state institutions of higher education for doctoral students who exceed the allowable number of semester credit hours (SCH). Refer to *Excessive Hours* under the *Enrollment* section for additional information.

A minimum of three (3) years of full-time graduate study beyond the bachelor's degree is required for a doctoral degree. Work completed for the master's degree, other than thesis hours, may be considered as a part of this period if it forms a logical sequence in the entire program. Credit typically will not be given for work completed more than eight (8) years prior to admission to the doctoral program. Exceptions to this policy will require written justification through the student's department and approval by the GSBS dean.

Work completed in the doctoral program of another recognized, accredited graduate school will be considered on the recommendation of the relevant department(s), but no assurance can be given that such work will reduce the course requirements at TTUHSC. Transferred credit will not reduce the minimum residence, as described in the *Residence Requirement* sub-section of the current catalog.

Title IX

Texas Tech University Health Sciences Center (TTUHSC) is committed to providing and strengthening an educational and working environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. TTUHSC prohibits discrimination based on sex, which includes pregnancy, sexual orientation and gender identity, as well as other types of sexual misconduct.

TTUHSC's Title IX and sexual misconduct policy and complaint procedures may be found in TTU System Regulation 07.06 and HSC OP 51.03 (Sexual Misconduct). Additionally, Part IV of the TTUHSC Student Handbook: Code of Professional Conduct addresses complaint procedures involving students.

Texas law requires employees to report certain types of sexual misconduct to appropriate University personnel. All employees, including student employees, who in the course and scope of employment, witness or receive information regarding the occurrence of an incident that the employee reasonably believes constitutes sexual misconduct and is alleged to have been committed by or against an individual who was a student enrolled at or an employee of the University at the time of the incident shall promptly report the incident to the TTUHSC Title IX Coordinator. If you have been involved in or are aware of sex discrimination or sexual misconduct, please use the online report form.

Please feel free to reach out to the TTUHSC Title IX Coordinator at TitleIXCoordinator@ttuhsc.edu to assist you with your concern, or visit the TTUHSC Title IX website for more information.

Transfer Credit from Other Colleges and Universities

There is no automatic transfer of credit toward a graduate degree in GSBS. Students must request approval for graduate credit to be transferred from an accredited college or university in the United States. Work completed in the doctoral program of another recognized, accredited graduate school will be considered on the recommendation of the relevant department(s), but no assurance can be given that such work will reduce the course requirements at TTUHSC.

No undergraduate credit may count towards graduate credit. Transfer credit is also contingent upon completion of the course with a B (3.0) or better. (A grade of “B” is defined by the numerical range of 80-89.) Courses graded using other systems, such as Pass/Fail, are not eligible for transfer credit. The length of time since the course was completed may also be a factor in evaluating transfer requests. In general, credit will typically not be given for work completed more than eight (8) years prior to admission.

Doctoral students can transfer no more than 30 semester credit hours (SCH) of an earned master’s degree or doctoral coursework from another institution. Master’s students can transfer no more than 6 SCH towards a 30-SCH master’s program and no more than 9 SCH towards a master’s program that requires ≥36 SCH. To process such transfer requests, the student must provide all requested documentation needed to evaluate course equivalency. This includes, but is not limited to, an official U.S. transcript and course syllabus from the completed course for which the transfer is requested.

A student must initiate a transfer request with the graduate advisor or program director, as applicable, as early as possible but before the official degree plan is filed with the GSBS office. Upon concentration/program approval, the request will be forwarded to the Student Affairs Advocate in the GSBS office for processing before submission to the Registrar’s office. Transfer credit reflects on the TTUHSC transcript but does not impact the student’s GPA. Transferred credit will not reduce the minimum residence, as described in the *Residence Requirement* sub-section of the current catalog.

Tutoring

Group tutoring is available through the GSBS for selected core courses. Once tutoring dates have been scheduled, the Student Affairs Advocate will notify students. Some group tutoring is also conducted by course directors or teaching assistants.

Verification of Student Identity

All students who are enrolled in a GSBS degree program are required to provide government-issued identification (ID) prior to distribution of the student's TTUHSC student identification badge. Failure to do so prior to the 12th class day of the first semester of enrollment will result in the student being dropped from all courses.

In addition, GSBS requires program applicants to provide government-issued identification ID in order to participate in any virtual admissions interviews. Finally, GSBS does not currently offer any online degree programs. However, in the event GSBS develops and implements such degree programs, enrolled students will be required to provide government-issued ID during a live videoconferencing session prior to the 12th class day of the first semester of enrollment.

Acceptable forms of government-issued ID include:

1. U.S. driver's license
2. State- or government-issued ID card
3. U.S. military ID
4. Unexpired passport
5. Unexpired U.S. passport card
6. Department of Indian Affairs Tribal card
7. U.S. permanent resident card

Waiving Course Requirements

Similar to transferring credits from other colleges and universities, a student may petition to waive a specific course requirement if the student has successfully completed a similar course. Unlike transfer credits, however, waived courses do not reflect on the student's TTUHSC transcript, nor do the semester credit hours count toward the degree.

The following courses cannot be waived: (1) *GSBS 5174: Core IV-Biomedical Seminar*, and (2) *GSBS 5275: Core V-Introduction to Biomedical Research*. Approval for waiving other course requirements is considered within each concentration/program. To initiate a course waiver, the student must provide all requested documentation needed to evaluate course equivalency. This includes, but is not limited to, an official transcript from the previous college or university and course syllabus from the completed course for which the waiver is requested.

A student must initiate a waiver request with the graduate advisor or program director, as applicable, as early as possible but before the official degree plan is filed with the GSBS office. The student should consult with the designated graduate advisor/program director for specific guidelines. In general, however, no undergraduate credits may be used to waive any graduate credits. Waivers are also contingent upon completion of the course with a B (3.0) or better. (A grade of "B" is defined by the numerical range of 80-89.) The length of time since the course was completed may also be a factor in evaluating waiver requests.

If applicable, the graduate advisor will present the information to the Core Curriculum Coordination Committee (CCCC) or concentration/program faculty with the authority to make a decision about the request. In cases where the appropriateness of the request cannot be determined, a student may be required to pass a comprehensive examination related to the course content. Upon concentration/program approval, the approved waiver will be forwarded to the Student Affairs Advocate in the GSBS office for documentation purposes.

Master of Science (M.S.) Degree Programs

Below are the interdisciplinary courses available through the Graduate School of Biomedical Sciences (GSBS) for master's level and doctoral programs. Specific program and/or concentration courses are listed in the appropriate sections.

Course Descriptions

GSBS

5000 **Interprofessional Collaborative Practice.** An introduction to broad concepts related to four interprofessional core competencies for healthcare providers: understanding roles and responsibilities; interprofessional communication; interprofessional teams and teamwork; and values and ethics for interprofessional practice. A module on electronic health records is also included. Course is required for all new GSBS students matriculated in a degree-granting program.

5098 **Techniques in Biomedical Research.** Through rotations in different laboratories, students will be introduced to fundamental principles and techniques in basic biomedical research.

5099 **Topics in Biomedical Sciences.** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.

5101 **Responsible Conduct of Research.** This course will address the regulatory and ethical environment of today's biomedical research as well as such topics as authorship and data management. The class format is lectures and case discussions. Course is required for all GSBS students.

5102 **How to be a Scientist: Professional Skills for the Biomedical Sciences Graduate Student.** Teaches useful concepts in the scientific professionalism that might not be learned elsewhere: how science is conducted in the United States and at TTUHSC, the importance of oral communication in science and tips for teaching in a science classroom.

5174 **Core IV: Biomedical Seminar Series.** Students will attend and participate in seminars.

5201 **Scientific Writing in the Biomedical Sciences.** Tactics for effective writing and communication in the biomedical sciences. Instruction will focus on the process of writing and publishing scientific manuscripts and writing fellowship applications. Students will complete short writing and editing exercises that focus on tactics of effective, clear, and concise writing, and prepare a manuscript or application in their area of study.

5275 **Core V: Introduction to Biomedical Research.** Introduces the first-year graduate student to the fundamental principles and techniques in basic biomedical research.

5303 **Introduction to Clinical Research.** This course will have two hours of didactic training and a three-hour "lab" each week with the students working with a nurse coordinator in the conduct of a clinical study. Students will be involved in all aspects of preparation for and execution of prospective human studies and retrospective chart reviews. The didactic training deals with the regulations and ethical considerations related to research in humans, the process of obtaining approval for a study and the requirements associated with conducting a study. Prerequisites include the required courses in the first-year GSBS curriculum and preferably at least one laboratory rotation.

5310 **Introduction to Statistical Methods in the Biomedical Sciences.** Provide students explanation and application of classical test theory involving univariate statistics. The course will include discussion about classical test theory (p values, scales of measurement, assumptions of analyses, etc.) and application of this theory for various statistical analyses, such as tests, anova, correlation. There will be a small introduction to non-parametric analyses.

5311 **Health Information Resources Management.** Hands-on experience focuses on learning advanced scientific and biomedical information seeking techniques based on current technology. Teaches the evaluation of sources, the management of data found and the primary ethics of presenting information in a paper or speech. Emphasis is to build life-long learning skills that can be applied to research and to patient care.

5319 **Seminar in Current Topics of Information Sciences.** Prerequisite: Must be enrolled or accepted in a graduate program. Course varies each semester emphasizing information science topics and includes searching relevant scientific databases. (Writing Intensive.)

5350 **Laboratory Methods in Biomedical Sciences.** Introduces the first-year graduate student to the fundamental principles and techniques in basic science research. Following a lecture and/or a laboratory demonstration, students conduct a well-defined laboratory exercise and provide a written report on the result.

5372 **Core II: Cells.** The structure/function relationships that underlie basic cellular processes, including translation, protein trafficking, cytoskeletal organization and motility, cell adhesion, and cell division. Required for first year students.

5373 **Core III: Genes.** Teaches essential scientific concepts underlying the field of Molecular Biology and Molecular Genetics. Required for first year students.

5399 **Topics in Biomedical Sciences.** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.

5471 **Core I: Molecules.** This course offers a broad coverage of biochemistry with an emphasis on structure and function of macromolecules, biosynthesis of small molecule precursors of macromolecules, and the pathways of intermediary metabolism. Required for first year students.

Master of Science (M.S.) Degree Programs *(continued)*

Biomedical Sciences, M.S.

Students cannot be admitted directly into this program. They are admitted only into the doctoral program. Contact the department chair, graduate advisor, and/or Student Affairs Advocate (SAA) in your program concentration to determine if the master's degree is a potential program option for you. The decision will be contingent upon several criteria.

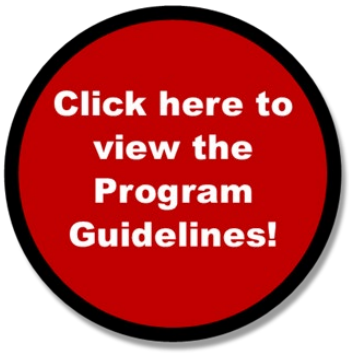
Biotechnology, M.S.

Program Leaders and Staff Contacts

Abilene Campus		Lubbock Campus	
Sanjay Srivastava, Ph.D.	Program Director	**Ina Urbatsch, Ph.D.**	Program Director
Irene La-Beck, PharmD	Graduate Advisor	**Komaraiah Palle, Ph.D.**	Graduate Advisor
Jerri Jones, MBA	Student Affairs Advocate	**Leslie Fowler**	Student Affairs Advocate

About the Program

The Master of Science (M.S.) in Biotechnology program, located on the Abilene and Lubbock campuses, offers several options for students interested in careers in biotechnology companies; technical research positions in academia, industry, or government agencies; and/or preparing for entry into a doctoral program. The program offers two tracks: (1) a one-year, non-thesis option which provides a strong foundation of knowledge about core concepts with minimal hands-on research experience; and (2) a 21-month, research track requiring two semesters of primarily didactic coursework and 12 months of full-time laboratory research.



The research track is typically a non-thesis degree with an optional thesis at the end of the second year by arrangement with the advisor. The research component may be completed either at a company in the biotechnology industry or on campus with graduate faculty members with active research programs. In Abilene, faculty members in the Department of Immunotherapeutics and Biotechnology are well-funded researchers who study cancer biology, cancer immunology and immunotherapy, nanoparticle drug delivery, tumor micro-environments, and drug screening. Biotechnology faculty members on the Lubbock campus represent faculty in the basic sciences and clinical departments. As such, they represent a variety of research interests, such as addiction, Alzheimer's disease, cancer, diabetes, neurobiology, protein biophysics, virology, and much more.

Sample Curriculum (Research Track)

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5471	Core I: Molecules	4
GSBS 5372	Core II: Cells	3
GSBS 5373	Core III: Genes	3
GSBS 5174	Core IV: Biomedical Seminar	1
GBTC 5020	Laboratory Methods	2
		13
Spring Term		
GBTC 6201	Biotechnology Seminar	2
GBTC 5337	Techniques in Biotechnology Research	3
GBTC 6301	Introduction to Biotechnology	3
GBTC 6202	Biomedical Informatics	2
GSBS 5101	Responsible Conduct of Research	1

Varies	Elective	3
		14
Summer Term		
GBTC7000/GBTC 6001[a]	Research or Internship	6
		6

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GBTC 7000[b]/GBTC 6001	Research or Internship	9
GBTC 5199	Biotechnology Lab Report OR	1
GBTC 5298	Biotechnology Industry Report	2
		10 or 11
Spring Term		
GBTC 7000[b]/GBTC 6001	Research or Internship	9
GBTC 5299	Biotechnology Final Report	2
		11
	PROGRAM TOTAL	**54 or 55**

[a] To receive academic credit for GBTC 7000/GBTC 6001, students are expected to work approximately 4.5 hours per week for every 1 SCH in a 10-week semester.
[b] Students who choose a TTUHSC research lab will be granted a paid Research Assistantship.

Sample Curriculum (One-Year Option)[a]

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5471	Core I: Molecules	4
GSBS 5372	Core II: Cells	3
GSBS 5373	Core III: Genes	3
GSBS 5174	Core IV: Biomedical Seminar	1
GBTC 5020	Laboratory Methods	2
		13
Spring Term		
GBTC 6201	Biotechnology Seminar	2
GBTC 5337	Techniques in Biotechnology Research	3
GBTC 6301	Introduction to Biotechnology	3
GBTC 6202	Biomedical Informatics	2
GSBS 5101	Responsible Conduct of Research	1
		11
Summer Term		
GBTC7000/GBTC 6001[b]	Research or Internship	6
		6
	PROGRAM TOTAL	**30**

[a] The one-year option is accepting applications starting in Fall 2023 for enrollment in Fall 2024.
[b] To receive academic credit for GBTC 7000/GBTC 6001, students are expected to work approximately 4.5 hours per week for every 1 SCH in a 10-week semester. Students in the one-year program will not be granted a paid Research Assistantship at TTUHSC.

Course Descriptions

GBTC

5020 **Biotech Lab Methods.** Laboratory Methods is offered the fall semester and is designed to introduce techniques fundamental to Biotechnology research. Successful mastery of these techniques will provide you with the experience and confidence to undertake more advanced methods as your education continues.

5099 **Special Topics in Biotechnology.** Special topics in Biotechnology not normally included in other classes. May be repeated for credit with change in content.

5199 **Biotechnology Lab Report.** Oral presentations and a final written report are expected to represent independent work by the student, conducted under the supervision of the mentor, and to be written and presented clearly and concisely in proper English. Candidates must enroll in this course the Fall semester of Year 2 (YR2). At the beginning of the YR2 Fall Semester, students will form a committee consisting of at least 3 Biotechnology Faculty, which must include their mentor, one of the three course directors, and at least one other member of the Biotechnology Program. Once membership is confirmed, please e-mail all three course directors the make-up of your committee. Meetings are required at least once in Mid-Fall of Year 2.

5210 **The Microbiome - Role in Health and Disease.** Focused on the role of microorganisms as active players in homeostasis and disease. Enrollment is only by permission of the instructor.

5211 **Biotechnology Innovation & Commercialization.** Addresses the essentials for generating and implementing innovations in biotechnology from invention and patent laws to developing a product prototype and business plan. Enrollment is only by permission of the instructor.

5212 **Fundamentals of Bacteriology.** The classification, structure, virulence and pathogenesis of the bacteria that cause human disease and the ways to control these organisms will be studied. The course is a Biotechnology elective offered any semester, but taken only by permission of the instructor.

5213 **Fundamentals of Virology/Parasitology.** The classification, structure, virulence and pathogenesis of the parasites and viruses that cause human disease, as well as the epidemiology and control of infections will be taught. The course is a Biotechnology elective offered any semester, but taken only by permission of the instructor.

5214 **Fundamentals of Immunology.** Cellular and Molecular Immunology is a study of the immune system, immunity against microbes, tumors and diseases caused by inappropriate immune responses.

5298 **Internship Report.** Oral presentations and a final written report are expected to represent independent work by the student, conducted under the supervision of the mentor, and to be written and presented clearly and concisely in proper English. Candidates must enroll in this course in the Fall Semester of Year 2 (YR2). At the beginning of the YR2 Fall Semester, students will form a committee consisting of at least 3 members, which must include their mentor, one of the three course directors, and at least one other member of the Biotechnology Program Faculty. Once membership is confirmed, please e-mail all three course directors the make-up of your committee. Meetings are required twice in mid-Fall of year 2.

5299 **Final Report.** A final written report and oral presentation are expected to represent independent work by the student, conducted under the supervision of the mentor, and to be written and presented clearly and concisely in proper English. Candidates must enroll in this course in the Spring Semester of Year 2 (YR2). At the beginning of the YR2 Fall Semester, students will form a committee consisting of at least 3 Biotechnology Faculty, which must include their mentor, one of the three course directors, and at least one other member of the Biotechnology Program in either GBTC 5199 or 5298. Meetings are required twice in the YR2 Spring Semester: early in the semester and again for a final presentation.

5330 **Immunology and Immunopathology.** The structure and molecular basis of immunological function will be taught, including: diagnostic tests using immunological reagents; mechanisms of resistance against microbial and neoplastic diseases; transplantation immunology; pathology of immune- mediated diseases; prevention of disease by vaccines; pharmacotherapeutic intervention in immunological processes; and contemporary topics in immunology. Enrollment is only by permission of the instructor.

5335 **Vaccines, Blood and Biologics.** Teaches the current and emerging importance of vaccines and biologics as essential tools for the prophylaxis and treatment of a multitude of diseases. Enrollment is only by permission of the instructor.

5337 **Techniques in Biotechnology Research.** In Spring semester of Year 1, students are required to rotate in a t least two laboratories of Biotechnology faculty members. Rotation 1 should begin immediately at the start of the semester and continue through the first one-half of the semester with rotation 2 starting immediately following

and continuing to the end of the semester. The objective or lab rotations is to allow the student to learn multiple experimental techniques and approaches, and choose a faculty mentor in which to conduct his/her required research. Rotation plans should be confirmed with the course director and the GSBS Biotechnology Student Advocate before to ensure they are initiated and completed in full.

5338 **Biochemical Methods.** Provides integrated approach to modern biochemical techniques and present methods used to manipulate a gene, purify and characterize the enzymatic properties of the encoded protein. Enrollment is only by permission of the instructor.

5340 **Biology of Cancer.** Teaches essential processes underlying the biology of cancer, from the molecular and cellular bases of cancer, to clinical manifestations, to therapy. Prerequisites: Successful completion of the GSBS Core Curriculum or consent of the course director(s).

5350 **Research and Molecular Pathology.** This course provides expertise necessary to design and interpret research data obtained through the use of knowledge pertaining to pathology of human diseases and methods offered by modern pathology. Enrollment is only by permission of the instructor.

6000 **Master Thesis**

6001 **Biotechnology Internship.** Research and training in a private-sector or government biotechnology laboratory (by prior arrangement with program director).

6201 **Biotechnology Seminar**

6202 **Biomedical Informatics.** Provides a broad introduction to the field of bioinformatics in medical research. Emphasizes use of modern software packages and internet-based genomic and other databases to solve research problems. Prerequisite GBTC 6301.

6301 **Introduction to Biotechnology.** Broad coverage will be given to topics with high current interest and utility to the biotechnology industries. The course emphasizes application of technologies and is required for all Biotechnology Master's students in Year 1 Spring semester.

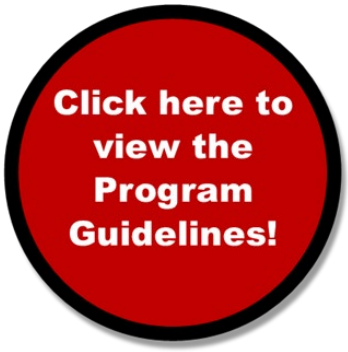
7000 **Research in Biotechnology**

Master of Science (M.S.) Degree Programs *(continued)*

Graduate Medical Education Sciences, M.S.

Program Leaders and Staff Contacts

Lubbock Campus Only	
Dan Webster, Ph.D.	Program Director
Gurvinder Kaur, Ph.D.	Graduate Advisor
Leslie Fowler	Student Affairs Advocate



About the Program

The Master of Science (M.S.) in Graduate Medical Education Sciences, or GMES, is a two-year, non-thesis master's degree. It is designed for students whose goal is either: (a) additional preparation for a healthcare-related professional school, or (b) a teaching career in the anatomical sciences. Students take courses in the anatomical, biochemical, and physiological sciences with first-year medical students at the TTUHSC School of Medicine. During the second year of the program, GMES students also serve as teaching assistants in the medical school. In addition, students design and implement an educational project in anatomy, biochemistry, or histology under the direction of a faculty advisor. The project is typically designed based on curricular needs and in alignment with student interests.

Students who complete the first year of the GMES curriculum in good standing are guaranteed one interview with the TTUHSC School of Medicine for potential admission into the Doctor of Medicine (M.D.) program. The interview will typically occur during the medical school application cycle during the student's second GMES year. If the student chooses to delay the application process, the interview can be delayed until the application cycle immediately following graduation from the GMES program. The student is guaranteed only one interview total regardless of the decision to delay the application process.

Sample Curriculum

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5000	Interprofessional Collaborative Practice	0
GMDS 5001	Graduate Human Anatomy, Histology & Embryology	6
GMDS 5021	Introduction to Biochemistry, Cell Biology, Inflammation and Infection	6
		12
Spring Term		
GMDS 5020	Introduction to Immunology, Hematology, and the Cardiovascular	10
GMDS 5110	Surgical Gross Anatomy and/or	1 and/or
GMDS 5006	Advanced Dissection Skills	3
		11-14

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GMDS 5023	Advanced Training in Anatomy, Histology & Embryology Education	3
GMDS 5024	Advanced Training in Biochemistry & Infectious Disease	3
GMDS 7000	Research (*Begin project.*)	3
		9
Spring Term		
GMDS 5022	Adv. Training in Immunology, Hematology, and the Cardio. System	3

GMDS 5310	Educational Project in Biomedical Sciences	3
GMDS 5121	Pedagogical Concepts in Medical Education	1
GMDS 7000	Research (*Complete project*.)	3
GSBS 5101	Responsible Conduct of Research	1
		11

PROGRAM TOTAL 43-46

Course Descriptions

GMDS

5001 **Graduate Human Anatomy, Histology & Embryology.** This course comprises a highly integrated study of human macroscopic and microscopic anatomy (including human dissection and both light and electron microscopy) which begins with the normal structure and function of the developing embryo as well as the mature body and then describes changes in both that are associated with various clinical conditions. Finally, learners will be exposed to educational approaches to the study of the human body that are essential for future success in the field of health care. Enrollment is limited to students admitted to the Graduate Medical Education Sciences M.S. program.

5021 **Introduction to Biochemistry, Cell Biology, Inflammation and Infection.** This course is designed to provide students with fundamental information concerning the traditional areas of biochemistry, genetics, cell biology, pharmacology, pathology and microbiology. The principles presented in this course will proceed from molecules to cells and then to tissues and organs, integrating structure and function in a way that will impart a deeper understanding that will allow students to achieve future success as either teachers or healthcare workers. Enrollment is limited to students admitted to the Graduate Medical Education Sciences M.S. program.

5020 **Introduction to Immunology, Hematology, and the Cardiovascular System.** This course is designed to provide students with fundamental information concerning the immune, hematopoietic and cardiovascular system. Normal function (histology and physiology) will be covered followed by disorders and pathophysiology, including infections, affecting each system. This will impart a deeper understanding that will allow students to achieve future success as either teachers or healthcare workers. Enrollment limited to students admitted to the Graduate Medical Education Sciences M.S. program.

5023 **Advanced Training in Anatomy, Histology & Embryology.** Students will participate in the gross anatomy and histology laboratories as teaching assistants, attend all pre-laboratory meetings, present at select pre-laboratory meetings, oversee prosection presentations during scheduled lab hours, attend all lectures in preparation for the laboratory sessions, assist in the preparation of practical exams, proctor exams, ultrasound sessions and STS sessions as needed, and schedule, organize, and conduct review sessions. Prerequisites include successful completion of the first-year course work in Graduate Med-Ed Sciences. Enrollment limited to students admitted to the Graduate Medical Education Sciences M.S. program.

5024 **Advanced Training in Biochemistry & Infectious Disease.** Students will lead and participate in designated small-group review sessions, team-based learning sessions for the medical school class, attend all lectures and designated laboratory sessions as teaching assistants, and participate in all pre-laboratory meetings in preparation for the laboratory sessions. Students will also proctor both the unit exams and the NBME final exam, as needed. Prerequisites include successful completion of the first-year course work in Graduate Med-Ed Sciences. Enrollment limited to students admitted to the Graduate Medical Education Sciences M.S. program.

5006 **Advanced Dissection Skills.** Students will review and conduct specialized dissections in the Anatomy Laboratory. The student will learn and practice advanced dissections skills designed to prepare specific teaching materials to demonstrate anatomical structures in different body regions. Prerequisites include successful completion of the first-year course work in Graduate Med-Ed Sciences.

5007 **Advanced Training in Ultrasound.** The overall goal is to show how to utilize ultrasound imaging to visualize and teach advanced topics in anatomy and physiology. Prerequisites: successful completion of GMDS 5001 and GMDS 5023.

5022 **Advanced Training in Immunology, Hematology, and the Cardiovascular System.** Students will lead and participate in designated small-group review sessions, team-based learning sessions, simulations, and laboratory sessions for the medical school class, attend all lectures and designated laboratory sessions as teaching assistants, and participate in all pre-laboratory meetings in preparation for the laboratory sessions. Students will also proctor both the unit exams and the NBME final exam, as needed. Prerequisites include successful completion of the first-

year course work in Graduate Med-Ed Sciences. Enrollment limited to students admitted to the Graduate Medical Education Sciences M.S. program.

5099 **Topics in Graduate Med-Ed Sciences.** Specific areas in Graduate Med-Ed Sciences or related areas not normally included in other courses. May be repeated for credit with change of content.

5110 **Surgical Gross Anatomy.** Introduction and overview to surgical approaches to different regions of the human body from a clinical perspective. Students will observe and assist surgeons with surgical dissections of cadavers. The experience in surgical anatomy will provide students with a relevant correlation of anatomy to applied surgical procedures. Enrollment limited to students admitted to Graduate Med-Ed Sciences M.S. program and successful completion of GMDS 5001 Gross Anatomy course.

5115 **Introduction to Functional Neuroanatomy.** Students will learn to identify external and internal structures of the central nervous system (CNS: brain and spinal cord) and associated vasculature. They will be able to describe the symptoms due to lesions in specific brain and spinal cord lesions. Prerequisites: good academic standing, GMDS 5001.

5120 **How People Learn: Theory and Practice.** The overall goal is to show how maximize learning skill in the health sciences with an emphasis on medical education. Individual differences in learning style will be used as examples of the application of Deliberate Practice to increase cognitive skills. Concepts such as the Growth Mindset and memory consolidation will provide a basis for understanding the universal application of concept mapping and question analysis as methods that maximize return on investment of learning time.

5121 **Pedagogical Concepts in Medical Education.** This course is intended to provide a graduate-level foundation for understanding important concepts that guide current medical education pedagogy. Students will evaluate papers from the Med-Ed literature, learn to write an effective abstract and present an effective poster, create vignette-style questions and an outline of their project for a possible manuscript.

5310 **Educational Project in Biomedical Sciences.** Students will design and carry out an educational project related to topics in GMDS 5001 or GMDS 5021. The project will be designed according to the needs of these courses and matched to the interest of the student. Projects might include self-directed learning units/sessions, or upgrading or creation of educational materials as presented on Sakai. Enrollment limited to students admitted to the Graduate Med-Ed Sciences M.S. program.

6101 **Seminar**

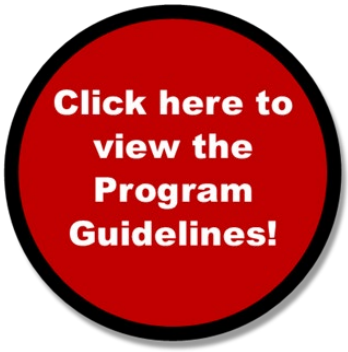
7000 **Research**

Master of Science (M.S.) Degree Programs *(continued)*

Pharmaceutical Sciences, M.S.

Program Leaders and Staff Contacts

Amarillo Campus Only	
Thomas Abbruscato, Ph.D.	Chair, Pharmaceutical Sciences
Abraham Al-Ahmad, Ph.D.	Graduate Advisor
Teresa Carlisle	Student Affairs Advocate



About the Program

The Master of Science (M.S.) in Pharmaceutical Sciences is offered at the Amarillo campus only. It is designed to introduce students to the field of pharmaceutical sciences, providing them with research experience and the opportunity to pursue entry-level careers as scientists in the pharmaceutical industry or prepare for entry into a doctoral program.

Sample Curriculum

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5000	Interprofessional Collaborative Practice	0
GSBS 5101	Responsible Conduct of Research	1
GPSC 5307	Pharmaceutical Sciences Research Methods	3
GPSC 5410	General Biochemistry	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
		9
Spring Term		
GPSC 5250	Applied Medicinal Chemistry	2
GPSC 5404	Principles of Drug Structure and Action	4
GPSC 5411	Graduate Pharmaceutics	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
		11

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GPSC 5230	Experimental Design and Biostatistics	2
GPSC 7000	Research	6
GPSC 7101	Pharmaceutical Sciences Seminar	1
		9
Spring Term		
GPSC 5429	Basic Pharmacokinetics	4
GPSC 6000	Master's Thesis	6
GPSC 7101	Pharmaceutical Sciences Seminar	1
		11
	PROGRAM TOTAL	**40**

Course Descriptions

GPSC

5101 **Topics in Pharm Sciences.** Special topics in pharmaceutical sciences that are not normally included in other classes. May be repeated for credit with change in content.

5230 **Experimental Design and Biostatistics.** Principle of experimental research design, theoretical and practical issues of measurements and data collection; biostatistics in research design and data analyses for graduate students pursuing pharmaceutical and biomedical researches. Course Prerequisite: Admission to TTUHSC Graduate Program of Pharmaceutical Sciences

5250 **Applied Medicinal Chemistry.** This introductory course is designed to facilitate understanding of the molecular aspects of drug action, including basic principles of drug-target interactions, the relationships between chemical structure and drug action and effects of metabolism on the drug structure.

5307 **Pharm Sci Res Methods.** A lecture and laboratory course designed to provide an overview of current research methods in pharmaceutical sciences under direct guidance of a faculty member.

5404 **Principles of Drug Structure and Action.** Basic principles of pharmacology, toxicology, pharmacokinetics, pharmacogenomics and physiochemical properties of drug molecules. This introductory course is designed to facilitate understanding of the fundamental concepts of pharmacology. Prerequisite: General Biochemistry (GPSC 5410)

5410 **General Biochemistry.** Chemical and molecular aspects of biological processes, including the chemistry of biomolecules, enzymology, bioenergy, biochemical control mechanisms, and molecular biology. Discussion of metabolic diseases and fundamentals of human nutrition.

5411 **Graduate Pharmaceutics.** Covers the physical chemical principles for the development of safe and effective pharmaceutical dosage forms, fabrication of conventional liquid, solid and aerosolized dosage forms, fundamental of various drug delivery systems, and the process of drug development, discovery and commercialization. Course prerequisite: Admission to the Graduate Program of Pharmaceutical Sciences.

5429 **Pharmacokinetics.** Introduces the basic principles of pharmacokinetics, including compartmental and physiological analysis of the time courses of drug absorption, distribution, and elimination, with an emphasis on the pharmacokinetic-based dosage-regimen design. Course prerequisite: Admission to the Graduate Program of Pharmaceutical Sciences.

6000 **Master's Thesis**

7000 **Research**

7101 **Pharmaceutical Sciences Seminar.** Weekly seminar series designed to provide training in research data presentation and analysis.

Doctor of Philosophy (Ph.D.) Degree Programs

Below are the interdisciplinary courses available through the Graduate School of Biomedical Sciences (GSBS) for master's level and doctoral programs. Specific program and/or concentration courses are listed in the appropriate sections.

Course Descriptions

GSBS

5000 **Interprofessional Collaborative Practice.** An introduction to broad concepts related to four interprofessional core competencies for healthcare providers: understanding roles and responsibilities; interprofessional communication; interprofessional teams and teamwork; and values and ethics for interprofessional practice. A module on electronic health records is also included. Course is required for all new GSBS students matriculated in a degree-granting program.

5098 **Techniques in Biomedical Research.** Through rotations in different laboratories, students will be introduced to fundamental principles and techniques in basic biomedical research.

5099 **Topics in Biomedical Sciences.** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.

5101 **Responsible Conduct of Research.** This course will address the regulatory and ethical environment of today's biomedical research as well as such topics as authorship and data management. The class format is lectures and case discussions. Course is required for all GSBS students.

5102 **How to be a Scientist: Professional Skills for the Biomedical Sciences Graduate Student.** Teaches useful concepts in the scientific professionalism that might not be learned elsewhere: how science is conducted in the United States and at TTUHSC, the importance of oral communication in science and tips for teaching in a science classroom.

5174 **Core IV: Biomedical Seminar Series.** Students will attend and participate in seminars.

5201 **Scientific Writing in the Biomedical Sciences.** Tactics for effective writing and communication in the biomedical sciences. Instruction will focus on the process of writing and publishing scientific manuscripts and writing fellowship applications. Students will complete short writing and editing exercises that focus on tactics of effective, clear, and concise writing, and prepare a manuscript or application in their area of study.

5275 **Core V: Introduction to Biomedical Research.** Introduces the first-year graduate student to the fundamental principles and techniques in basic biomedical research.

5303 **Introduction to Clinical Research.** This course will have two hours of didactic training and a three-hour "lab" each week with the students working with a nurse coordinator in the conduct of a clinical study. Students will be involved in all aspects of preparation for and execution of prospective human studies and retrospective chart reviews. The didactic training deals with the regulations and ethical considerations related to research in humans, the process of obtaining approval for a study and the requirements associated with conducting a study. Prerequisites include the required courses in the first-year GSBS curriculum and preferably at least one laboratory rotation.

5310 **Introduction to Statistical Methods in the Biomedical Sciences.** Provide students explanation and application of classical test theory involving univariate statistics. The course will include discussion about classical test theory (p values, scales of measurement, assumptions of analyses, etc.) and application of this theory for various statistical analyses, such as tests, anova, correlation. There will be a small introduction to non-parametric analyses.

5311 **Health Information Resources Management.** Hands-on experience focuses on learning advanced scientific and biomedical information seeking techniques based on current technology. Teaches the evaluation of sources, the management of data found and the primary ethics of presenting information in a paper or speech. Emphasis is to build life-long learning skills that can be applied to research and to patient care.

5319 **Seminar in Current Topics of Information Sciences.** Prerequisite: Must be enrolled or accepted in a graduate program. Course varies each semester emphasizing information science topics and includes searching relevant scientific databases. (Writing Intensive.)

5350 **Laboratory Methods in Biomedical Sciences.** Introduces the first-year graduate student to the fundamental principles and techniques in basic science research. Following a lecture and/or a laboratory demonstration, students conduct a well-defined laboratory exercise and provide a written report on the result.

5372 **Core II: Cells.** The structure/function relationships that underlie basic cellular processes, including translation, protein trafficking, cytoskeletal organization and motility, cell adhesion, and cell division. Required for first year students.

5373 **Core III: Genes.** Teaches essential scientific concepts underlying the field of Molecular Biology and Molecular Genetics. Required for first year students.

5399 **Topics in Biomedical Sciences.** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.

5471 **Core I: Molecules.** This course offers a broad coverage of biochemistry with an emphasis on structure and function of macromolecules, biosynthesis of small molecule precursors of macromolecules, and the pathways of intermediary metabolism. Required for first year students.

Doctor of Philosophy (Ph.D.) Degree Programs *(continued)*

Biomedical Sciences, Ph.D.

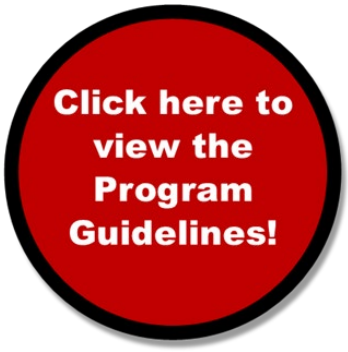
General Information

The Doctor of Philosophy (Ph.D.) in Biomedical Sciences program is offered on the Lubbock campus only. All students enter this degree program with an undeclared concentration. Students complete the core curriculum and rotate in faculty labs prior to selecting a specific concentration and research mentor.

Every doctoral student is required to publish an original peer-reviewed research paper to demonstrate that the student has made a significant contribution to science based on work accomplished during the academic program. In addition, each doctoral student must propose, prepare, and defend a dissertation that demonstrates a mastery of research techniques, a thorough understanding of the subject matter and its background, and a high degree of skill in organizing and presenting the materials. The dissertation, which is presented in a scholarly manuscript, should embody a significant contribution of new information to a subject or a substantial reevaluation of existing knowledge.

Biomedical Sciences, Ph.D.

Concentration: Biochemistry, Cellular and Molecular Biology



Program Leaders and Staff Contacts

Lubbock Campus Only	
Jannette Dufour, Ph.D.	Department Chair
Jeffrey Thomas, Ph.D.	Graduate Advisor
D'Ann Holubec, M.A.	Student Affairs Advocate
Sharla Cook	Department Support Staff Representative

About the Program

The Biochemistry, Cellular and Molecular Biology (BCMB) concentration prepares students for careers in the fields of biochemistry, cellular, developmental, and molecular biology. Dissertation topics in this concentration vary widely. Examples include regulation of gene expression, development and regeneration of the nervous system, protein amyloidogenesis, and tumor microenvironment in cancer progression. Specific employment opportunities for graduates include faculty positions in academia, industry, and related government agencies.

Sample Curriculum

A minimum of three (3) years of full-time graduate study beyond the bachelor's degree is required for a doctoral degree. In addition, all Ph.D. candidates are required to complete a minimum total of 72 semester credit hours (SCH). Specific requirements include: (a) 48 SCH of didactic course instruction, (b) 12 SCH of research, and (c) 12 SCH of dissertation. It is common for students to spend 4-5 years of full-time graduate study in the program. Below is a sample curriculum.

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5000	Interprofessional Collaborative Practice	0
GSBS 5471	Core I: Molecules	4
GSBS 5372	Core II: Cells	3
GSBS 5373	Core III: Genes	3
GSBS 5174	Core IV: Biomedical Seminar	1
GSBS 5274	Core V: Laboratory Methods	2
		13

Spring Term		
GSBS 5098	Techniques in Biomedical Research	6
GBCM 6320	Advanced Cell Biology	3
GBCM 7101	Seminar	1
GBCM 5130	Research Presentation Skills	1
		11
Summer Term		
GSBS 5098	Techniques in Biomedical Research	6
		6

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GBCM 7000	Research	5
GBCM 7101	Seminar	1
	Elective	3
		9
Spring Term		
GSBS 5101	Responsible Conduct of Research	1
GBCM 5130	Research Presentation Skills	1
GBCM 6333	Advanced Protein Biochemistry	3
GBCM 7000	Research	1
GBCM 7101	Seminar	1
GSBS 5099	Into to Biostatistics	2
		9
Summer Term		
GBCM 7000	Research	6
		6

YEAR 3

Prefix/Number	Course Title	SCH
Fall Term		
GBCM 7000	Research	5
GBCM 7101	Seminar	1
	Elective	3
		9
Spring Term		
GBCM 5130	Research Presentation Skills	1
GBCM 7000	Research	5
GBCM 7101	Seminar	1
	Elective	2
		9
Summer Term		
GBCM 7000	Research	6
		6

YEAR 4

Prefix/Number	Course Title	SCH
Fall Term		
GBCM 7000	Research	8
GBCM 7101	Seminar	1

		9
Spring Term		
GBCM 5130	Research Presentation Skills	1
GBCM 7101	Seminar	1
GBCM 7000	Research	7
		9
Summer Term		
GBCM 7000	Research	6
		6

YEAR 5

Prefix/Number	Course Title	SCH
Fall Term		
GBCM 7101	Seminar	1
GBCM 8000	Dissertation	8
		9
Spring Term		
GBCM 5130	Research Presentation Skills	1
GBCM 7101	Seminar	1
GBCM 8000	Dissertation	7
		9
	PROGRAM TOTAL	**120**

Course Descriptions

GBCM

5113 **Selected Topics in Cell & Developmental Biology.** Topics vary from semester to semester and reflect the research interests of the faculty. Recent offerings have included oncogenes and molecular biology, hormone action, and advanced genetics. May be repeated provided that different topics are covered each registration.

5130 **Research Presentation Skills.** A comprehensive coverage of the most widely used research presentation methods used at national and international meetings. The course is offered at the request of a faculty member or the request of a student or group of students. May be repeated with credit.

5213 **Selected Topics in Cell & Developmental Biology.** Topics vary from semester to semester and reflect the research interests of the faculty, recent offerings have included oncogenes and molecular biology, hormone action, and advanced genetics. May be repeated provided that different topics are covered each registration.

5313 **Selected Topics in Cell & Developmental Biology.** Topics vary from semester to semester and reflect the research interests of the faculty. Recent offerings have included oncogenes and molecular biology, hormone action, and advanced genetics. May be repeated provided that different topics are covered each registration.

6055 **Laboratory Methods.** Taken as a hands-on introduction to the laboratories in which a student may wish to do thesis or dissertation research, or (2) after a student is well established in his or her dissertation research, additional rotations can be done to gain expertise in techniques applicable to the student's research but not available in faculty advisor's laboratory. Repeatable if different methods are covered for each registration. Prerequisite: Consent of instructor.

6101 **Biochemistry Conference.** Informal conferences between faculty and students considering topics of current interest in biochemistry not normally included in other courses. Literature search, evaluation, organization, writing, and oral presentation by the student are emphasized. Different topic each semester. May be repeated for credit.

6135 **Topics in Biochemistry.** Lectures in specific areas of biochemistry not normally included in other courses. May be repeated for credit with change of content. Prerequisite: Consent of Instructor.

6235 **Topics in Biochemistry.** Lectures in specific areas of biochemistry not normally included in other courses. May be repeated for credit with change of content. Prerequisite: Consent of instructor.

6320 **Advanced Cell Biology.** This will cover advanced topics in cell biology and is designed for senior students who have completed introductory cell biology courses. The topics covered will include regulatory mechanisms that control the development of metazoan organisms, cell cycle regulation, cancer, and reproductive and stem cell biology. Prerequisite: GSBS core curriculum or consent of course director.

6333 **Advanced Protein Biochemistry.** Teaches advanced concepts in the field of protein biochemistry with emphasis on the fundamentals of protein biosynthesis, structure, and folding: methods of characterizing protein structural properties and conformation; and techniques for purifying proteins with diverse properties. Prerequisite: Successful completion of the GSBS common first year curriculum or consent of the course director.

6335 **Topics in Biochemistry.** Lectures in specific areas of biochemistry not normally included in other courses. May be repeated for credit with change of content. Prerequisite: Consent of Instructor.

6535 **Topics in Biochemistry.** Lectures in specific areas of biochemistry not normally included in other courses. May be repeated for credit with change of content. Prerequisite: Consent of Instructor.

7000 **Research**

7101 **Seminar.** Students will attend and participate in departmental seminars.

8000 **Doctoral Dissertation**

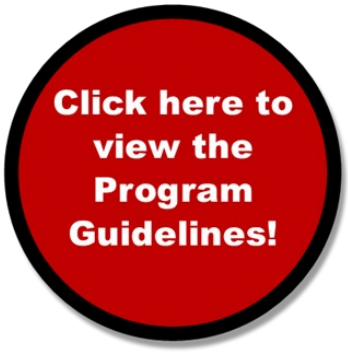
Doctor of Philosophy (Ph.D.) Degree Programs *(continued)*

Biomedical Sciences, Ph.D.

Concentration: Immunology and Infectious Diseases

Program Leaders and Staff Contacts

Lubbock Campus Only	
Afzal Siddiqui, Ph.D.	Department Chair
Joe Fralick, Ph.D.	Graduate Advisor
D'Ann Holubec, M.A.	Student Affairs Advocate
Valerie Sosa	Department Support Staff Representative



About the Program

The Immunology and Infectious Diseases (IID) concentration integrates several disciplines, such as immunology, bacterial pathogenesis, virology, and parasitology. Dissertation topics in this concentration vary widely but examples include microbial pathogenesis, biofilms, multi-drug resistance, and tumor antigen identification. Specific employment opportunities for graduates include faculty positions in academia, industry, and related government agencies.

Sample Curriculum

A minimum of three (3) years of full-time graduate study beyond the bachelor's degree is required for a doctoral degree. In addition, all Ph.D. candidates are required to complete a minimum total of 72 semester credit hours (SCH). Specific requirements include: (a) 48 SCH of didactic course instruction, (b) 12 SCH of research, and (c) 12 SCH of dissertation. It is common for students to spend 4-5 years of full-time graduate study in the program. Below is a sample curriculum.

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5000	Interprofessional Collaborative Practice	0
GSBS 5471	Core I: Molecules	4
GSBS 5372	Core II: Cells	3
GSBS 5373	Core III: Genes	3
GSBS 5174	Core IV: Biomedical Seminar	1
GSBS 5274	Core V: Laboratory Methods	2
		13
Spring Term		
GSBS 5098	Techniques in Biomedical Research	6
GBTC 52XX	Fundamental Micro and Immunology Course	2
GBTC 52XX	Fundamental Micro and Immunology Course	2
GIID 7101	Seminar	1
GSBS 5101	Responsible Conduct of Research	1
		12
Summer Term		
GSBS 5098	Techniques in Biomedical Research	6
		6

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GIID 7000	Research	3
GIID 7101	Seminar	1
GIID 52XX	Special Topics Elective	2
GIID 63XX	Micro/Immunology Course	3
		9
Spring Term		
GIID 7000	Research	2
GIID 7101	Seminar	1
GIID 53XX	Special Topics Elective	3
GIID 63XX	Micro/Immunology Course	3
		9
Summer Term		
GIID 7000	Research	6
		6

YEAR 3

Prefix/Number	Course Title	SCH
Fall Term		
GIID 7000	Research	5
GIID 7101	Seminar	1
GIID 53XX	Special Topics Elective	3
		9
Spring Term		
GIID 7000	Research	8
GIID 7101	Seminar	1
		9
Summer Term		
GIID 7000	Research	6
		6

YEAR 4

Prefix/Number	Course Title	SCH
Fall Term		
GIID 7000	Research	8
GIID 7101	Seminar	1
		9
Spring Term		
GIID 7000	Research	8
GIID 7101	Seminar	1
		9
Summer Term		
GIID 7000	Research	6
		6

YEAR 5

Prefix/Number	Course Title	SCH
Fall Term		
GIID 7101	Seminar	1

GIID 8000	Dissertation	8
		9
Spring Term		
GBCM 8000	Dissertation	9
		9
	PROGRAM TOTAL	**121**

Course Descriptions

GIID

5181 **Select Topics in Immunology and Infectious Diseases.** Prerequisite: Biomedical Sciences core curriculum or consent of instructor. Self-study courses provide students with a specialized topic within their area of interest that is not typically offered within the Texas Tech University system. Participants must agree upon objectives, grading criteria, and deadlines.

5281 **Select Topics in Immunology and Infectious Diseases.** Prerequisite: Biomedical Sciences core curriculum or consent of instructor. Self-study courses provide students with a specialized topic within their area of interest that is not typically offered within the Texas Tech University system. Participants must agree upon objectives, grading criteria, and deadlines.

5340 **Cellular and Molecular Immunology.** Prerequisite: Core curriculum or consent of instructor. Cellular and Molecular Immunology is a study of the development of the immune system, and immunity against microbes and tumors, and diseases caused by inappropriate immune responses.

5381 **Select Topics in Immunology and Infectious Diseases.** Prerequisite: Biomedical Sciences core curriculum or consent of instructor. Self-study courses provide students with a specialized topic within their area of interest that is not typically offered within the Texas Tech University system. Participants must agree upon objectives, grading criteria, and deadlines.

6324 **The Molecular Biology of Pathogenic Bacteria.** Prerequisite: Core curriculum or consent of instructor. Lectures and discussions concerning the molecular analysis of mechanisms by which pathogenic bacteria produce infections. The regulation and expression of virulence factors are emphasized. The course also includes writing an NIH-styled grant proposal. Students may choose to write their proposals on any virulence related subject. They are also required to present and successful defend their proposals.

6325 **Advances in Virology.** Prerequisite: Core curriculum or consent of instructor. Covers a broad range of topics including virus/host interactions, molecular pathogenesis of latent, persistent or cytoloytic virus infections, and research strategies to treat and prevent viral infections.

6329 **Advances in Immunology.** Prerequisite: Core curriculum or consent of the instructor. This 3 credit course provides students with an advanced course in the discipline of Immunology. The course includes the peer review process as it relates to specific aspects of Immunology and includes Immunologic based investigations in the fields of cancer, host defense, and infectious diseases. The course is literature driven utilizing both manuscripts and research proposals as examples to understand the peer review processes and attempts to bridge the gap between the textbook and the literature. Both written and oral participation by the students on specialized topics is required. Students will be responsible for a written research proposal based on the present NIH R01 format.

6335 **The Pathogenesis of Infectious Disease.** Prerequisite: Core curriculum or consent of the instructor. A study of the processes by which microorganisms produce disease in humans and how the host responds. The bacterial, mycological, and parasitic aspects of infectious disease will be taught. Students will be expected to understand all major bacterial, fungal, and parasitic diseases. Students must understand the mechanisms by which the virulence factors of these organisms allow them to cause their respective diseases.

6340 **Mucosal Immunology.** Prerequisite: Core Curriculum or consent of the instructor. This 3 hour credit course provides students with an advanced course in the discipline of mucosal immunology. The course will utilize didactic lectures, literature reviews and faculty-led discussions to expose the students to basic concepts of mucosal immunology with particular emphasis on the intestinal immune system. Both written and oral participation by the

students on specialized topics required. Students will select and present various cutting-edge topics in mucosal immunology as well as submit a written review on a current topic related to mucosal immunology.

6346 **Medical Bacteriology.** Prerequisite: Core curriculum or consent of instructor. A study of bacterial classification, structure, virulence and pathogenesis of the microorganisms that cause human disease and the ways to control these organisms.

6347 **Medical Mycology, Parasitology, and Virology.** Course prerequisite: Core curriculum or consent of instructor. A study of the classification, structure, and pathogenesis of fungi, parasites, and viruses that cause human disease and the ways used to control these organisms. The biology of fungi, parasites and viruses that cause human disease, the epidemiology and control of infections will be taught. Students will be expected to understand the major organisms and viruses.

6931 **Introduction to Medical Microbiology and Immunology.** This course will provide graduate students with basic understanding of the molecular and cellular biology of microorganisms (e.g. bacteria, fungi, parasites, viruses) and the methods by which these microbes produce diseases in humans. In addition, this course will present our current understanding of the structure and function of the body's immune system.

7000 **Research.** Prerequisite: Core curriculum or consent of mentor. This course will allow students time to develop their research interests and these or dissertation projects.

7101 **Immunology and Infectious Diseases Seminar.** Prerequisite: GSBS 5174 or consent of instructor. Weekly seminar series designed to provide training in research data presentation and analysis. This course will allow students to develop their presentation skills by providing experiences in both written and oral communication, presentations and critiques. Use of visual aid equipment and software is mandatory.

8000 **Doctoral Dissertation**

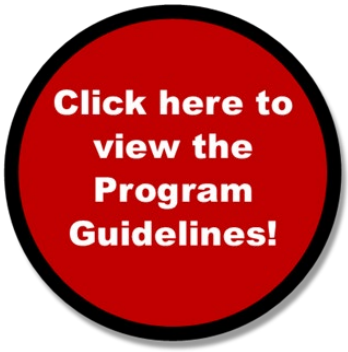
Doctor of Philosophy (Ph.D.) Degree Programs *(continued)*

Biomedical Sciences, Ph.D.

Concentration: Molecular Biophysics

Program Leaders and Staff Contacts

Lubbock Campus Only	
Michael Wiener, Ph.D.	Department Chair
Pablo Artigas, Ph.D.	Graduate Advisor
D'Ann Holubec, M.A.	Student Affairs Advocate
Lisa Castillo/Christy Gresham	Department Support Staff Representative



About the Program

The Molecular Biophysics (MB) concentration is geared towards students who have a primary research interest in studying the structure of membrane proteins and their function in health and disease, as well as utilizing cellular and molecular approaches to study these areas. The concentration is closely aligned with work in the School of Medicine's Center for Membrane Protein Research. Potential research topics relate to the: (a) ion transport and the role of ligand- and voltage-gated potassium channels in normal physiological and pathophysiological conditions; (b) structure/function correlations and structural modeling of ion channels and transporters; and (c) structure-function studies of proteins involved in membrane traffic and fusion. State-of-the-art approaches and techniques, such as X-ray crystallography, molecular spectroscopy, patch-clamp electrophysiology, and confocal microscopy, are used to carry out various research projects. Specific employment opportunities for graduates include faculty positions in academia, industry, and related government agencies.

Sample Curriculum

A minimum of three (3) years of full-time graduate study beyond the bachelor's degree is required for a doctoral degree. In addition, all Ph.D. candidates are required to complete a minimum total of 72 semester credit hours (SCH). Specific requirements include: (a) 48 SCH of didactic course instruction, (b) 12 SCH of research, and (c) 12 SCH of dissertation. It is common for students to spend 4-5 years of full-time graduate study in the program. Below is a sample curriculum.

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5000	Interprofessional Collaborative Practice	0
GSBS 5471	Core I: Molecules	4
GSBS 5372	Core II: Cells	3
GSBS 5373	Core III: Genes	3
GSBS 5174	Core IV: Biomedical Seminar	1
GSBS 5274	Core V: Laboratory Methods	2
		13
Spring Term		
GSBS 5098	Techniques in Biomedical Research	6
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GSBS 5101	Responsible Conduct of Research	1
		9
Summer Term		
GSBS 5098	Techniques in Biomedical Research	6
		6

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GMBP 7000	Research	4
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GMBP 53XX	Special Topics/Elective Course	3
		9
Spring Term		
GMBP 7000	Research	2
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GSBS 5099	Intro to Biostatistics	2
GMBP 5321	Biochemistry & Biophysics of Membranes	3
		9
Summer Term		
GMBP 7000	Research	6
		6

YEAR 3

Prefix/Number	Course Title	SCH
Fall Term		
GMBP 7000	Research	4
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GMBP 53XX	Special Topics/Elective	3
		9
Spring Term		
GMBP 7000	Research	4
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GBTC 5340	Biology of Cancer	3
		9
Summer Term		
GMBP 7000	Research	6
		6

YEAR 4

Prefix/Number	Course Title	SCH
Fall Term		
GMBP 7000	Research	7
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
		9
Spring Term		
GMBP 7000	Research	7
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
		9

Summer Term		
GMBP 7000	Research	6
		6

YEAR 5

Prefix/Number	Course Title	SCH
Fall Term		
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GMBP 8000	Dissertation	7
		9
Spring Term		
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GMBP 8000	Dissertation	7
		9
	PROGRAM TOTAL	**118**

Course Descriptions

GMBP

5221 **Experimental Biochemistry and Biophysics of Membranes.** This is a parallel course to GMBP 5321 (Biochemistry and Biophysics of Membranes) with two credit hours. The main goal is to bridge the knowledge acquired in the classroom and experimental attitudes and skills necessary for dissertation work. The students will be involved in planning, performing, and analyzing classic experiments in the fields of biochemistry and biophysics of membranes, and the experiments will be carried out in several laboratories housed in the Department of Cell Biology and Molecular Biophysics. Prerequisite: current enrollment in GMBP 5321. (F)

5302 **Human Physiology.** This introductory graduate course provides the student with a basic understanding of the organ systems of the human body, including the functions, regulations and interactions. No prerequisites are required.

5321 **Biochemistry and Biophysics of Membranes.** This is a 3 credit hour course to introduce cell membranes and membrane proteins stressing the physical and chemical bases of cellular functions. The course starts with a review of physical chemistry and common biochemical and biophysical approaches applied to biology, and then focuses on major classes of membrane transport proteins, their structures and mechanisms of function. Lecture materials are supplemented by readings from textbooks, review articles and original research papers, as well as discussion of current research in the instructors' laboratories. This course may be taken with GMBP 5221.

5350 **Advanced Topics in Molecular Biophysics.** Fundamental principles of cell physiology and molecular biophysics are explored through a series of hands-on laboratory exercises. Numerous techniques common to research in many fields will be introduced.

5360 **Laboratory Rotations as an Introduction Modern Physiological Research.** Prerequisite: consent of instructor. Students work in a specific laboratory assisting an ongoing research project or conducting an independent research effort.

5904 **Systems Physiology.** This course provides the student with a basic understanding of the organ systems of the human body. Their functions, regulations and interactions are emphasized.

6105 **Advanced Topics in Molecular Biophysics.** Prerequisite: Consent of the instructor. Advanced training in a specialized area of cell physiology and molecular biophysics. May be repeated for credit with change in content.

6205 **Advanced Topics in Molecular Biophysics.** Prerequisite: Consent of the instructor. Advanced training in a specialized area of cell physiology and molecular biophysics. May be repeated for credit with change in content.

6305 **Advanced Topics in Molecular Biophysics.** Prerequisite: Consent of the instructor. Advanced training in a specialized area of cell physiology and molecular biophysics. May be repeated for credit with change in content.

7000 **Research**

7101 **Molecular Biophysics Seminar.** Showcases internationally acclaimed researchers and provides the student with the most current information on a variety of interesting topics in cell physiology, as well as an introduction to state-of-the art techniques and instrumentation.

7102 **Readings in Molecular Biophysics.** This course is designed to complement the Molecular Biophysics Seminar Series and provide a forum for the students to become familiar with some of the speakers publications. The readings course will examine the hypothesis that was tested, the techniques employed, the most important results obtained, and the conclusions that were drawn from the study. The course requires that the students further develop skills for reading, analysis, integration of knowledge and oral presentation of original science articles and reviews. May be repeated for credit.

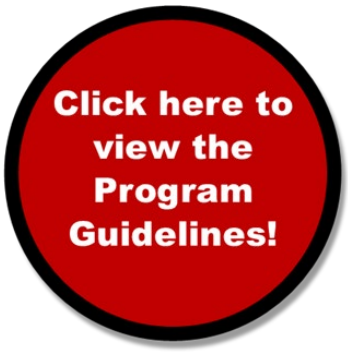
7103 **Advanced Topics in Molecular Biophysics.** This course gives the student experience in organizing and presenting lectures. The overall objective is to assist the student in developing the skills required to teach in any area of cell physiology and molecular biophysics.

8000 **Doctoral Dissertation**

Doctor of Philosophy (Ph.D.) Degree Programs *(continued)*

Biomedical Sciences, Ph.D.

Concentration: Translational Neuroscience and Pharmacology



Program Leaders and Staff Contacts

Lubbock Campus Only	
Volker Neugebauer, M.D., Ph.D.	Department Chair
Josee Guindon, DVM, Ph.D.	Graduate Advisor
D'Ann Holubec, M.A.	Student Affairs Advocate
Lisa Moran	Department Support Staff Representative

About the Program

The Translational Neuroscience and Pharmacology (TNP) concentration facilitates graduate study in several areas, including systems and cellular neuropharmacology and neuroscience, molecular pharmacology, biochemistry, and neurobiology of disease. The School of Medicine's Center of Excellence for Translational Neuroscience and Therapeutics provides valuable opportunities for interdisciplinary basic science and translational research. Clinically relevant research topics include pain mechanisms and therapies in various preclinical models (arthritis, multiple sclerosis (MS), HIV, chemotherapy- and nerve injury-induced neuropathic pain); alcohol abuse disorders; alcohol- and oxidative stress-induced damage to the developing brain and neurodegeneration; neurodegenerative disorders (Alzheimer's disease); and anti-neoplastic drug development and mechanisms of drug resistance. Specific employment opportunities for graduates include faculty positions in academia, industry, and related government agencies.

Sample Curriculum

A minimum of three (3) years of full-time graduate study beyond the bachelor's degree is required for a doctoral degree. In addition, all Ph.D. candidates are required to complete a minimum total of 72 semester credit hours (SCH). Specific requirements include: (a) 48 SCH of didactic course instruction, (b) 12 SCH of research, and (c) 12 SCH of dissertation. It is common for students to spend 4-5 years of full-time graduate study in the program. Below is a sample curriculum.

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5000	Interprofessional Collaborative Practice	0
GSBS 5471	Core I: Molecules	4
GSBS 5372	Core II: Cells	3
GSBS 5373	Core III: Genes	3
GSBS 5174	Core IV: Biomedical Seminar	1
GSBS 5274	Core V: Laboratory Methods	2
		13
Spring Term		
GSBS 5098	Techniques in Biomedical Research	6
GSBS 5101	Responsible Conduct of Research	1
GTNP 5303	Principles of Translational Neuroscience	3
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
		12
Summer Term		
GSBS 5098	Techniques in Biomedical Research	6
		6

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GTNP 7000	Research	4
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
GTNP 53XX	Elective Course	3
		9
Spring Term		
GSBS 5099	Intro to Biostatistics	2
GTNP 7000	Research	2
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
GTNP 53XX	Elective Course	3
		9
Summer Term		
GTNP 7000	Research	6
		6

YEAR 3

Prefix/Number	Course Title	SCH
Fall Term		
GTNP 7000	Research	3 or 7
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
GTNP 54XX	Elective Course (if needed)	0 or 4
		9
Spring Term		
GTNP 7000	Research	7
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
		9
Summer Term		
GTNP 7000	Research	6
		6

YEAR 4

Prefix/Number	Course Title	SCH
Fall Term		
GTNP 7000	Research	7
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
		9
Spring Term		
GTNP 7000	Research	7
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
		9
Summer Term		
GTNP 7000	Research	6

		6

YEAR 5

Prefix/Number	Course Title	SCH
Fall Term		
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
GTNP 8000	Dissertation	7
		9
Spring Term		
GTNP 8000	Dissertation	9
		9
	PROGRAM TOTAL	**121**

Course Descriptions

GTNP

5101 **Topics in Translational Neuroscience and Pharmacology.** Specific areas of pharmacology not normally included in other courses. May be repeated for credit with change in content.

5201 **Topics in Translational Neuroscience and Pharmacology.** Specific areas of pharmacology not normally included in other courses. May be repeated for credit with change in content.

5225 **Techniques in Translational Neuroscience and Pharmacological Research.** Standard experimental techniques used in pharmacological research are explored through a series of hands-on laboratory exercises. Numerous techniques common to research in many fields will be introduced.

5301 **Topics in Translastional Neuroscience and Pharmacology.** Specific areas of pharmacology not normally included in other courses. May be repeated with change in content.

5303 **Principles of Translational Neuroscience and Pharmacology.** Prerequisite: Consent of instructor. This course will investigate drug actions on the nervous system. Focusing on translation of basic neuroscience into the discovery of therapies in the treatment of brain disorders, including elucidating mechanisms by which drugs act in disease, also the use of drugs as tools to probe the function of neurons, synapses, and neural circuits. The course will introduce critical thinking skills by linking textbook knowledge to current literature, using the Journal Club submission format to encourage in-depth critical analyses of high impact, peer-reviewed articles.

5312 **Medical Pharmacology I.** A study of pharmacology with emphasis on mechanisms of drug action, interaction, and therapeutics.

5326 **Pharmacology of the Autonomic Nervous System.** A conceptual study of drugs which alter the function of the autonomic nervous system. Emphasis will be on the mechanisms by which drugs affect transmitter synthesis release, uptake, and metabolism as well as receptor function.

5336 **Molecular and Cellular Pharmacology.** Course focuses on experimental methods employed in pharmacological research. Topics include expression cloning, photo-affinity labeling, gene microarrays, patch clamp recording, etc. This course will consist of selected topics lectures, and student discussions.

5410 **Integrated Neurosciences.** The course covers the anatomy and corresponding sensory, motor, and behavioral functions of the nervous system. There is a mix of resources offered, including online lectures, online reviews, independent reading assignments, dry labs, practice exams, lectures, reviews, online laboratory guides, clinical correlations, and laboratory neuroanatomy sessions. Following the Neuroscience block in GSBS 5372 (Cells) and GTNP 5303 (Principles of Translational Pharmacology and Therapeutics), this 2nd Year Translational Neuroscience and Pharmacology course will engage Translational Neuroscience and Pharmacology graduate students in micro- and macroscopic structure, normal function, and basic pathophysiology of the peripheral and central nervous system. It will provide students with knowledge to enhance problem-solving, and to establish general relationships between neurological systems and the signs and symptoms of disease."

7000 **Research**

7101 **Translational Neuroscience and Pharmacology Seminar.** This course will enhance student skills in scientific public speaking through a series of seminars that are critiqued by Translational Neuroscience & Pharmacology faculty. Weekly seminars are designed to provide training in research data presentation and analysis or critical evaluation and presentation of a manuscript in press. A required course of Translational Neuroscience & Pharmacology graduate students, it is taken in the fall and spring semesters. The course is designed so students must interact by participating in the question and answer component of all seminars and invited speakers. Grades are determined by faculty evaluation of seminar presentation and participation.

7102 **Readings in Pharmacology.** This course is designed to complement the Translational Neuroscience and Pharmacology seminar series and provide a forum for the students to become familiar with some of the speakers' publications. The readings course will examine the hypothesis that was tested, the techniques employed, the most important results obtained, and the conclusions that were drawn from the study. The knowledge and oral presentation of the original science articles are reviewed. May be repeated for credit.

8000 **Doctoral Dissertation**

Doctor of Philosophy (Ph.D.) Degree Programs *(continued)*

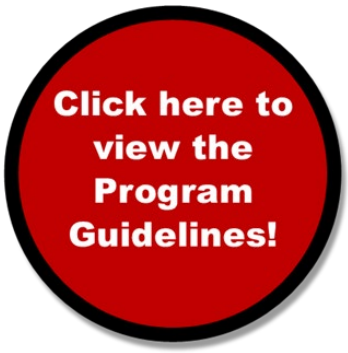
Pharmaceutical Sciences, Ph.D.

Program Leaders and Staff Contacts

Abilene Campus		Amarillo Campus	
Sanjay Srivastava, Ph.D.	Chair, Immuno. & Biotech.	**Thomas Abbruscato, Ph.D.**	Chair, Pharm. Sciences
Laurence Wood, Ph.D.	Assistant Graduate Advisor	**Abraham Al-Ahmad, Ph.D.**	Graduate Advisor
Jerri Jones, MBA	Student Affairs Advocate	**Teresa Carlisle**	Student Affairs Advocate

About the Program

The Doctor of Philosophy (Ph.D.) in Pharmaceutical Sciences, which is offered on the Amarillo and Abilene campuses, encompasses all areas of pharmacy research that pertain to drug design, delivery, therapeutics and immunotherapeutics, and biotechnology. This doctoral program is designed to educate students for careers in the pharmaceutical industry, academia, and federal agencies, such as the FDA and NIH. Departmental faculty members exhibit research interests and expertise in drug design and delivery, pharmacology, pharmaceutics, pharmacokinetics, drug receptor modeling, molecular biology, biochemistry, pathophysiology, immunology and cancer biology and therapy, and medicinal chemistry.



Sample Curriculum

A minimum of three (3) years of full-time graduate study beyond the bachelor's degree is required for a doctoral degree. In addition, all Ph.D. candidates are required to complete a minimum total of 72 semester credit hours (SCH). Specific requirements include: (a) 48 SCH of didactic course instruction, (b) 12 SCH of research, and (c) 12 SCH of dissertation. It is common for students to spend 4-5 years of full-time graduate study in the program. Below is a sample curriculum.

YEAR 1

Prefix/Number	Course Title	SCH
Fall Term		
GSBS 5000	Interprofessional Collaborative Practice	0
GSBS 5101	Responsible Conduct of Research	1
GPSC 5230	Experimental Design and Biostatistics	2
GPSC 5410	General Biochemistry	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
	Elective	1
		9
Spring Term		
GPSC 5250	Applied Medicinal Chemistry	2
GPSC 5404	Principles of Drug Structure and Action	4
GPSC 5411	Graduate Pharmaceutics	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
		11
Summer Term		
GPSC 7000	Research	6
		6

YEAR 2

Prefix/Number	Course Title	SCH
Fall Term		
GPSC 5435	Physiology-based Pharmacology	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
	Elective(s)	4
		9
Spring Term		
GPSC 5429	Basic Pharmacokinetics	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
	Elective(s)	4
		9
Summer Term		
GPSC 7000	Research	6
		6

YEAR 3

Prefix/Number	Course Title	SCH
Fall Term		
GPSC 7101	Pharmaceutical Sciences Seminar	1
GPSC 7000	Research	2
	Elective(s)	6
		9
Spring Term		
GPSC 7101	Pharmaceutical Sciences Seminar	1
GPSC 8000	Doctoral Dissertation	8
		9
Summer Term		
GPSC 8000	Doctoral Dissertation	6
		6

YEAR 4

Prefix/Number	Course Title	SCH
Fall Term		
GPSC 7101	Pharmaceutical Sciences Seminar	1
GPSC 8000	Doctoral Dissertation	8
		9
Spring Term		
GPSC 7101	Pharmaceutical Sciences Seminar	1
GPSC 8000	Doctoral Dissertation	8
		9
	PROGRAM TOTAL	**92**

Course Descriptions

GPSC

5101 **Topics in Pharmaceutical Sciences.** Special topics in pharmaceutical sciences that are not normally included in other classes. May be repeated for credit with change in content.

5105 **Immunology Journal Club.** This journal club will focus on discussion of research topics associated with immunology. These topics will be presented by discussion of a basic research paper that is either a landmark or

recent discovery in the field of immunology. The leading faculty will initiate the discussion and will provide background and encourage class participation while reviewing the findings of the selected paper. Each individual student will be expected to analyze and discuss every facet of the selected papers, including background, methods, data and conclusions. Prerequisites: None

5112 **Principles and Techniques in Structure Determination of Bioactive Molecules.** An Advanced analytical chemistry course. The course is designed to familiarize doctoral candidates with general principles of modern spectroscopy techniques including MS, UV, IR, and general chromatography, introduce the minimum data required to identify the structure of a macromolecule and interpret data produced from MS, HPLC, IR spectra. Course Prerequisite: Admission to the Pharmaceutical Sciences Graduate Program. Students must have passed GPSC 5410 General Biochemistry and GPSC 5504 Principles of Drug Action.

5113 **Molecular Structure Determination by NMR Spectroscopy.** An advanced analytical chemistry course. The course is designed to familiarize doctoral candidates with general principles of Nuclear Magnetic Resonance spectroscopy techniques including 1N, 13C, 2D and 3D experiments, introduce the data required to assign the structure of a molecule including any stereochemistry/isomers, and interpret spectra produced from 1H and 13C and heteronuceli NMR. Course Prerequisite: Admission to the Pharmaceutical Sciences Graduate Program. Students must have passed GPSC 5410 General Biochemistry and GPSC 5504 Principles of Drug Action.

5201 **Topics in Pharmaceutical Sciences.** Special topics in pharmaceutical sciences that are not normally included in other classes. May be repeated for credit with change in content.

5215 **Advanced Neurosciences.** An advanced course designed to provide an overview of different aspects of neurosciences. This course is especially designed for graduate students interested to develop their neuroscience expertise and also introduced to different aspects of neurobiology, including but not limited to neuroanatomy, neurodevelopment, neurophysiology, neuroimaging and neurological diseases. Course Prerequisite: This course is designed for students with a basic knowledge of human anatomy and physiology. Successful completion of Biochemistry (GPSC5510) and Principles of Drug action (GPSC5504) is mandatory.

5220 **Drugs of Abuse.** This course is designed to teach the students the pharmacology of different classes of abused drugs and the physiologic and societal aspects of addiction. Course Prerequisite: Biochemistry and Principles of Drug Action. In addition, while it is not required it is highly recommended that Pharmacology is completed or nearly complete by the time the course starts.

5230 **Experimental Design and Biostatistics.** Principle of experimental research design, theoretical and practical issues of measurements and data collection; biostatistics in research design and data analyses for graduate students pursuing pharmaceutical and biomedical researches. Course Prerequisite: Admission to TTUHSC Graduate Program of Pharmaceutical Sciences

5250 **Applied Medicinal Chemistry.** This introductory course is designed to facilitate understanding of the molecular aspects of drug action, including basic principles of drug-target interactions, the relationships between chemical structure and drug action and effects of metabolism on the drug structure.

5301 **Topics in Pharmaceutical Sciences.** Special topics in pharmaceutical sciences that are not normally included in other classes. May be repeated for credit with change in content.

5307 **Pharmaceutical Sciences Research Methods.** A lecture and laboratory course designed to provide an overview of current research methods in pharmaceutical sciences under direct guidance of a faculty member.

5311 **Drug Development and Discovery.** The steps and processes involved in drug development and discovery. Course Prerequisite: N/A

5326 **Cancer Biology and Therapeutics.** This course is designed for graduate students studying molecular and cellular basis of cancer. The course offers principles of cancer biology from origin of cancers to therapeutic intervention principles. Admission to the Pharmaceutical Sciences Graduate Program and basic knowledge of biochemistry and cell biology are required. Permission from the advisor and the team leader are also required.

5330 **Advanced Pharmacokinetics.** Advanced topics related to pharmacokinetics (PK) and pharmacodynamics (PD) of drugs and their metabolites with particular emphasis on modeling strategies appropriate for PK/PD research. Course Prerequisite: Basic Pharmacokinetics (GPSC 5329) and Course Director's Consent.

5362 **Pharmaceutical Regulatory Affairs.** Basic regulatory and Quality Assurance concepts. Course Prerequisite: N/A

5375 **Immunology.** The structural components of the human immune system; the cellular and molecular basis of immunological function; diagnostic tests using immunological reagents; mechanisms of resistance against microbial and neoplastic diseases; transplantation immunology; pathology of immune-mediated diseases;

prevention of disease by vaccines; pharmacotherapeutic intervention in immunological processes; contemporary topics in immunology.

5404 **Principles of Drug Structure and Action.** Basic principles of pharmacology, toxicology, pharmacokinetics, pharmacogenomics and physiochemical properties of drug molecules. This introductory course is designed to facilitate understanding of the fundamental concepts of pharmacology. Prerequisite: General Biochemistry (GPSC 5410)

5410 **General Biochemistry.** Chemical and molecular aspects of biological processes, including the chemistry of biomolecules, enzymology, bioenergy, biochemical control mechanisms, and molecular biology. Discussion of metabolic diseases and fundamentals of human nutrition.

5411 **Graduate Pharmaceutics.** Covers the physical chemical principles for the development of safe and effective pharmaceutical dosage forms, fabrication of conventional liquid, solid and aerosolized dosage forms, fundamental of various drug delivery systems, and the process of drug development, discovery and commercialization. Course prerequisite: Admission to the Graduate Program of Pharmaceutical Sciences.

5429 **Pharmacokinetics.** Introduces the basic principles of pharmacokinetics, including compartmental and physiological analysis of the time courses of drug absorption, distribution, and elimination, with an emphasis on the pharmacokinetic-based dosage-regimen design. Course prerequisite: Admission to the Graduate Program of Pharmaceutical Sciences.

5435 **Physiology-based Pharmacology.** This is an integrated course of physiology and pharmacology, with an introduction to clinical pharmacology. The emphasis will be on understanding drug actions at the molecular, cellular, organ and whole organism level for select classes of drugs. Prerequisite: Principles of Drug Structure and Action (GPSC 5404)

5440 **Biopharmaceutics.** Advanced treatment of the influence of dosage forms, route of administration, and dosage regimen on drug availability and newer technologies for targeting drug delivery to specific organs and cell types. Prerequisite: DDS 3rd and kinetics or equivalent.

6000 **Master's Thesis**

7000 **Research**

7101 **Pharmaceutical Sciences Seminar.** Weekly seminar series designed to provide training in research data presentation and analysis.

8000 **Doctoral Dissertation**