



**2024-2025**

# Catalog



**TTU  HSC**  
**BIOMEDICAL SCIENCES**



## Message from the Dean

### Brandt Schneider, PhD

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 diverse 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!

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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 any other legally protected category, class, or characteristic.*

## **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](#).*

## 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. Texas Tech University Health Sciences Center 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](http://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

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## GSBS Vision

To create a collaborative and innovative academic environment that inspires and lays the foundation for new generations of biomedical scientists to realize their potential, commit to success and make discoveries that have major impact on treatment of diseases worldwide.

## 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

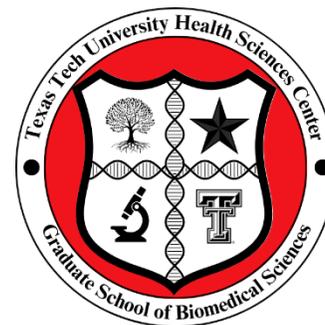
I acknowledge that the mission of scientific research is a true and noble calling to discover truths that are hidden and to reveal wisdom yet unknown, always for the greater good. I welcome the privilege and opportunity to join in this mission, and to dedicate the talents that I have and the education 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

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## 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.)
<ul style="list-style-type: none"> <li>Biomedical Sciences <i>Areas of Concentration:</i> (1) Biochemistry, Cellular and Molecular Biology (2) Immunology and Infectious Diseases (3) Molecular Biophysics (4) Translational Neuroscience and Pharmacology</li> <li>Pharmaceutical Sciences</li> </ul>	<ul style="list-style-type: none"> <li>Biomedical Sciences<sup>1</sup></li> <li>Biotechnology</li> <li>Graduate Medical Education Sciences</li> <li>Pharmaceutical Sciences</li> </ul> <p><sup>1</sup> <i>Students cannot be admitted directly into this program.</i></p>

## Collaborative 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. Students must apply to each school and/or program separately for all collaborative academic programs.

Collaborative Academic Program	GSBS Program	Partner
<b>Dual Degree</b>		
Master of Science in Biotechnology (MS) Master of Business Administration (MBA)	MS, Biotechnology	TTU Rawls College of Business
<b>Internal Dual Degree</b>		
Doctor of Philosophy in Biomedical Sciences (PhD) Doctor of Medicine (MD)	PhD, Biomedical Sciences	TTUHSC School of Medicine
<b>Other</b>		
Master of Science in Biotechnology (MS) Doctor of Jurisprudence (JD)	MS, Biotechnology	TTU School of Law
Doctor of Philosophy in Biomedical Sciences (PhD) Master of Business Administration (MBA)	PhD, Biomedical Sciences	TTU Rawls College of Business

New agreements are currently being explored. For more information about collaborative academic programs, email [graduate.school@ttuhsc.edu](mailto:graduate.school@ttuhsc.edu).

## Campuses

<b>Abilene</b>	MS, Biotechnology PhD, Pharmaceutical Sciences
<b>Amarillo</b>	MS, Pharmaceutical Sciences PhD, Pharmaceutical Sciences
<b>Lubbock</b>	MS, Biomedical Sciences MS, Biotechnology MS, Graduate Medical Education Sciences PhD, Biomedical Sciences



# Organizational Structure

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## 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 GSBS 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 Student Associations in Abilene, Amarillo, and Lubbock participate in Graduate Council.

NAME	GSBS ADMINISTRATIVE POSITION	PRIMARY CAMPUS
<b>Brandt Schneider, PhD</b>	Dean	Lubbock
<b>Thomas Abbruscato, PhD</b>	Senior Associate Dean	Amarillo
<b>Michael Blanton, PhD</b>	Senior Associate Dean, MD/PhD Co-Director	Lubbock
<b>Tres Boren</b>	Senior IT Support Technician	Lubbock
<b>Teresa Carlisle</b>	Unit Manager	Amarillo
<b>Kari Dickson, PhD</b>	Associate Dean	Lubbock
<b>Leslie Fowler</b>	Business Manager	Lubbock
<b>D'Ann Holubec</b>	Program Manager	Lubbock
<b>Pamela Johnson</b>	Assistant Dean/Managing Director	Lubbock
<b>Jerri Jones</b>	Program Manager	Abilene
<b>Terri Lloyd</b>	Director of Admissions	Lubbock
<b>Debbie Martinez</b>	Senior Administrative Assistant	Lubbock
<b>Ashlee Rigsby</b>	Associate Director, Outreach and Engagement	Lubbock

## Academic Program Leaders

In the Ph.D. in Biomedical Sciences program, a Senior Associate Dean provides general oversight of the program prior to students declaring a specific concentration. Each concentration is administered by basic science departments within the TTUHSC School of Medicine by a Department Chair. A Graduate Advisor assists with the management of the concentration, and each concentration also has departmental staff to help with administrative responsibilities. In the M.S. and Ph.D. in Pharmaceutical Sciences programs, a Senior Associate Dean provides general oversight of each program, and Program Directors on the Abilene and Amarillo campuses assist with the management of the programs. Other master's level programs are led by a Program Director with assistance provided by a Graduate Advisor. A staff member, or 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 each academic program successfully.

NAME	POSITION	PRIMARY CAMPUS
<b>MS, Biotechnology</b>		
<b>Susan Bergeson, PhD</b>	Program Director	Lubbock
<b>Irene La-Beck, PharmD</b>	Program Director	Abilene
<b>Komaraiah Palle, PhD</b>	Graduate Advisor	Lubbock
<b>Leslie Fowler</b>	Student Affairs Advocate	Lubbock
<b>Jerri Jones</b>	Student Affairs Advocate	Abilene

## Academic Program Leaders (continued)

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NAME	POSITION	PRIMARY CAMPUS
<b>MS, Graduate Medical Education Sciences (GMES)</b>		
<b>Dan Webster, PhD</b>	Program Director	Lubbock
<b>Gurvinder Kaur, PhD</b>	Graduate Advisor	Lubbock
<b>Leslie Fowler</b>	Student Affairs Advocate	Lubbock

<b>MS, Pharmaceutical Sciences (Amarillo only) and PhD, Pharmaceutical Sciences</b>		
<b>Thomas Abbruscato, PhD</b>	Sr. Associate Dean	Amarillo
<b>Abraham Al-Ahmad, PhD</b>	Program Director	Amarillo
<b>Laurence Wood, PhD</b>	Program Director	Abilene
<b>Teresa Carlisle</b>	Student Affairs Advocate	Amarillo
<b>Jerri Jones</b>	Student Affairs Advocate	Abilene

<b>PhD, Biomedical Sciences (Concentration: Biochemistry, Cellular and Molecular Biology)</b>		
<b>Jannette Dufour, PhD</b>	Department Chair	Lubbock
<b>Jeffrey Thomas, PhD</b>	Graduate Advisor	Lubbock
<b>Michael Blanton, PhD</b>	Senior Associate Dean, MD/PhD Co-Director	Lubbock
<b>Terri Lloyd</b>	Student Affairs Advocate (Undeclared Students)	Lubbock
<b>D'Ann Holubec</b>	Student Affairs Advocate (Declared Students)	Lubbock

<b>PhD, Biomedical Sciences (Concentration: Immunology and Infectious Diseases)</b>		
<b>Afzal Siddiqui, PhD</b>	Department Chair	Lubbock
<b>Abdul Hamood, PhD</b>	Graduate Advisor	Lubbock
<b>Michael Blanton, PhD</b>	Senior Associate Dean, MD/PhD Co-Director	Lubbock
<b>Terri Lloyd</b>	Student Affairs Advocate (Undeclared Students)	Lubbock
<b>D'Ann Holubec</b>	Student Affairs Advocate (Declared Students)	Lubbock

<b>PhD, Biomedical Sciences (Concentration: Molecular Biophysics)</b>		
<b>Michael Wiener, PhD</b>	Department Chair	Lubbock
<b>Luis Cuello, PhD</b>	Graduate Advisor	Lubbock
<b>Michael Blanton, PhD</b>	Senior Associate Dean, MD/PhD Co-Director	Lubbock
<b>Terri Lloyd</b>	Student Affairs Advocate (Undeclared Students)	Lubbock
<b>D'Ann Holubec</b>	Student Affairs Advocate (Declared Students)	Lubbock

<b>PhD, Biomedical Sciences (Concentration: Translational Neuroscience and Pharmacology)</b>		
<b>Volker Neugebauer, MD, PhD</b>	Department Chair	Lubbock
<b>Josee Guindon, DVM, PhD</b>	Graduate Advisor	Lubbock
<b>Michael Blanton, PhD</b>	Senior Associate Dean, MD/PhD Co-Director	Lubbock
<b>Terri Lloyd</b>	Student Affairs Advocate (Undeclared Students)	Lubbock
<b>D'Ann Holubec</b>	Student Affairs Advocate (Declared Students)	Lubbock



## 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 admissions 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 applications and all required supplemental items 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. For some programs, the GRE is optional, as described below.
- **Individual Profile:** Profiles may include recommendations, research background, motivation, undergraduate institution, presentations, publications, and interviews. Admissions committees may also consider work experience, demonstrated commitment to a particular field of 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](http://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. The GRE is optional for applicants to the following degree programs: (a) MS, Biotechnology, (b) MS/PhD, Pharmaceutical Sciences, and (3) PhD, Biomedical Sciences. The GRE or MCAT is required for applicants to the MS, Graduate Medical Education Sciences. Information about the GRE may be accessed online through the Educational Testing Service (ETS) at [www.gre.org](http://www.gre.org). All GRE test scores must be sent directly from ETS to the TTUHSC Office of the Registrar. The institution code is 6851. Photocopies or scanned copies will not be accepted. Information about the MCAT may be accessed online through the Association of American Medical Colleges, or [AAMC](http://AAMC). Email [graduate.school@ttuhsc.edu](mailto:graduate.school@ttuhsc.edu) for specific instructions if you plan to use MCAT test scores.

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	Philippines
Belize	Saint Kitts and Nevis
Bermuda	Saint Lucia
Canada (except Province of Quebec)	Saint Helena
Cayman Islands	South Africa
Dominica	St. Vincent and the Grenadines
Falkland Islands (Islas Malvinas)	Trinidad and Tobago
Ghana	Turks and Caicos Islands
Gibraltar	United Kingdom—England
Grenada	United Kingdom—Northern Ireland
Guam	United Kingdom—Scotland
Guyana	United Kingdom—Wales
Ireland, Republic of	United States of America
Jamaica	Virgin Islands
Kenya	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:

- 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.)*
- 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.)*
- 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. Transcripts

Applicants to the Graduate School of Biomedical Sciences (GSBS) must have earned a bachelor's degree from an institutionally accredited college/university 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 a transcript from each U.S. college or university attended. Unofficial transcripts are accepted for admissions consideration only. If admitted, official transcripts must be provided.

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. We do not accept international transcripts, marksheets, or certificates.

#### **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. Oath of Residency**

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

#### **7. Statement of Purpose/Essay**

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

#### **8. 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](mailto: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.

9. **Passport**

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

10. **Placement Fee**

A \$50 placement guarantee fee is required upon an offer and acceptance of admission.

## Admitted Students Only

11. **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 \(Health Surveillance Program for TTUHSC\)](#).

12. **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 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](mailto:graduate.school@ttuhsc.edu).

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

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Registration information is provided to new students 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.

Students are required to register for appropriate courses every semester, including summer, in which they expect to receive assistance, use university facilities, take qualifying examinations, or defend a thesis/dissertation. Every GSBS student must also be registered in the semester of graduation.

## 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, may be 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. 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.
2. 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). 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. 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.
3. Any requests to waive out-of-state tuition based on excessive hours 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 15-week term, students are generally not allowed to enroll for more than 15 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. These minimum enrollment requirements include students who are devoting full time to research using university facilities and faculty time.

Limited exceptions apply to credit hour requirements. During the final semester before graduation, a doctoral student may register for one (1) SCH and maintain full-time status. In addition, as described in the *Excessive Hours* sub-section, a doctoral student who has been admitted to candidacy and accumulated 120 SCH may enroll in reduced credit hours for up to one year. Reduced enrollment in this case may have certain implications, and students should contact the appropriate offices before doing so.

## 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/designated tuition and mandatory fees for one permitted course per term, not to exceed three courses in an academic year for employees that have been employed in a full-time position for more than six months.

## Registration by Undergraduate and Graduate Students

With the exception of participants in approved early acceptance programs, undergraduate students may not enroll for courses carrying graduate credit in GSBS 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 in the collaborating university and/or academic program.

Undergraduates who take GSBS courses for graduate credit may be limited in the total number of SCH they can take each semester. This includes undergraduate and graduate coursework combined. 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 a graduate degree program in GSBS. This credit hour restriction does not apply to students in approved early acceptance programs.

Graduate students in other academic programs at TTUHSC or other colleges/universities are also eligible to enroll in GSBS courses. Contact the GSBS office for more information.

## 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 term. 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 (or Program Director, as applicable) 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 tuition scholarships.

# General Information

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## 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.

## Admission to Candidacy

Admission to candidacy indicates a doctoral student is adequately prepared to begin working full-time on a doctoral research project. A student must be admitted to doctoral candidacy at least four (=4) months prior to the proposed graduation date. Eligibility requirements include continuous enrollment since entering the program, a cumulative GPA of 3.0 or higher, no grades of Incomplete (“I”) on the academic record, and an approved degree on file in the GSBS office. Upon successful completion of the written and oral components of the qualifying examination, an *Admission to Candidacy* form must be submitted to the GSBS office. The request will be submitted to members of the Graduate Council for consideration at its next regularly scheduled meeting. If admitted to candidacy, the student may enroll in dissertation hours the following semester and must be continuously enrolled in dissertation hours every semester until graduation.

## 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.

For information specific to attendance expectations for Research Assistants, please refer to the *Research Assistantships* sub-section in the current catalog.

## 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 **K. Wyatt McMahon Outstanding Graduate Student** is awarded to an outstanding doctoral student, and the **Dean’s Recognition Award** is awarded to a highly qualified master’s 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/Program Director of their intent. Once notification has been given, the student should contact the Graduate Advisor/Program Director 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, Program Director, and/or Department Chair 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, 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 concentration/program 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 informal steps include:

1. The student must first attempt to resolve the issue with the individual(s) involved.
2. If dissatisfied with the outcome of step (1), the student must contact the Assistant Dean. If the complaint originates in Amarillo or Abilene, the Assistant Dean will collaborate with the appropriate leadership on that campus. If the grievance is against the Assistant Dean, however, the student should contact the Sr. Associate Dean-Lubbock. A complaint against a Sr. Associate Dean should be filed with the other Sr. Associate Dean.
3. The Assistant Dean, who also serves as the Student Affairs Officer of the school, 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.
4. If the grievance is satisfactorily resolved during any steps listed above, the terms of the resolution shall be summarized in writing by the administrative leader involved in the resolution process and signed by the student, respondent, and administrative leader.



If a grievance is not resolved informally using the process outlined above, then any faculty, staff, or students of TTUHSC may submit a formal written complaint following the policies and procedures on the [TTUHSC Student Affairs website](#) and in 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. The GSBS Dean 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.

## Computer

All GSBS students should obtain a personal laptop (i.e., PC, Mac) to use for the duration of the academic program. Refer to the [recommended system specifications](#) for additional information.

## Degree Plan

Each student must file a formal degree plan with the GSBS office. Typically, these degree plans are completed by the end of the student's second year in the academic program. Any revisions to the plan require submission of the *Changes to the Degree Plan* form, which is available to current students online. Contact the appropriate Student Affairs Advocate for more information.

## Dismissal/Appeal Procedures

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 as defined by GSBS policies or who fails to conform to the policies 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 maintain satisfactory academic standing; and
- Any other violation of misconduct, as outlined in the [TTUHSC Student Handbook: Code of Professional Conduct](#).

### **DISMISSAL PROCEDURE FOR FAILURE TO MAINTAIN SATISFACTORY ACADEMIC STANDING**

Failure to maintain a minimum 3.0 GPA each semester will result in probation or dismissal. Furthermore, students who fail to make satisfactory academic progress will be warned in writing about the possibility of probation or dismissal. They will be given clear parameters by which to alleviate the problem within a specified time period. 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.

### **PROCEDURE FOR APPEALING DISMISSALS**

#### **Step 1: Initial Appeal**

Students who receive a dismissal letter must submit their written request for an appeal to the Assistant Dean, who will engage the Dismissal Appeal Committee, within five (5) business days from the receipt of the dismissal letter. This notification should include a justification for the appeal and supporting documentation, including but not limited to, the student handbook, program policy, syllabus requirements, and email communication with faculty as appropriate.

During the dismissal appeal process, the student may enroll and attend didactic courses ONLY and will NOT be allowed to enroll in or attend any research or dissertation courses or be present in the lab. Should the appeal be denied, the student will be subject to immediate academic dismissal. Additionally, any payment due for tuition and fees or student refunds will be administered according to TTUHSC policy.

## Step 2: Dismissal Appeal Committee

The Dismissal Appeal Committee shall consist of a member of the GSBS Dean's Office (i.e., Associate Dean), who shall serve as the Chair, and two GSBS faculty members selected by the Chair. The faculty members selected will be from an academic program outside of the student's degree program. The Dismissal Appeal Committee will be appointed within three (3) business days of receipt of the student appeal. All written explanations and responses from the student, Program Director and Department Chair will be provided by the Assistant Dean to the Dismissal Appeal Committee.

The Dismissal Appeal Committee shall meet within three (3) business days from their appointment to discuss the appeal. The Dismissal Appeal Committee may request, in its sole discretion, additional documentation from the student, Program Director, or Department Chair. No person or party shall be present before the Dismissal Appeal Committee. The decision will be based strictly on written appeal; there will be no live testimony or a hearing.

Upon conclusion of the Dismissal Appeal Committee deliberations, the Chair will submit findings and recommendations to the Dean within two (2) business days. The Dean must issue a decision within three (3) business days of receiving the Committee's findings and recommendations. The decision of the Dean is FINAL. Notification will be sent to all parties within three (3) business days of the Dean's decision.

Should any relevant faculty, Program Director, Department Chair or member of the GSBS office staff be on authorized leave, a designee for the respective party may fill in during the review process.

## Dissertations and Theses

Doctoral dissertation and master's 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, which is presented in a scholarly manuscript, embodies a significant contribution of new information to a subject or a substantial reevaluation of existing knowledge. It should 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 work occurs under the supervision of a Graduate Advisory Committee, the composition of which varies by program and concentration. The student's research mentor serves as the dissertation chair. Please note the student's research mentor may not serve as the chair of the qualifying exam committee. Refer to the [Qualifying Examination](#) subsection.

Because the subject of the dissertation must be approved by the Graduate Advisory Committee, it is strongly recommended that each student presents and defends a dissertation proposal to the advisory committee early in the course of the proposed research. An electronic copy of the written dissertation should be presented to the advisory committee members and a Dean's representative at least two (2) weeks prior to the scheduled dissertation defense. In addition, two (2) weeks prior to a student's dissertation defense, department coordinators should also prepare and distribute the dissertation announcement template to all GSBS faculty, staff, and students.

Upon completion of the oral defense, the advisory committee may request additional revisions to the written dissertation prior to submission to GSBS staff for a final formatting review. Students must achieve the desired performance expectations on the oral defense and written dissertation to meet graduation requirements.

**Thesis.** The master's thesis, which is also conducted under the supervision of an advisory 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. An electronic copy of the written thesis should be presented to the committee members and the Dean's representative at least two weeks prior to the oral defense. Students must achieve the desired performance expectations on the oral defense and written thesis to meet graduation requirements.

**Hours.** Registration for at least 6 semester credit hours (SCH) of 6000 is required for the master's thesis. At least 12 SCH 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.

**Grading.** Dissertation and thesis semester credit hours (SCH) are graded with a “CR” (i.e., credit), except for the last semester of enrollment in which a letter grade is assigned. At the instructor’s discretion, a letter grade may be assigned to the last 12 SCH of dissertation or 6 SCH of thesis. For doctoral students, the letter grade assigned for the written dissertation and oral defense is based upon evaluation by the advisory 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 should work collaboratively with the committee chair to determine the appropriate style manual to use in preparing the written manuscript. The final manuscript must be submitted electronically to the GSBS office, including notification of the selected style manual. Dissertations/theses must be accompanied by an abstract of no more than 350 words. GSBS does not require a bound, printed copy. Students may purchase bound copies for personal use through various external vendors, such as [www.thesisondemand.com](http://www.thesisondemand.com).

**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 are 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.

## 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.

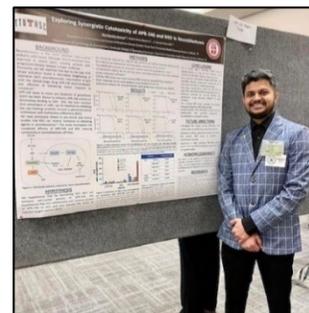
## Extracurricular Activities

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. Refer to the [Office of the Registrar](#) and/or [HSC OP 77.13 \(Student Education Records\)](#) for additional information.

## 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	
D	Fair	1.0	Fail**
F	Poor	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 used for enrollment in master’s thesis or doctoral dissertation semester credit hours (SCH) until the completed manuscript has been approved by the student’s advisory committee and accepted by the GSBS office. At that time, a letter grade will be entered for the final semester of enrollment. Faculty members may also elect to assign a letter grade to the last 6 SCH of thesis or 12 SCH of dissertation by preparing a [Change of Grade 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 an “F” 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, Department Chair/Program Director/Graduate 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 within three (3) days of the grade being posted. After the meeting with the course director, if the student wishes to pursue filing a final grade appeal, the following procedures shall be followed.

## GRADE APPEAL PROCEDURE

### Step 1: Initial Appeal

Students must file a *Grade Appeal* form within five (5) business days of the date the student met with the faculty member who issued the grade to discuss the posted final grade. The *Grade Appeal* form, which is available online to current students, should be filed with the GSBS office. The student must include in the appeal a written statement containing any information regarding attempts at resolution, the basis for the allegation that the grading was erroneous, and a proposed remedy. 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.

The GSBS Assistant Dean will review all materials pertinent to the grade appeal and meet with the faculty and/or student if clarification of information is needed.

After review of all materials, the Assistant Dean 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. 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.

If unsatisfied with the decision of the Assistant Dean, the student may appeal to a Grade Appeal Committee by submitting a detailed written explanation outlining every reason why the grade is perceived to be unjust to the Assistant Dean, who will engage the Committee. Any reason not set forth in writing will not be considered. Such explanation must be submitted within five (5) business days from the receipt of the written decision of the Assistant Dean.

All records related to the appeal are retained by the GSBS office for a period of three (3) years.

### Step 2: Grade Appeal Committee

The appointment and deliberation process of the Grade Appeal Committee shall follow the same procedures as those for the Dismissal Appeal Committee, except that any decision by a Committee on a Grade Appeal is final and will not go to the Dean.

## 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

**Semester of Graduation.** There are three official graduation dates: December, May, and August. However, there is only one commencement ceremony in May. (December and August graduates are invited to participate in the May ceremony following completion of all graduation requirements.) 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.



**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 institutional level. Refer to the [TTUHSC Commencement website](#) for additional information.

**Graduation Fee.** In the semester of graduation, the candidate will pay a graduation fee regardless of commencement participation. 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  $\geq 1$  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* sub-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 students. 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 is subject to disciplinary actions, including but not limited to, dismissal from the degree program.

## 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 higher 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 and staying for the duration of classes, seminars, and 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 and master's level students who are completing a thesis should also participate in committee meetings at least annually to enable the student and committee members to evaluate student progress towards degree completion. Students and/or mentors must prepare meeting documentation, 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 for the student to schedule the defense, defend the dissertation, 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.

## Qualifying Examination

The qualifying examination is one of the major requirements of the doctoral degree program. The examination requires a synthesis and application of knowledge acquired during the doctoral degree course of study; consequently, successful performance in coursework does not necessarily guarantee successful performance on the qualifying examination. The purpose of the qualifying examination is to ensure that students have mastered the fundamentals in a major area of interest; can apply the scientific process to study a specific problem; and are adequately prepared to begin working full-time on the doctoral research project.

In general, a doctoral student is eligible for the qualifying exam after completing the graduate core curriculum. The exam consists of two components—written and oral. The oral examination will be a public seminar (approximately 45 minutes) with a brief opportunity for questions and answers by attendees. The public presentation will be followed by a closed session with the student and the qualifying examination committee. Please note the student's research mentor may not serve as the chair of the qualifying exam committee. Individual doctoral programs may have specific requirements related

to timeline, eligibility, format, committee composition, and grading. Contact the appropriate Student Affairs Advocate and/or the [Biomedical Sciences Program Guidelines](#) or [Pharmaceutical Sciences Program Guidelines](#) for more information.

Upon successful completion of the written and oral components of the examination, an *Admission to Candidacy* form will be submitted to the GSBS office for consideration by the Graduate Council. Failure to complete the qualifying exam successfully may result in dismissal from the academic program.

## Research Assistantships

**Enrollment.** Students on research assistantships must be full-time students. The minimum enrollment for full-time graduate status is nine (9) semester credit hours (SCH) in the regular semester and at least six (6) SCH 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 the department/Principal Investigator. For continuation of the research assistantship from year to year, the student must be in satisfactory academic standing and continue making appropriate progress toward a degree. Master's level students in the Biotechnology—Research Track will be employed as Research Assistants during the second year of the program unless they participate in an internship with an external partner. Students in the Biotechnology—Abbreviated Track will not be granted a paid research assistantship at TTUHSC.

**Fee Waivers.** Students must be appointed before the official census date for the semester 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. 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.”
- **Medical Services Waiver:** Waives the student from payment of the medical services fee. Refer to the [Student Health](#) sub-section for more information.

**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 thesis/dissertation preparation in alignment with the number of registered credit hours. 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.

**Flex Time.** 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. 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 research mentor/advisor and Assistant Dean before that time has been taken. Students planning any time away from the lab should promptly consult with their mentor/advisor, meet with the assigned Student Affairs Advocate (SAA), and submit appropriate paperwork for approval. Research 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—*GSBS 5101: Responsible Conduct of Research*—as part of their program. 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 a date to be determined by each program's Student Affairs Advocate, 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. A final CV is also due prior to graduation.

## 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 satisfactory academic standing and have a FAFSA or TASFA on file with [Financial Aid](#) to receive scholarships, including tuition scholarships.

## Student Health

**Student Health Services/Medical Services Fee.** 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. However, the medical services fee is automatically waived for students who hold research assistantships. For Research Assistants 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 Life website](#) for additional information and deadlines. 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 for the duration of the coverage period. 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](mailto: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 limited vaccinations to current students. Immunization records are kept up-to-date through the [Office of Institutional Health and Wellness](#). 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. Costs for pre-matriculation immunization requirements are not covered.

## 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 the *Excessive Hours* sub-section 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 *Enrollment* section.

## 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](mailto: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  $\geq 36$  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 *Enrollment* section.

## 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 census date 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 census date 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

## 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.

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

### Interdisciplinary Course Descriptions

#### GSBS

- 5000 Interprofessional Collaborative Practice (0:0:0).** 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.
- 5097 Internship (V1-9:0:0).** Through study in the laboratories of pharmaceutical and biotechnology companies, institutions, or government agencies, standard experimental techniques used in industry are explored by means of a series of hands-on laboratory exercise and directed projects.
- 5098 Techniques in Biomedical Research (V1-9:0:3-27).** Through rotations in different laboratories, students will be introduced to fundamental principles and techniques in basic biomedical research.
- 5099 Topics in Biomedical Sciences (V1-9:1-9:0).** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.
- 5101 Responsible Conduct of Research (1:1:0).** 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 (1:1:0).** 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 (1:1:0).** Students will attend and participate in seminars.
- 5201 Scientific Writing in the Biomedical Sciences (2:2:0).** 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.
- 5210 Biomedical Statistics (2:2:0).** Teaches the essentials for designing and analyzing biomedical experiments including appropriate experimental design, appropriate statistical tests for specific conditions, understanding power and sample size, statistical traps to avoid, and design and analyses for a student's research.
- 5275 Core V: Introduction to Biomedical Research (2:2:0).** Introduces the first-year graduate student to the fundamental principles and techniques in basic biomedical research.
- 5303 Introduction to Clinical Research (3:2:3).** 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.
- 5311 Health Information Resources Management (3:3:0).** 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.

## Interdisciplinary Course Descriptions

### GSBS (cont.)

- 5319 Seminar in Current Topics of Information Sciences (3:3:0).** 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 (3:3:0).** 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 (3:3:0).** 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 (3:3:0).** Teaches essential scientific concepts underlying the field of Molecular Biology and Molecular Genetics. Required for first year students.
- 5399 Topics in Biomedical Sciences (3:3:0).** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.
- 5471 Core I: Molecules (4:4:0).** 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	
<b>Irene La-Beck, PharmD</b>	Program Director	<b>Susan Bergeson, PhD</b>	Program Director
<b>Jerri Jones, MBA</b>	Student Affairs Advocate	<b>Komaraiah Palle, PhD</b>	Graduate Advisor
		<b>Leslie Fowler</b>	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.

In Abilene, faculty members in the Department of Immunotherapeutics and Biotechnology are 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 biology and therapeutic developments, diabetes, membrane protein physiology and biophysics, neurobiology and pain research, virology and parasitology, and much more.



**Tracks.** The program offers two tracks: (1) an abbreviated one-year, non-thesis option which provides a strong foundation of knowledge about core concepts with limited research experience; and (2) a 21-month, research track requiring two semesters of primarily didactic coursework and 12 months of full-time 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. Students who work in a campus laboratory will be granted a paid research assistantship at TTUHSC. This excludes students who select the abbreviated program track.

**Core Curriculum.** Students in both tracks complete four core courses during the first semester of coursework. These courses include *GSBS 5471 (Core I: Molecules)*, *GSBS 5372 (Core II: Cells)*, *GSBS 5373 (Core III: Genes)*, and *GSBS 5174 (Core IV: Biomedical Seminar)*. Refer to the GSBS course descriptions for additional information.

Biotechnology students are enrolled in the same core courses as first-year students in the Ph.D. in Biomedical Sciences program. These courses are intended to provide a strong foundation of scientific knowledge in the biomedical sciences in order to enhance future opportunities for basic and translational research.

Please note core courses are only offered during the fall semester. Therefore, failure to complete these courses successfully during the first year may result in delayed graduation and/or other academic consequences described in the current catalog.

## Sample Curriculum (Research Track)

### YEAR 1

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
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
		<b>13</b>
<b>Spring Term</b>		
GBTC 6101/6201	Biotechnology Seminar	1 or 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
		<b>13 or 14</b>
<b>Summer Term</b>		
GBTC7000/GBTC 6001 <sup>a</sup>	Research or Internship	6
		<b>6</b>

### YEAR 2

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GBTC 7000 <sup>b</sup> /GBTC 6001	Research or Internship	7
GBTC 5298	Biotechnology Project Report	2
		9
<b>Spring Term</b>		
GBTC 7000 <sup>b</sup> /GBTC 6001	Research or Internship	7
GBTC 5299	Biotechnology Final Report	2
		9

**PROGRAM TOTAL      50 or 51**

<sup>a</sup> 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.

<sup>b</sup> Students who choose a TTUHSC research lab will be granted a paid Research Assistantship.

## Sample Curriculum (Abbreviated Track)

### YEAR 1

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
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
		<b>13</b>
<b>Spring Term</b>		
GBTC 6101/6201	Biotechnology Seminar	1 or 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
		<b>10 or 11</b>
<b>Summer Term</b>		
GBTC 5025	Biotechnology Integrated Learning Experience	6 or 7
		<b>6 or 7</b>
<b>PROGRAM TOTAL</b>		<b>30</b>

## Course Descriptions

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

### GBTC

- 5020 Biotechnology Laboratory Methods (V1-3:0:3-9).** Introduces techniques fundamental to Biotechnology research. Successful mastery of basic laboratory techniques will provide students with the experience to understand methods commonly used in biotechnology and basic medical science research.
- 5025 Biotechnology Integrated Learning Experience (V1-7:0:0).** The Integrated Learning Experience requires the student to synthesize and integrate knowledge acquired in coursework and to apply theory and principles in a situation that approximates some aspect of Biotechnology. The student will choose between four alternative integrated learning experiences. The first option is a laboratory-based application of methods/techniques in Biotechnology. The second option is a clinical research-based application related to Biotechnology. The third option is a literature-based project such as a systematic review of a topic in Biotechnology. The fourth option is an external internship experience in an area related to Biotechnology.
- 5099 Special Topics in Biotechnology (V1-9:1-9:0).** Special topics in Biotechnology not normally included in other classes. May be repeated for credit with change in content.
- 5210 The Microbiome—Role in Health and Disease (2:2:0).** 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 (2:2:0).** 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.

## Course Descriptions

### GBTC (cont.)

- 5212 Fundamentals of Bacteriology (2:2:0).** 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 (2:2:0).** 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 (2:2:0).** Cellular and molecular immunology, immunity against microbes, tumors and diseases caused by inappropriate immune responses will be the focus of study. The course is a Biotechnology elective offered any semester but taken only by permission of the instructor.
- 5250 Introduction to Python Programming (2:2:0).** In this course, students will learn all of the fundamental aspects of computer programming. Python is a popular, general-purpose, open-source, scripting language designed to emphasize code readability. Students will be taught the Python programming language through hands on exercises and assignments. Students will learn the theory and practice of computer programming with emphasis on the practical techniques and problem-solving skills required to use computer programming in research.
- 5298 Biotechnology Project Report (2:2:0).** Oral presentations and a final written report and 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 English. Candidates must enroll in this course in both the Fall and Spring Semesters of Year 2 (YR2). At the beginning of the YR2 Fall Semester, students will form a committee consisting of at least 3 individuals, which must include their project mentor, one of the course directors, and at least one other faculty member of the Biotechnology Program. Once membership is confirmed, please e-mail your campus course directors the make-up of your committee. One meeting is required in mid-Fall of year 2 and two meetings are required in the YR2 Spring Semester: early in the semester (January or February) for a progress update and again for a final presentation (in April). The student should submit the final written report to the committee members 1 week prior to the final presentation.
- 5299 Biotechnology Final Report (2:2:0).** In Spring semester Year 2, all Biotechnology Master's students are required to present two professional oral reports and a final written report to their 3 member faculty committee. The reports 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.
- 5330 Immunology and Immunopathology (3:3:0).** 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 (3:3:0).** 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 (3:0:9).** In Spring semester of Year 1, students are required to rotate in at 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 of 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 (3:1:6).** 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 (3:3:0).** 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 5471, GSBS 5372, GSBS 5373, GSBS 5174, or consent of the course director(s).
- 5350 Research and Molecular Pathology (3:3:0).** 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.

## Course Descriptions

### GBTC (cont.)

- 6000 Master's Thesis (V1-6:0:0).** Master's Thesis.
- 6001 Biotechnology Internship (V1-9:0:0).** Research and training in a private-sector or government biotechnology laboratory (by prior arrangement with program director).
- 6101 Biotechnology Seminar (1:1:0).** Presentation of current research in biochemistry, molecular biology, genetics, cell biology, genomics, and other areas directly relevant to biotechnology.
- 6201 Biotechnology Seminar (2:2:0).** Presentation of current research in biochemistry, molecular biology, genetics, cell biology, genomics, and other areas directly relevant to biotechnology.
- 6202 Biomedical Informatics (2:2:0).** 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. Personal laptop meeting the GSBS laptop guidelines is required. Prerequisite: GSBS 5373 or by permission of the instructor. Required course for Biotechnology Master's students for Spring, Year 1.
- 6301 Introduction to Biotechnology (3:3:0).** 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 (V1-9:0:3-27).** Laboratory research.

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

## Graduate Medical Education Sciences, M.S.

### Program Leaders and Staff Contacts

Lubbock Campus Only	
Dan Webster, PhD	Program Director
Gurvinder Kaur, PhD	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
<b>Fall Term</b>		
GSBS 5000	Interprofessional Collaborative Practice	0
GMDS 5001	Graduate Human Anatomy, Histology & Embryology	6
GMDS 5021	Introduction to Biochem., Cell Bio., Inflammation and Infection	6
		<b>12</b>
<b>Spring Term</b>		
GMDS 5020	Introduction to Immunology, Hematology, and Cardio. System	10
GMDS 5110	Surgical Gross Anatomy <u>and/or</u>	1 <u>and/or</u>
GMDS 5006	Advanced Dissection Skills	3
		<b>11-14</b>

#### YEAR 2

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GMDS 5023	Advanced Training in Anatomy, Histology & Embryology	3
GMDS 5024	Advanced Training in Biochemistry & Infectious Disease	3
GMDS 7000	Research ( <i>Begin project.</i> )	3
		<b>9</b>

<b>Spring Term</b>		
GMDS 5022	Adv. Training in Immunology, Hematology, and the Cardio.	3
GMDS 5310	Educational Project in Biomedical Sciences	3
GMDS 5121	Pedagogical Concepts in Medical Education	1
GMDS 7000	Research ( <i>Complete project.</i> )	3
GSBS 5101	Responsible Conduct of Research	1
		<b>11</b>
	<b>PROGRAM TOTAL</b>	<b>43-46</b>

## Course Descriptions

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

### GMDS

- 5001 Graduate Human Anatomy, Histology & Embryology (V1-9:1-9:0).** 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.
- 5006 Advanced Dissection Skills (V1-6:0:3-18).** Students will review and conduct specialized dissections in the anatomy lab. The students will learn and practice advanced dissection skills designed to prepare specific teaching materials to demonstrate anatomical structures. Prerequisites: GMDS 5001. Registration restricted to students admitted to the Graduate Medical Education Sciences program.
- 5007 Advanced Ultrasound Skills (V1-3:0:3-9).** Students will learn to show how to utilize ultrasound imaging to visualize and teach advanced topics in anatomy and physiology Prerequisites: GMDS 5001. Registration restricted to students admitted to the Graduate Medical Education Sciences program.
- 5020 Introduction to Immunology, Hematology, and Cardiovascular System (V1-12:1-12:0).** 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.
- 5021 Introduction to Biochemistry, Cell Biology, Inflammation and Infection (V1-12:1-12:0).** 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.
- 5022 Advanced Training in Immunology, Hematology & the Cardiovascular System (V1-6:1-6:0).** 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.
- 5023 Advanced Training in Anatomy, Histology & Embryology Education (V1-6:1-6:0).** 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.

## Course Descriptions

### GMDS (cont.)

- 5024 Advanced Training in Biochemistry & Infectious Disease (V1-6:1-6:0).** 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.
- 5099 Topics in Graduate Medical Education Sciences (V1-6:1-6:0).** Specific areas in Graduate Medical Education Sciences or related areas not normally included in other courses. May be repeated for credit with change of content. Registration restricted to students admitted to the Graduate Medical Education Sciences program.
- 5110 Surgical Gross Anatomy (1:1:0).** 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. Prerequisite: GMDS 5001. Registration restricted to students admitted to the Graduate Medical Education Sciences program.
- 5121 Pedagogical Concepts in Medical Education (1:1:0).** The course is intended to provide a graduate-level foundation for understanding important concepts that guide current medical education pedagogy. To accomplish this goal, papers from literature will be selected by the instructors for reading and subsequent discussion by the group. Registration restricted to students admitted to the Graduate Medical Education Sciences program.
- 5310 Educational Project in Biomedical Sciences (3:0:0).** Students will design and carry out an educational project related to topics in medical education. The project will be designed according to the needs of the medical courses and matched to the interest of the student. Registration restricted to students admitted to the Graduate Medical Education Sciences program.
- 7000 Research (V1-9:0:0).** Research.



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

## Pharmaceutical Sciences, M.S.

### Program Leaders and Staff Contacts

Amarillo Campus Only	
Thomas Abbruscato, PhD	Senior Associate Dean
Abraham Al-Ahmad, PhD	Program Director
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
<b>Fall Term</b>		
GSBS 5000	Interprofessional Collaborative Practice	0
GSBS 5101	Responsible Conduct of Research	1
GPSC 5098	Pharmaceutical Sciences Research Methods	3
GPSC 5410	General Biochemistry	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
		<b>9</b>
<b>Spring Term</b>		
GPSC 5250	Applied Medicinal Chemistry	2
GPSC 5404	Principles of Drug Structure and Action	4
GPSC 5349	Pharmaceutics	3
GPSC 7101	Pharmaceutical Sciences Seminar	1
		<b>10</b>

#### YEAR 2

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GPSC 5230	Experimental Design and Biostatistics	2
GPSC 7000	Research	7
GPSC 7101	Pharmaceutical Sciences Seminar	1
		<b>10</b>
<b>Spring Term</b>		
GPSC 5429	Basic Pharmacokinetics	4
GPSC 6000	Master's Thesis	6
GPSC 7101	Pharmaceutical Sciences Seminar	1
		<b>11</b>

**PROGRAM TOTAL 40**

## Course Descriptions

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

### GPSC

- 5098 Pharmaceutical Sciences Research Methods (V1-9:0:3-27).** Introduces incoming graduate students to the graduate program by providing the ability to rotate into two different research labs and declare their preference at the end of the course sequence.
- 5230 Experimental Design and Biostatistics (2:2:0).** 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 (2:2:0).** This introductory course is designed to facilitate understanding of the molecular aspects of drug action, including basic principles of drug-target interactions, the relationship between chemical structure and drug action and effects of metabolism on the drug structure.
- 5349 Pharmaceutics (3:3:0).** 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.
- 5404 Principles of Drug Structure and Action (4:4:0).** 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.
- 5410 General Biochemistry (4:4:0).** 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.
- 5429 Pharmacokinetics (4:4:0).** 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 (V1-6:0:0).** Master's Thesis.
- 7000 Pharmaceutical Sciences Research (V1-12:0:3-36).** Pharmaceutical Sciences Research.
- 7101 Pharmaceutical Sciences Seminar (1:1:0).** Weekly seminar series designed to provide training in research data presentation and analysis.

# Doctor of Philosophy (Ph.D.) Degree Programs

## Biomedical Sciences, Ph.D.

### General Information/Undeclared Students

#### Program Leaders and Staff Contacts

Lubbock Campus Only	
Michael Blanton, PhD	Senior Associate Dean, MD/PhD Co-Director
Terri Lloyd	Student Affairs Advocate (Undeclared Students)



#### About the Program

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. Four concentrations are offered: (1) Biochemistry, Cellular and Molecular Biology; (2) Immunology and Infectious Diseases; (3) Molecular Biophysics; and (4) Translational Neuroscience and Pharmacology.

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. 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 academic program. Refer to [Publication of Student Work](#) for more details.

The qualifying examination is also one of the major requirements of the doctoral degree program. The examination requires a synthesis and application of knowledge acquired during the doctoral degree course of study. The purpose of the qualifying examination is to ensure that students have mastered the fundamentals in a major area of interest; can apply the scientific process to study a specific problem; and are adequately prepared to begin working full-time on the doctoral research project. For more information, see [Qualifying Examination](#).

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. Refer to [Dissertations and Theses](#) for more information.

#### Core Curriculum

Students complete five core courses during the first semester of doctoral coursework. These courses include *GSBS 5471 (Core I: Molecules)*, *GSBS 5372 (Core II: Cells)*, *GSBS 5373 (Core III: Genes)*, *GSBS 5174 (Core IV: Biomedical Seminar)*, and *GSBS 5275 (Core V: Introduction to Biomedical Research)*. Refer to the [GSBS course descriptions](#) for additional information.

These courses are intended to provide a strong foundation of scientific knowledge in the biomedical sciences in order to enhance future opportunities for basic and translational research regardless of the program concentration which a student eventually chooses. Please note core courses are only offered during the fall semester. Therefore, failure to complete these courses successfully during the first year may result in delayed academic progress and/or other academic consequences described in the current catalog.

Students who have a master’s degree or previous doctoral coursework in a biomedical or biological sciences discipline may request to opt out of the following individual core courses: *Core I*, *Core II*, and/or *Core III*. Students, however, cannot opt out of *Core IV* or *Core V*. Refer to [Transfer Credit from Other Colleges and Universities](#) for additional details.

A student must initiate a transfer request related to a core course with the Senior Associate Dean—Lubbock prior to the first day of classes of the initial fall semester. The Senior Associate Dean will review the submitted materials in collaboration with the course director of the applicable course and the Core Curriculum Coordination Committee (CCCC). While a final

decision is pending, the student must audit the applicable core course. The GSBS office will notify the student of the transfer request prior to the official census date for the semester.

### Undeclared Student Information

All students enter the Ph.D. in Biomedical Sciences degree program with an undeclared concentration. Before or after New Student Orientation, each student will meet with the Student Affairs Advocate (Undeclared Students) to discuss first-year course selection, laboratory rotations, procedures guiding concentration selection, and related academic topics.

During the fall semester, students complete the core curriculum, including *GSBS 5275 (Core V: Introduction to Biomedical Research)*. During the first 4 weeks of the course, faculty will present concentration-specific information and discuss research opportunities within each concentration. Then students will complete a minimum of two lab rotations based on their interests and faculty availability. Students are also encouraged to review program guidelines for each concentration and become familiar with concentration expectations. Speaking with individual research mentors, Graduate Advisors, and current students in each concentration are excellent strategies to inform the decision-making process.

The earliest a student may declare a specific concentration and research mentor is the last day of the fall semester of Year 1. The selection must be mutual by the student and research mentor. If a student remains undecided after the fall semester, additional lab rotations may be completed during the spring term. A concentration and mentor must be selected by the end of the summer term prior to Year 2. Once a decision has been made, the student should submit the *Application for Change in Major/Declare Concentration* form to the GSBS office. This form is available online to current students.

### Interdisciplinary Course Descriptions

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.

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

#### GSBS

- 5000 Interprofessional Collaborative Practice (0:0:0).** 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.
- 5097 Internship (V1-9:0:0).** Through study in the laboratories of pharmaceutical and biotechnology companies, institutions, or government agencies, standard experimental techniques used in industry are explored by means of a series of hands-on laboratory exercise and directed projects.
- 5098 Techniques in Biomedical Research (V1-9:0:3-27).** Through rotations in different laboratories, students will be introduced to fundamental principles and techniques in basic biomedical research.
- 5099 Topics in Biomedical Sciences (V1-9:1-9:0).** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.
- 5101 Responsible Conduct of Research (1:1:0).** 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 (1:1:0).** 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 (1:1:0).** Students will attend and participate in seminars.

## Interdisciplinary Course Descriptions

### GSBS (cont.)

- 5201 Scientific Writing in the Biomedical Sciences (2:2:0).** 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.
- 5210 Biomedical Statistics (2:2:0).** Teaches the essentials for designing and analyzing biomedical experiments including appropriate experimental design, appropriate statistical tests for specific conditions, understanding power and sample size, statistical traps to avoid, and design and analyses for a student's research.
- 5275 Core V: Introduction to Biomedical Research (2:2:0).** Introduces the first-year graduate student to the fundamental principles and techniques in basic biomedical research.
- 5303 Introduction to Clinical Research (3:2:3).** 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.
- 5311 Health Information Resources Management (3:3:0).** 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 (3:3:0).** 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 (3:3:0).** 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 (3:3:0).** 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 (3:3:0).** Teaches essential scientific concepts underlying the field of Molecular Biology and Molecular Genetics. Required for first year students.
- 5399 Topics in Biomedical Sciences (3:3:0).** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit.
- 5471 Core I: Molecules (4:4:0).** 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.

Concentration: Biochemistry, Cellular and Molecular Biology

### Program Leaders and Staff Contacts

Lubbock Campus Only	
Jannette Dufour, PhD	Department Chair
Jeffrey Thomas, PhD	Graduate Advisor
Michael Blanton, PhD	Senior Associate Dean, MD/PhD Co-Director
D'Ann Holubec, MA	Student Affairs Advocate
Sharla Cook	Department Support Staff Representative



### About the Concentration

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
<b>Fall Term</b>		
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 5275	Core V: Laboratory Methods	2
		<b>13</b>
<b>Spring Term</b>		
GSBS 5098	Techniques in Biomedical Research	6
GBCM 6320	Advanced Cell Biology	3
GBCM 7101	Seminar	1
GBCM 5130	Research Presentation Skills	1
		<b>11</b>
<b>Summer Term</b>		
GSBS 5098	Techniques in Biomedical Research	6
		<b>6</b>

**YEAR 2**

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GBCM 7000	Research	5
GBCM 7101	Seminar	1
	Elective	3
		<b>9</b>
<b>Spring Term</b>		
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
		<b>9</b>
<b>Summer Term</b>		
GBCM 7000	Research	6
		<b>6</b>

**YEAR 3**

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

**YEAR 4**

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GBCM 7000	Research	8
GBCM 7101	Seminar	1
		<b>9</b>
<b>Spring Term</b>		
GBCM 5130	Research Presentation Skills	1
GBCM 7101	Seminar	1
GBCM 7000	Research	7
		<b>9</b>

**Summer Term**

GBCM 7000	Research	6
		6

**YEAR 5**

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GBCM 7101	Seminar	1
GBCM 8000	Dissertation	8
		9
<b>Spring Term</b>		
GBCM 5130	Research Presentation Skills	1
GBCM 7101	Seminar	1
GBCM 8000	Dissertation	7
		9

**PROGRAM TOTAL      120**

**Course Descriptions**

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

**GBCM**

- 5113 Selected Topics in Cell & Developmental Biology (1:1:0).** 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 (1:0:0).** 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 (2:2:0).** 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 (3:3:0).** 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.
- 6000 Master's Thesis (V1-6:0:0).** Master's Thesis.
- 6055 Laboratory Methods (V1-6:0:1-6).** 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 (1:1:0).** 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 (1:1:0).** 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.



## Course Descriptions

### GBCM (cont.)

- 6235 Topics in Biochemistry (2:2:0).** 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 (3:3:0).** 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 (3:3:0).** 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 (3:3:0).** 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 (5:5:0).** 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 (V1-12:0:0).** Research.
- 7101 Seminar (1:1:0).** Students will attend and participate in departmental seminars.
- 8000 Doctoral Dissertation (V1-12:0:0).** 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, PhD	Department Chair
Abdul Hamood, PhD	Graduate Advisor
Michael Blanton, PhD	Senior Associate Dean, MD/PhD Co-Director
D'Ann Holubec, MA	Student Affairs Advocate
Valerie Sosa	Department Support Staff Representative



### About the Concentration

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
<b>Fall Term</b>		
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 5275	Core V: Laboratory Methods	2
		<b>13</b>
<b>Spring Term</b>		
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
		<b>12</b>
<b>Summer Term</b>		
GSBS 5098	Techniques in Biomedical Research	6
		<b>6</b>

## YEAR 2

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

## YEAR 3

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

## YEAR 4

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

## YEAR 5

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GIID 7101	Seminar	1
GIID 8000	Dissertation	8
		<hr/>
		<b>9</b>
		<hr/>
<b>Spring Term</b>		
GBCM 8000	Dissertation	9
		<hr/>
		<b>9</b>
		<hr/>
<b>PROGRAM TOTAL</b>		<b>121</b>

## Course Descriptions

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

### GIID

- 5181 Select Topics in Immunology and Infectious Diseases (1:1:0).** 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 (2:2:0).** 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 (3:3:0).** Prerequisite: Core curriculum or consent of instructor. Cellular and molecular immunology is a study of the development of the immune system, immunity against microbes and tumors, and diseases caused by inappropriate immune responses.
- 5381 Select Topics in Immunology and Infectious Diseases (3:3:0).** 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.
- 6000 Master's Thesis (V1-6:1-6:0).** Master's thesis.
- 6324 Molecular Biology of Pathogenic Bacteria (3:3:0).** 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 successfully defend their proposals.
- 6325 Advances in Virology (3:3:0).** Prerequisite: Core curriculum or consent of instructor. Covers a broad range of topics including virus/host interactions; molecular pathogenesis of latent, persistent or cytolytic virus infections; and research strategies to treat and prevent viral infections.
- 6329 Advances in Immunology (3:3:0).** 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.

## Course Descriptions

### GIID (cont.)

- 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 (3:3:0).** 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 (3:3:0).** 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 (3:3:0).** 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 (9:9:0).** 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 (V1-12:0:0).** Prerequisite: Core curriculum or consent of mentor. This course will allow students time to develop their research interests and thesis or dissertation projects.
- 7101 Immunology and Infectious Diseases Seminar (1:1:0).** 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 (V1-12:0:0).** Prerequisite: Admission to doctoral candidacy or consent of instructor. The doctoral dissertation is expected to represent independent work by the student, conducted under the supervision of the committee, and to be written clearly and concisely in good English. The dissertation will be presented both in written and oral form. The oral presentation of the dissertation is meant to act as the final examination of the doctoral student.

# 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, PhD	Department Chair
Luis Cuello, PhD	Graduate Advisor
Michael Blanton, PhD	Senior Associate Dean, MD/PhD Co-Director
D'Ann Holubec, MA	Student Affairs Advocate
Stephen Freeman	Department Support Staff Representative



### About the Concentration

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
<b>Fall Term</b>		
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 5275	Core V: Laboratory Methods	2
		<b>13</b>
<b>Spring Term</b>		
GSBS 5098	Techniques in Biomedical Research	6
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GSBS 5101	Responsible Conduct of Research	1
		<b>9</b>
<b>Summer Term</b>		
GSBS 5098	Techniques in Biomedical Research	6
		<b>6</b>

## YEAR 2

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GMBP 7000	Research	4
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GMBP 53XX	Special Topics/Elective Course	3
		<hr/>
		<b>9</b>
<b>Spring Term</b>		
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
		<hr/>
		<b>9</b>
<b>Summer Term</b>		
GMBP 7000	Research	6
		<hr/>
		<b>6</b>

## YEAR 3

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

## YEAR 4

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

**Summer Term**

GMBP 7000	Research	6
		6

**YEAR 5**

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GMBP 8000	Dissertation	7
		9
<b>Spring Term</b>		
GMBP 7101	Seminar	1
GMBP 7102	Readings	1
GMBP 8000	Dissertation	7
		9

**PROGRAM TOTAL      118**

**Course Descriptions**

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

**GMBP**

- 5221 Experimental Biochemistry and Biophysics of Membranes (2:0:6).** 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: Concurrent enrollment in GMBP 5321.
- 5302 Human Physiology (3:3:0).** 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 (3:3:0).** 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 (3:0:9).** 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 (3:0:9).** Prerequisite: Consent of instructor. Students work in a specific laboratory assisting an ongoing research project or conducting an independent research effort.
- 5904 Systems Physiology (9:9:0).** This course provides the student with a basic understanding of the organ systems of the human body. Their functions, regulations and interactions are emphasized.
- 6000 Master's Thesis (V1-6:0:0).** Master's thesis.



## Course Descriptions

### GMBP (cont.)

- 6105 Advanced Topics in Molecular Biophysics (1:1:0).** 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 (2:2:0).** 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 (3:3:0).** 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 (V1-12:0:0).** Research.
- 7101 Molecular Biophysics Seminar (1:1:0).** 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 (1:1:0).** 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 (1:1:0).** 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 (V1-12:0:0).** 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, MD, PhD	Department Chair
Josee Guindon, DVM, PhD	Graduate Advisor
Michael Blanton, PhD	Senior Associate Dean, MD/PhD Co-Director
D'Ann Holubec, MA	Student Affairs Advocate
Lisa Moran	Department Support Staff Representative



### About the Concentration

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, 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
<b>Fall Term</b>		
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 5275	Core V: Laboratory Methods	2
		<b>13</b>
<b>Spring Term</b>		
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
		<b>12</b>
<b>Summer Term</b>		
GSBS 5098	Techniques in Biomedical Research	6
		<b>6</b>

**YEAR 2**

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

**YEAR 3**

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

**YEAR 4**

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GTNP 7000	Research	7
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
		<b>9</b>
<b>Spring Term</b>		
GTNP 7000	Research	7
GTNP 7101	Seminar	1
GTNP 7102	Readings	1
		<b>9</b>

**Summer Term**

GTNP 7000	Research	6
		<u>6</u>

**YEAR 5**

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

**Course Descriptions**

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

**GTNP**

- 5101 Topics in Translational Neuroscience and Pharmacology (1:1:0).** 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 (2:2:0).** 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 (2:2:0).** 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 Translational Neuroscience and Pharmacology (3:3:0).** Specific areas of pharmacology not normally included in other courses. May be repeated for credit with change in content.
- 5303 Principles of Translational Neuroscience and Pharmacology (3:3:0).** 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 (3:3:0).** A study of pharmacology with emphasis on mechanisms of drug action, interaction, and therapeutics.
- 5326 Pharmacology of the Autonomic Nervous System (3:3:0).** 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 (3:3:0).** 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.

## Course Descriptions

### GTNP (cont.)

- 5410 Integrated Neurosciences (4:4:0).** 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 2<sup>nd</sup>-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.
- 6000 Master's Thesis. (V1-6:0:0).** Master's thesis.
- 7000 Research (V1-12:0:0).** Research.
- 7101 Translational Neuroscience and Pharmacology Seminar (1:1:0).** 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 (1:1:0).** 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 (V1-12:0:0).** Doctoral dissertation.

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

### Pharmaceutical Sciences, Ph.D.

#### Program Leaders and Staff Contacts

Abilene Campus		Amarillo Campus	
<b>Laurence Wood, PhD</b>	Program Director	<b>Thomas Abbruscato, PhD</b>	Senior Associate Dean
<b>Jerri Jones, MBA</b>	Student Affairs Advocate	<b>Abraham Al-Ahmad, PhD</b>	Program Director
		<b>Teresa Carlisle</b>	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, pharmaceuticals, pharmacokinetics, drug receptor modeling, molecular biology, biochemistry, pathophysiology, immunology and cancer biology and therapy, and medicinal chemistry. All students enter the degree program with an undeclared laboratory.



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. 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 academic program. Refer to [Publication of Student Work](#) for more details.

The qualifying examination is also one of the major requirements of the doctoral degree program. The examination requires a synthesis and application of knowledge acquired during the doctoral degree course of study. The purpose of the qualifying examination is to ensure that students have mastered the fundamentals in a major area of interest; can apply the scientific process to study a specific problem; and are adequately prepared to begin working full-time on the doctoral research project. For more information, see [Qualifying Examination](#).

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. Refer to [Dissertations and Theses](#) for more information.

#### Core Curriculum

Doctoral students complete approximately 32 semester credit hours (SCH) of core curriculum courses, including *GPSC 7101: Pharmaceutical Sciences Seminar*. This course must be taken each fall and spring semester of enrollment. Students must also taken a minimum of 16 SCH of electives in order to complete the required 48 SCH of didactic coursework.

#### 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
<b>Fall Term</b>		
GSBS 5000	Interprofessional Collaborative Practice	0
GPSC 5098	Pharmaceutical Sciences Research Methods (i.e., lab rotations)	3
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
		<b>11</b>
<b>Spring Term</b>		
GPSC 5250	Applied Medicinal Chemistry	2
GPSC 5349	Pharmaceutics	3
GPSC 5404	Principles of Drug Structure and Action	4
GPSC 7101	Pharmaceutical Sciences Seminar	1
		<b>10</b>
<b>Summer Term</b>		
GPSC 7000	Research	6
		<b>6</b>

**YEAR 2**

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

**YEAR 3**

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GPSC 7000	Research	3
GPSC 7101	Pharmaceutical Sciences Seminar	1
	Elective(s)	5
		<b>9</b>
<b>Spring Term</b>		
GPSC 7000	Research	8
GPSC 7101	Pharmaceutical Sciences Seminar	1
		<b>9</b>
<b>Summer Term</b>		
GPSC 7000	Research	6
		<b>6</b>

## YEAR 4

Prefix/Number	Course Title	SCH
<b>Fall Term</b>		
GPSC 7101	Pharmaceutical Sciences Seminar	1
GPSC 8000	Doctoral Dissertation	8
		<hr/>
		<b>9</b>
		<hr/>
<b>Spring Term</b>		
GPSC 7101	Pharmaceutical Sciences Seminar	1
GPSC 8000	Doctoral Dissertation	8
		<hr/>
		<b>9</b>
		<hr/>
<b>PROGRAM TOTAL</b>		<b>93</b>

## Course Descriptions

GSBS uses a course numbering system comparable to systems used by peer institutions. In general, the course prefix indicates the unit/department in which the course is offered. The first digit of the course number represents the level of the course (i.e., graduate); the second digit represents the number of credit hours associated with the course; and the remaining digits represent identification numbers for the course. After the course title, there are three digits in parentheses: (1) total credit hours, (2) lecture contact hours/week, and (3) laboratory contact hours/week. Some courses may have variable (V) credit hours.

### GPSC

- 5098 Pharmaceutical Sciences Research Methods (V1-9:0:3-27).** Introduces incoming graduate students to the graduate program by providing the ability to rotate into two different research labs and declare their preference at the end of the course sequence.
- 5101 Topics in Pharmaceutical Sciences (1:1:0).** 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 (1:1:0).** 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.
- 5110 Grant Writing (1:1:0).** Grant writing is a course aimed to introduce students to the basics of grantsmanship for applying to fellowships, scholarships, and grant mechanisms.
- 5112 Principles and Techniques in Structure Determination of Bioactive Molecules (1:1:0).** 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.
- 5113 Molecular Structure Determination by NMR Spectroscopy (1:1:0).** An advanced analytical chemistry course. The course is designed to familiarize doctoral candidates with general principles of Nuclear Magnetic Resonance spectroscopy techniques including <sup>1</sup>N, <sup>13</sup>C, 2D and 3D experiments, introduce the data required to assign the structure of a molecule including any stereochemistry/isomers, and interpret spectra produced from <sup>1</sup>H and <sup>13</sup>C and heteronuclei NMR.
- 5201 Topics in Pharmaceutical Sciences (2:2:0).** 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 (2:2:0).** 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.
- 5220 Drugs of Abuse (2:2:0).** 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 Descriptions

### GPSC (cont.)

- 5230 Experimental Design and Biostatistics (2:2:0).** 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.
- 5250 Applied Medicinal Chemistry (2:2:0).** This introductory course is designed to facilitate understanding of the molecular aspects of drug action, including basic principles of drug-target interactions, the relationship between chemical structure and drug action and effects of metabolism on the drug structure.
- 5301 Topics in Pharmaceutical Sciences (3:3:0).** Special topics in pharmaceutical sciences that are not normally included in other classes. May be repeated for credit with change in content.
- 5311 Drug Development and Discovery (3:3:0).** The steps and processes involved in drug development and discovery.
- 5326 Cancer Biology and Therapeutics (3:3:0).** 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 (3:3:0).** 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.
- 5349 Pharmaceutics (3:3:0).** 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.
- 5362 Pharmaceutical Regulatory Affairs (3:3:0).** Basic regulatory and quality assurance concepts.
- 5375 Immunology (3:3:0).** 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 (4:4:0).** 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.
- 5410 General Biochemistry (4:4:0).** 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.
- 5429 Pharmacokinetics (4:4:0).** 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.
- 5435 Physiology-based Pharmacology (4:4:0).** 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.
- 5440 Biopharmaceutics (4:4:0).** 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.
- 7000 Pharmaceutical Sciences Research (V1-12:0:3-36).** Pharmaceutical Sciences Research.
- 7101 Pharmaceutical Sciences Seminar (1:1:0).** Weekly seminar series designed to provide training in research data presentation and analysis.
- 8000 Doctoral Dissertation (V1-12:0:0).** Doctoral dissertation.