

# ***COURSE LISTING***

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## **How to Read Catalog Course Descriptions**

Courses are listed by program/concentration, beginning with interdisciplinary GSBS course offerings. Not all courses listed in this catalog are offered every year. The university reserves the right to cancel any scheduled course or withdraw any program from the list of offerings when the best interests of the institution require such action.

## **Example GSBS 5101**

**5101.Responsible Conduct of Research (1:1:0:0).** 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.

- Subject Prefix – indicates course subject (GSBS = Interdisciplinary Graduate School of Biomedical Sciences)
- First digit in course number – Indicates the academic level of the course. Graduate standing is a prerequisite for enrollment in all courses numbered in the 5000 series or above and are intended only for graduate students (except for seniors who are within 12 hours of graduation and whose enrollment has been authorized by the GSBS Dean). Although graduate students occasionally enroll in undergraduate courses to fill out deficiencies in their preparation for graduate work, coursework credited toward a graduate degree must, except in rare instances and with prior GSBS Dean approval, be of graduate level (5000 series or above).
- Second digit in course number – Indicates the semester hour credit of the course. Thus, GSBS 5101 is a graduate-level course with 1 semester hour of credit.
- Last two digits of course number – The distinguishing numbers of the course.
- Numbers in Parentheses (1:1:0:0) – The first number denotes the total number of credit hours for a course, the second number represents lecture hours, the third number represents lab hours, and the fourth number represents other hours such as precept. When the letter V precedes the numbers (e.g., V1-6), this indicates the class is a variable credit course. Such courses are ordinarily research courses and permit enrollment for any number of hours up to the limit indicated by the second number in the parentheses.
- Prerequisites – Some courses have specific prerequisites that must be met before the student can enroll.
- Instructional Method – information in parenthesis after the course description describes the course instructional method, defined as:
  - (F) Traditional, face-to-face course;
  - (H) Hybrid course with combination of face-to-face and significant web-based instruction;
  - (O) Online course with most, if not all, web-based instruction;
  - (IVC) A course in which synchronous instruction is delivered via two-way transmission between an instructor and student who are not in the same physical location.

Courses with more than one instructional method (e.g., F, IVC) indicates instructional method varies by course section.

## *Interdisciplinary*

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GSBS Courses:

- 5000. Interprofessional Collaborative Practice (0:0:0:0).** 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. (O)
- 5098. Techniques in Biomedical Research (V1-9:0:V3-27).** Through rotations in different laboratories, students will be introduced to fundamental principles and techniques in basic biomedical research. (F)
- 5099. Topics in Biomedical Sciences (V1-9).** Specific areas in biomedical sciences or related research not normally included in other courses. (F)
- 5101. Responsible Conduct of Research (1:1:0:0).** 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. (F)
- 5102. How to be a Scientist: Professional Skills for the Biomedical Sciences Graduate Student (1:1:0:0).** 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. (F)
- 5174. Core IV: Biomedical Seminar Series (1:1:0:0).** Students will attend and participate in seminars. (F, IVC)
- 5201. Scientific Writing in the Biomedical Sciences (2:2:0:0).** 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. (F)
- 5275. Core V: Introduction to Biomedical Research (2:0:0:0).** Introduces the first-year graduate student to the fundamental principles and techniques in basic biomedical research. (F)
- 5303. Introduction to Clinical Research (3:2:3:0).** 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. (F)
- 5310. Introduction to Statistical Methods in the Biomedical Sciences (3:3:0:0).** Provide students explanation and application of classical test theory involving univariate statistics. The course will include discussion about classical test theory (p values, scales of measurement, assumptions of analyses, etc.) and application of this theory for various statistical analyses,

such as t tests, anova, correlation. There will be a small introduction to non-parametric analyses. (F)

~~**5311. Health Information Resources Management (2:2:0:0).** 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. (O)~~

~~**5319. Seminar in Current Topics of Information Sciences (3:3:0:0).** 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.) (O)~~

**5350. Laboratory Methods in Biomedical Sciences (3:3:0:0).** 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 results. (F)

**5372. Core II: Cells (3:3:0:0).** 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.** (F, IVC)

**5373. Core III: Genes (3:3:0:0).** Teaches essential scientific concepts underlying the field of Molecular Biology and Molecular Genetics. **Required for first year students.** (F, IVC)

**5399. Topics in Biomedical Sciences (3:0:0:0).** Specific areas in biomedical sciences or related research not normally included in other courses. May be repeated for credit. (F, IVC)

**5471. Core I: Molecules (4:4:0:0).** 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.** (F, IVC)

Neuroscience (GIDN) Course:

**5910. Integrated Neurosciences (9:8:1:0).** This cooperative, interdepartmental effort offers a detailed study of the nervous system. Students examine both gross and fine structure and function from the subcellular through the behavioral level. (F)

## *Biochemistry, Cellular and Molecular Biology (GBCM)*

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GBCM Courses:

**5113, 5213, 5313. Selected Topics in Cell and Developmental Biology (1:1:0:0, 2:2:0:0, 3:3:0:0).** 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 for each registration. (F)

**5130. Research Presentation Skills (1:0:0:0).** 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. (F)

**6000. Master's Thesis (V1-6).** (F)

- 6055.Laboratory Methods (V1-6).** Taken as (1) 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 the faculty advisor's laboratory. Repeatable if different methods are covered for each registration. Prerequisite: Consent of instructor. (F)
- 6101.Biochemistry Conference (1:1:0:0).** 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. (F)
- 6135, 6235, 6335, 6535. Topics in Biochemistry (1:1:0:0, 2:2:0:0, 3:3:0:0, 5:5:0:0).** 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. (F)
- 6320.Advanced Cell Biology (3:3:0:0).** 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. (F)
- 6333.Advanced Protein Biochemistry (3:3:0:0).** 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. (F)
- 7000.Research (V1-12).** (F)
- 7101.Seminar (1:1:0:0).** Students will attend and participate in departmental seminars. (F)
- 8000.Doctoral Dissertation (V1-12).** (F)

## ***Biotechnology (GBTC)***

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### GBTC Courses:

- 5020.Biotechnology Laboratory Methods (V1-3:0:V3-9:0).** 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. Required course for Biotechnology Master's students for Fall, Year 1. (F, H, IVC)
- 5199.Biotechnology Lab Report (1:0:0:15).** Biotechnology Master's students working in TTUHSC laboratories report their research by giving a professional oral presentation. At the beginning of the YR2 Fall Semester, Biotechnology students are required to form a committee consisting of at least three Biotechnology Faculty, which must include their mentor, one of the three course directors, and at least one other member of the Biotechnology Program. Meetings are required once. (F, IVC)
- 5210.The Microbiome-Role in Health and Disease (2:2:0:0).** Focused on the role of microorganisms as active players in homeostasis and disease. Enrollment is only by permission of the instructor. (F, IVC)

- 5211. Biotechnology Innovation & Commercialization. (2:2:0:0).** 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. (F, IVC)
- 5212. Fundamentals of Bacteriology (2:2:0:0).** The classification, structure, virulence and pathogenesis of the bacteria that cause human disease and the ways to control these organisms will be studied. This course is a Biotechnology elective offered any semester, but taken only by permission of the instructor. (H, IVC)
- 5213. Fundamentals of Virology/Parasitology (2:2:0:0).** The classification, structure, and pathogenesis of 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. (H, IVC)
- 5214. Fundamentals of Immunology (2:2:0:0).** 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.. (H, IVC)
- 5298. Biotechnology Internship Report (2:2:0:0).** Biotechnology Master's students completing internships off-campus report their research by giving a professional oral presentation using interactive technology. At the beginning of the YR2 Fall Semester, students will form a committee consisting of at least 3 members, which must include their mentor, one of the three course directors, and at least one other member of the Biotechnology Program. Meetings are required at least once. (F, IVC)
- 5299. Biotechnology Internship Report (2:0:0:0).** 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 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. (F, IVC)
- 5330. Immunology and Immunopathology. (3:3:0:0).** The structural 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. (F, IVC)
- 5335. Vaccines, Blood and Biologics (3:3:0:0).** 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. (F, IVC)
- 5337. Techniques in Biotechnology Research. (3:0:3:0).** In Spring semester 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 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 registration to ensure they are initiated and completed in full. (F, H, IVC)



- 5338. Biochemical Methods (3:1:6:0).** Provides an 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. (F)
- 5340. Biology of Cancer (3:3:0:0).** Teaches essential processes underlying the biology of cancer, from the molecular and cellular bases of cancer, to clinical manifestations, to therapy. Prerequisites: GSBS 5471, GSBS 5372, GSBS 5373, GSBS 5174 or consent of the course director(s). (F, IVC)
- 5350. Research and Molecular Pathology. (3:3:0:0).** 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. (F)
- 6000. Master's Thesis (V1-6).** (F)
- 6001. Biotechnology Internship (V1-9).** Research and training in a private-sector or government biotechnology laboratory (by prior arrangement with program director). (F)
- 6101. Biotechnology Seminar (1:1:0:0).** Biotechnology Master's students attend, critique and present seminars of importance to the field of biotechnology. Required course for Biotechnology Master's students for Spring, Year 1. (F)
- 6202. Biomedical Informatics (2:0:2:0).** 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. (H)
- 6301. Introduction to Biotechnology (3:3:0:0).** Broad coverage will be given to topics with high current interest to the biotechnology industries. This course emphasizes application of technologies and is required for all Biotechnology Master's students in Year 1 Spring semester. (F, IVC)
- 7000. Research (V1-12).** (F)

## *Graduate Medical Sciences (GGMS)*

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### GGMS Courses:

- 5001. Graduate Human Anatomy (V1-9).** A highly integrated graduate course of human macroscopic anatomical study (including human dissection) which embodies the gross morphology of the body and coordinates it with clinical, developmental, and educational approaches to the human body. Course prerequisite: undergraduate degree with a strong science background. Enrollment limited to students admitted to the Graduate Medical Sciences concentration. (F)
- 5002. Graduate Cell and Tissue Biology (V1-9).** Graduate Cell and Tissue Biology is designed to provide students with fundamental information concerning the traditional areas of biochemistry, genetics, cell biology, and Tissue and Organ Histology. The principles presented in the 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 teacher or healthcare worker. Course prerequisite: acceptance into the Graduate Medical Sciences concentration. (F)

**5003. Graduate Systems Physiology (V1-9).** A graduate course of human physiology which provides the student with a basic understanding of the organ systems of the human body. Their functions, regulation and interactions are emphasized. Course prerequisite: undergraduate degree with a strong science background, and acceptance in the Graduate Medical Sciences concentration. (F)

**5004. Advanced Training in Anatomy (V1-6).** Students will participate in the gross anatomy laboratories as teaching assistants and attend all pre-laboratory meetings in preparation for the laboratory sessions. The students will also assist in preparing the practical exams. Prerequisites include successful completion of the first year course work in Graduate Medical Sciences. Enrollment limited to students admitted to the Graduate Medical Sciences M.S. concentration. (F)

**5005. Advanced Training in Histology (V1-6).** Students will participate in the histology laboratories as teaching assistants and attend all pre-laboratory meetings in preparation for the laboratory sessions. The students will also assist in preparing the practical exams. Prerequisites include successful completion of the first year course work in Graduate Medical Sciences. Enrollment limited to students admitted to the Graduate Medical Sciences M.S. concentration. (F)

**5006. Advanced Dissection Skills (V1-6).** Students will review and conduct specialized dissections in the Anatomy Laboratory. The student will learn and practice advanced dissections skills designed to prepare specific teaching materials to demonstrate anatomical structures in different body regions. Prerequisites include successful completion of the first year course work in Graduate Medical Sciences. (F)

**5007. Advanced Training in Ultrasound (V1-3).** The overall goal is to show how to utilize ultrasound imaging to visualize and teach advanced topics in anatomy and physiology. Prerequisites: successful completion of GGMS 5001 and GGMS 5004. (F)

**5008. Advanced Training Physiology Education (V1-6).** Students will participate in the physiology laboratories as teaching assistants and attend all pre-lab meetings and lectures. The students will assist with proctoring exams and leading study sessions. Prerequisites include successful completion of the first year coursework in Graduate Medical Science. (F)

**5099. Topics in Graduate Medical Sciences (V1-6).** Specific areas in Graduate Medical Sciences or related areas not normally included in other courses. May be repeated for credit with change of content. (F)

**5110. Surgical Gross Anatomy (1:1:0:0).** 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. The experience in surgical anatomy will provide students with a relevant correlation of anatomy to applied surgical procedures. Enrollment limited to students admitted to Graduate Medical Sciences M.S. concentration and successful completion of GGMS 5001 Gross Anatomy course. (F)

**5115. Introduction to Functional Neuroanatomy (1:1:0:0).** Students will learn to identify external and internal structures of the central nervous system (CNS: brain and spinal cord) and associated vasculature. They will be able to describe the symptoms due to lesions in specific brain and spinal cord lesions. Prerequisites: good academic standing, GGMS 5001. (F)

**5120. How People Learn: Theory and Practice (1:1:0:0).** The overall goal is to show how maximize learning skill in the health sciences with an emphasis on medical education. Individual differences in learning style will be used as examples of the application of Deliberate Practice to increase cognitive skills. Concepts such as the Growth Mindset and memory consolidation will provide a basis for understanding the universal application of concept mapping and question analysis as methods that maximize return on investment of learning time. (F)

**5310. Educational Project in Biomedical Sciences (3:0:3:0).** Students will design and carry out an educational project related to topics in GGMS 5001 or GGMS 5002. The project will be designed according to the needs of these courses and matched to the interest of the student. Projects might include self-directed learning units/sessions, or upgrading or creation of educational materials as presented on Sakai. Enrollment limited to students admitted to the Graduate Medical Sciences M.S. concentration. (F)

**6101. Seminar (1:1:0:0).** (F)

**7000. Research (V1-9).** (F)

## *Immunology and Infectious Diseases (GIID)*

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GIID Courses:

**5181, 5281, 5381. Selected Topics in Immunology and Infectious Diseases (1:1:0:0; 2:2:0:0; 3:3:0:0).** 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. (F)

**6000. Master's Thesis (V1-6).** (F)

**6323. Genetics and Molecular Biology of Prokaryotes (3:3:0:0).** Prerequisite: Core curriculum, GIID 6610 Fundamental Microbiology and Immunology, or consent of instructor. Current concepts on the molecular biology and genetics of prokaryotes with emphasis on regulation of gene expression. (F)

**6324. The Molecular Biology of Pathogenic Bacteria (3:3:0:0).** Prerequisite: Core curriculum, GIID 6610 Fundamental Microbiology and Immunology, 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-style 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. (F)

**6325. Advances in Virology (3:3:0:0).** Prerequisite: Core curriculum, GIID 6610 Fundamental Microbiology and Immunology, 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. (F)

**6329. Advances in Immunology (3:3:0:0).** Prerequisite: Core curriculum, GIID 6610 Fundamental Microbiology and Immunology, 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 process and attempts to bridge the gap between the textbook and the literature. Both written 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. (F)

**6330. Vaccine Development (3:3:0:0).** Prerequisite: Core curriculum, GIID 6610 Fundamental Microbiology and Immunology, or consent of the instructor. This course will cover important steps involved in vaccine development, including antigen discovery, efficacy testing in animal models, process development, pre-clinical development and vaccination strategies. This course will combine classroom sessions by TTUHSC professors and expert vaccinologists with instructor-assigned self-reading. (F)

**6335. The Pathogenesis of Infectious Disease (3:3:0:0).** Prerequisite: Core curriculum, GIID 6610 Fundamental Microbiology and Immunology, 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. (F)

**6340. Mucosal Immunology (3:3:0:0).** Prerequisite: Core curriculum, GIID 6610 Fundamental Microbiology and Immunology, or consent of instructor. This 3 hour credit course provides students with an advanced course in the discipline of mucosal immunology. This 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 is 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. (F)

**6610. Fundamental Microbiology and Immunology (6:6:0:0).** Cellular and Molecular Immunology is a study of the immune system, immunity against microbes, tumors and diseases caused by inappropriate immune responses. Bacterial physiology/bacterial pathogenesis is a study of the classification, structure, virulence and pathogenesis of the microorganisms that cause human disease and the ways to control these organisms. Virology/Parasitology is a study of the classification, structure, and pathogenesis of parasites and viruses that cause human disease and the ways used to control these organisms. The biology of parasites and viruses that cause human disease, the epidemiology and control of infections will be taught. (F)

**7000. Research (V1-12).** (F)

**7101. Immunology and Infectious Diseases Seminar (1:1:0:0).** 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. (F)

**8000.Doctoral Dissertation (V1-12).** (F)

## ***Molecular Biophysics (GMBP)***

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GMBP Courses:

**5221.Experimental Biochemistry and Biophysics of Membranes (2:2:0:0).** 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 Physiology and Molecular Biophysics. Prerequisite: Concurrent enrollment in GMBP 5321. (F)

**5302.Human Physiology (3:3:0:0).** This introductory graduate course provides the student with a basic understanding of the organ systems of the human body, including the functions, regulation and interactions. No prerequisites are required. (F)

**5321.Biochemistry and Biophysics of Membranes (3:3:0:0).** 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. Prerequisite: consent of instructor. This course may be taken with GMBP 5221. (F).

**5350.Laboratory Methods in Molecular Biophysics (3:0:3:0).** Fundamental principles of 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. (F)

**5360.Laboratory Rotations as an Introduction to Modern Physiological Research (3:0:3:0).** Prerequisite: Consent of instructor. Students work in a specific laboratory assisting an ongoing research project or conducting an independent research effort. (F)

**5904.Systems Physiology (9:4:0:0).** This course provides the student with a basic understanding of the organ systems of the human body. Their functions, regulation and interactions are emphasized. (F)

**6000.Master's Thesis (V1-6).** (F)

**6105, 6205, 6305. Advanced Topics in Molecular Biophysics (1:1:0:0; 2:2:0:0; 3:3:0:0).**

Prerequisite: Consent of instructor. Advanced training in a specialized area of cell physiology and molecular biophysics. May be repeated for credit with change in content. (F)

**7000.Research (V1-12).** (F)

**7101.Molecular Biophysics Seminar (1:1:0:0).** Showcases internationally acclaimed researchers and provides the student with the most current information on a variety of interesting topics in

molecular biophysics, as well as an introduction to state-of-the art techniques and instrumentation. (F)

**7102. Readings in Molecular Biophysics (1:1:0:0).** 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. (F)

**7103. Advanced Topics in Molecular Biophysics (1:1:0:0).** 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. (F)

**8000. Doctoral Dissertation (V1-12).** (F)

## *Pharmaceutical Sciences (GPSC)*

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GPSC Courses:

**5101. Topics in Pharmaceutical Sciences (1:1:0:0).** Special topics in pharmaceutical sciences that are not normally included in other courses. May be repeated for credit with change in content. (F, IVC)

**5112. Principles and Techniques in Structure Determination of Bioactive Mol. (1:1:0:0).** 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. Course prerequisite: admission to the Pharmaceutical Sciences Graduate Program. Students must have passed GPSC 5410 General Biochemistry and GPSC 5504 Principles of Drug Action. (F, IVC)

**5113. Molecular Structure Determination by NMR Spectroscopy (1:1:0:0).** 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>H, <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. Course prerequisite: admission to the Pharmaceutical Sciences Graduate Program. Students must have passed GPSC 5410 General Biochemistry and GPSC 5504 Principles of Drug Action. (F, IVC)

**5201. Topics in Pharmaceutical Sciences (2:2:0:0).** Special topics in pharmaceutical sciences that are not normally included in other courses. May be repeated for credit with change in content. (F, IVC)

**5215. Advanced Course in Neurosciences (2:2:0:0).** 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. Course prerequisite: this course is designed for students with a basic knowledge of human anatomy and physiology. Successful completion of Basic Biochemistry (GPSC 5410) and Principles of Drug Action (GPSC 5504) is mandatory. (F, IVC)

- 5220. Drugs of Abuse (2:2:0:0).** This course is designed to teach the pharmacology of different classes of abused and the physiologic and societal aspects of addiction. Course Prerequisite: Biochemistry, Principles of Drug Action and Physiology-based Pharmacology. (F, IVC)
- 5230. Experimental Design and Biostatistics (2:2:0:0).** 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 research. Course prerequisite: admission to TTUHSC Graduate Program of Pharmaceutical Sciences. (F, IVC)
- 5301. Topics in Pharmaceutical Sciences (3:3:0:0).** Special topics in pharmaceutical sciences that are not normally included in other courses. May be repeated for credit with change in content. (F, IVC)
- 5307. Pharmaceutical Sciences Research Methods (3:3:3:0).** A lecture and laboratory course designed to provide an overview of current research methods in pharmaceutical sciences under direct guidance of a faculty member. (F, IVC)
- 5310. Drug Design and Discovery (3:3:0:0).** Prerequisite: GPSC 5504 Principles of Drug Action. Overview of new methods for quantitative SAR, computer-aided drug design, mass screening, and combinatorial chemistry. Course prerequisite: GPSC 5504 Principles of Drug Action. (F, IVC)
- 5311. Drug Development and Discovery (3:3:0:0).** The steps and processes involved in drug development and discovery. (F, IVC)
- 5320. Drug Metabolism (3:3:0:0).** Analysis of primary metabolic enzymatic systems involved in the clearance of drugs from the body and the mechanisms that regulate their activity. (F, IVC)
- 5325. Medicinal Chemistry (3:3:0:0).** A comprehensive study of the chemistry molecules and their interactions to aid in the understanding of concepts such as drug discovery and design. (F, IVC)
- 5326. Cancer Biology and Therapeutics (3:3:0:0).** This course is designed for graduate students studying molecular and cellular basis of cancer. It offers principles of cancer biology from origin of cancer 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. (F, IVC)
- 5330. Advanced Pharmacokinetics (3:3:0:0).** 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. Course prerequisite: GPSC 5329 Basic Pharmacokinetics and Course Director's Consent. (F, IVC)
- 5350. Advanced Pharmaceutics (3:3:0:0).** Prerequisite: Drug Delivery Systems 3 or equivalent. Quantitative treatment of reactions of pharmaceutical interest. Drug decomposition, approaches to stabilization and preservation, accelerated stability analysis, complexation, and micromeritics. (F, IVC)

- 5356. Advanced Principles of Disease (3:3:0:0).** Pathophysiological mechanisms at the molecular and cellular level. Lecture and discussion will cover the etiology, pathogenesis, functional changes, and clinical significance of general diseases. (F, IVC)
- 5362. Pharmaceutical Regulatory Affairs (3:3:0:0).** Basic regulatory and quality assurance concepts. (F, IVC)
- 5370. Biotechnology (3:3:0:0).** An introduction to the area of molecular biology, genomics, and protein chemistry. (F, IVC)
- 5375. Immunology (3:3:0:0).** 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. (F, IVC)
- 5410. General Biochemistry (4:4:0:0).** 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. (F, IVC)
- 5411. Graduate Pharmaceutics (4:4:0:0).** Covers the physical chemical principles for the development of safe and effective pharmaceutical dosage forms, fabrication of conventional liquid, solid and aerosolized dosage forms, fundamentals of various drug delivery systems, and the process of drug development, discovery and commercialization. Course prerequisite: admission to the Graduate Program of Pharmaceutical Sciences. (F, IVC)
- 5429. Pharmacokinetics (4:4:0:0).** 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. (F, IVC)
- 5435. Physiology-Based Pharmacology (4:4:0:0)** 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. (F, IVC)
- 5440. Biopharmaceutics (4:4:0:0).** Prerequisite: DDS3 and kinetics or equivalent. 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. (F, IVC)
- 5504. Principles of Drug Action (5:5:0:0).** This introductory course is designed to facilitate understanding of fundamental concepts relating to drug action. It covers basic principles of pharmacology, toxicology, and medicinal chemistry. Course prerequisites include the admission to the Pharmaceutical Sciences Graduate Program, and students must have passed GPSC 5510 General Biochemistry. (F, IVC)
- 6000. Master's Thesis (V1-6).** (F)
- 7000. Pharmaceutical Sciences Research (V1-12).** (F)
- 7101. Pharmaceutical Sciences Seminar (1:1:0:0).** Weekly seminar series designed to provide training in research data presentation and analysis. (F, IVC)
- 8000. Doctoral Dissertation (V1-12).** (F)



## *Public Health (GSPH)*

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### **GSPH Courses (Face-to-Face Program):**

**5090.Integrated Learning Experience-Extended (V1-6).** The Integrated Learning Experience requires the student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply theory and principles in a situation that approximates some aspect of professional practice. The course will be taken by students who have not completed their project or thesis ILE. (F) Prerequisites: GSPH 5304, GSPH 5307, GSPH 5309, GSPH 5310, GSPH 5311, GSPH 5313, and GSPH 5334.

**5099.Independent Study (V1-6).** (F, O, H, IVC)

**5110.Leadership Seminar (1:1:0:0).** The course will provide the student with the opportunity to learn leadership lessons from the careers of a diverse group of leaders who are successful executives and entrepreneurs from multiple sectors, including public health, hospitals, government, nonprofit. It will present the chance to discuss and reflect on leadership styles, provide exposure to leadership theory, and assist in the development of effective networking skills. It will prepare students for effectively engaging with their peers, personal network, and potential employers. (F, O, H, IVC).

**5230.Scientific Writing and Communication (2:2:0:0).** This two-credit hour course applies an active, participatory approach to help public health and health care professionals learn how to better communicate more effectively both in written communications and oral presentations. Students will work in small groups to critique and peer review each other's written assignments as well as practice oral presentations. The course focuses on selecting written and oral communication strategies for a diverse range of public and professional audiences, with further attention to cultural competence in targeting messages to specific populations. (F, O, H, IVC)

**5250.Public Health Ethics and Law (2:2:0:0).** This two-credit hour course focuses on rural health issues and their influence on public health. This course will delve deeper into these challenges, addressing the specific physical and cultural characteristics of rural areas that make them so different from their urban counterparts. Additionally, this course will address epis intended to introduce students to key concepts of law and ethics as applied to public health. It seeks to demonstrate, with both current and historical examples, constrains in public health decision-making and actions. This course will help students identify and appropriately assess legal and ethical issues that underlie the field of public health. (F, O, H, IVC)

**5304.Introduction to Social and Behavioral Sciences (3:3:0:0).** This three-credit hour course focuses on the behavioral sciences and their influence on public health. As a core course, this is an overview and introduction to social and behavioral health theories and issues- briefly covering several aspects of the behavioral sciences, such as: individual, community, organizational, and social impacts on health and population health status; cultural competence; effective communication strategies; and engagement of rural and urban communities using theory-informed models. (F, O, H, IVC)

- 5305.Social and Behavioral Sciences (for SBS majors) (3:3:0:0).** This course is intended for students majoring in the area of Social and Behavioral Sciences. The focus of this course is on the use of behavioral science theories in the development of interventions to change individual or group behavior. We will briefly cover many aspects of the behavioral sciences, including individual, community, organizational, and social impacts on health. (F, O, H, IVC)
- 5307.Introduction to Epidemiology (3:3:0:0).** This course will introduce students to the fundamental principles of epidemiology. Students will be introduced to quantitative data collection methods as well as being taught how to interpret results of data analysis for public health research, policy, or practice. Ultimately, this course will equip students with the necessary information to apply epidemiological methods to the breadth of settings and situations in public health practice.. (F, O, H, IVC)
- 5308.Advanced Epidemiology Methods (3:3:0:0).** This three-semester hour course will review selected articles from the epidemiologic and biostatistical literature that are of historical importance. Prerequisites: GSPH 5307. (F, O, H, IVC)
- 5309.Basic Environmental Health Sciences (3:3:0:0).** This course is an overview of the major areas of environmental health and provides students with an understanding of hazards in the environment, the effects of environmental contaminants on health, and various approaches to address major environmental health problems. Areas of emphasis are environmental epidemiology, toxicology, agents of environmental disease and policy and regulation. (FO, H, IVC)
- 5310.Public Health Policy (3:3:0:0).** This course presents competencies surrounding public health policy formulation. The main focus will be on the policy issues in the U.S. health care system, but some global health will be explored. The course will include application of principles of policy formulation, development budgeting, implementation, evaluation and analysis. An historical overview of seminal health policy events in U.S. history is also explored through competing stakeholder dynamics. (F, O, H, IVC)
- 5311.Introduction to Biostatistics (3:3:0:0).** This course will introduce students to basic biostatistics as used in public health practice. Through the utilization of SPSS software, students will learn to interpret their statistical analysis results in order to describe, measure, and analyze quantitative data. Additionally, students will learn to interpret their statistical analysis results in order to describe, measure, and analyze public health problems. Applications of these interpretations will be useful in several avenues of public health including research and policy making. Prerequisite: leveling exam will be given to incoming students. (F, H, O, IVC).
- 5312.Intermediate Biostatistics (3:3:0:0).** The objective of this course is to expand upon the basic concepts of statistical reasoning developed in GSPH 5411 (Introduction to Biostatistics) to selected applications of biostatistical analysis: simple and multiple linear regression, contingency table analysis, logistic regression, and analysis of variance. The course also includes introductions to survival analysis, repeated measures data, and nonparametric methods. Prerequisite: GSPH 5311 or equivalent. (F, O, H, IVC)
- 5313.Introduction to Public Health (3:3:0:0).** This introductory course will explore the history of public health, the successes and challenges faced by public health practitioners over the years, and the current trends in public health in the United States. Students will learn the core functions of public health and the essential services of public health, and how public health is

practiced in the United States. This course covers the Foundational Knowledge in Public Health as required by our accrediting body. (F, O, H, IVC)

**5314.Planning and Development Health Promotion Interventions (3:3:0:0).** This course will take the student through the process of intervention development, beginning with the assessment needed to understand determinants of health and behavior through the mapping of determinants, development of strategies and methods, and preparing for evaluation. Students will work in small groups on a complex public health problem and will develop an intervention to address that problem. Prerequisite: GSPH 5304 or GSPH 5305. (F, O, H, IVC)

**5315.Organizational Leadership and Management (3:3:0:0).** This three credit course provides an overview of theory and practice of leadership and management as applied to public health. Public health managerial concerns such as leadership, strategic planning, decision making, negotiations, and budget and resource management, will be introduced in this course. This course is intended primarily for MPH students with little or no previous graduate-level academic preparation in leadership and management. (F, O, H, IVC)

**5316.Responsible Conduct of Research and Communication in Public Health (3:3:0:0).** This three-credit hour course applies an active, participatory approach to help public health and health care professionals learn about the regulatory environment as well as the normative ethics of conducting public health research as well as how to better communicate more effectively in written and spoken communications. (F, O, H, IVC).

**5319. Applied Practice Experience (3:0:0:3).** The Applied Practice Experience is an integral component of professional training in public health, enabling students to observe from professionals in the field. The Applied Practice Experience also allows students to apply theoretical learning toward achievement of practical goals and skills while under the supervision of a preceptor and an Applied Practice Experience advisor. Prerequisites: GSPH 5304, GSPH 5307, GSPH 5309, GSPH 5310, GSPH 5311, GSPH 5313, and GSPH 5334. (F, O, H, IVC)

**5321.Program Evaluation (3:3:0:0).** Students will learn the basics of public health program evaluation. Combining the CDC Framework for Program Evaluation with theory-based evaluation principles, students will learn how to engage stakeholders, describe public health programs, design evaluations, gather credible evidence, and justify conclusions to ensure maximum use of evaluation findings for program stakeholders and evidence-based public health programming. Prerequisites: GSPH 5304 or GSPH 5305, GSPH 5311. (F, O, IVC)

**5322.Epidemiology Research Methods (3:3:0:0).** This three-semester hour course will focus on the key principles and methods of epidemiologic research at an intermediate level. Practical issues, such as applied logistic regression, will be discussed. Prerequisite: GSPH 5307. (F, O, H, IVC)

**5323.MPH Culminating Experience (3:3:0:0).** The culminating experience requires the student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply theory and principles in a situation that approximates some aspect of professional practice. The student will choose between four alternative culminating experiences. The first is the research thesis. The topic will be decided by the student and student advisor. The second option is a public health project which will be reported to faculty in both writing and oral presentation. The third option is the capstone course. The fourth option is the comprehensive exam. (F, O, H, IVC)

- 5325. Health Care Payment Systems and Policy (3:3:0:0).** In this course we will evaluate multiple dimensions of health care cost and payment, focusing on how payment systems influence provider organization, behavior and performance and how policy is developed. (F, O, H, IVC)
- 5326. Emerging Theories for Public Health (3:3:0:0).** We will discuss the scientific principles of theory surrounding the changing population health environment. In this class, students learn to view theoretical models as tools that can be applied to explain retrospective population health behavior, as well as, forecast future behavior change in human populations. Theoretical constructs, variables, and operationalized measures of theory are applied in the scientific analysis of both open and closed systems that allow for a contrast of for-profit, non-profit, and government systems of healthcare. The class is conducted in a seminar format. No textbook is required. Journal articles are provided by the professor. (F, O, H, IVC)
- 5327. Social Epidemiology (3:3:0:0).** This class focuses on social, behavioral, and environmental contributors to population health and well-being. This course will include analysis and discussion of the data, methods, and research ethics relevant to social epidemiology, and students will be expected to develop and refine population-based solutions to complex social and structural factors that impact population health. The course examines how structural biases and social inequality impact health at the local, national, and global level, and considers how issues of cultural competence are relevant to addressing health disparities. (F, O, H, IVC)
- 5328. Chronic Disease Epidemiology (3:3:0:0).** This course addresses the etiology, prevention, distribution, natural history, and treatment outcomes of chronic health conditions, and their impact on public health. (F, O, H, IVC)
- 5329. Issues in Rural Health (3:3:0:0).** This three-credit hour course focuses on rural health issues and their influence on public health. This course will delve deeper into these challenges, addressing the specific physical and cultural characteristics of rural areas that make them so different from their urban counterparts. Additionally, this course will address epidemiological methods to assess rural health issues such as ethical principles and environmental hazards. Students will be challenged to interpret results of data, assess population needs specific to rural communities, propose strategies to build coalitions using partnerships. During the course of study students will apply systems thinking tools to research public health issues, solving skills to identify interventions and present findings both in writing and using oral presentations. They will also look at public health program planning from a community-focused lens and focus on overcoming specific barriers that are driving disparities in rural areas. Prerequisites: GSPH 5304, GSPH 5307, GSPH 5311. (F, O, H, IVC).
- 5330. Toxicology and Public Health (3:3:0:0).** This course is designed to cover the basic concepts of toxicology, including an examination of major classes of pollutants, mechanisms of toxicity and the relationship between human disease and exposure to environmental chemicals. This course also applies these concepts to effects on general and susceptible populations, risk communication and public health practice. (F, O, H, IVC)
- 5331. Global Health Issues (3:3:0:0).** This course will explore issues of global health and public health responses to those needs. (F, O, H, IVC)
- 5332. Quality Improvement in Healthcare (3:3:0:0).** The purpose of this course is to explore the concept of Quality and the process of Quality Improvement across the Health Care continuum. We will discuss the history and evolution of quality, its terms, principles, theories, and

practices. Students will review methods of improving quality, including but not limited to continuous Quality Improvement and Total Quality Management, and to the guidelines for implementing quality management and continuous quality improvement processes. Students will also be asked to think creatively to design novel ways of improving quality. (F, O, H, IVC)

**5333. Qualitative Research Methods (3:3:0:0).** This course will include sessions on: introduction to qualitative research, research design, ethnography, conducting a literature search, qualitative interviewing, recruitment and sampling, mixed methods, focus groups, thematic qualitative data analysis, ethics, and the quality of qualitative research. (F, O, H, IVC)

**5334. Community-Based Methods and Practice (3:3:0:0).** This class deals with public health practice at the community, organizational, and political levels and Community Based Participatory Research methods. We want you to feel comfortable with all of these levels, and would like you to be able to work on health issues at all levels. In this class you will learn how to select qualitative methods and how to do them (focus groups, photo voice, key informant interviews, nominal group process). In this class you will develop a community-based project, intervention, or program. (F, O, H, IVC)

**5335. Reproductive Epidemiology (3:3:0:0).** An introduction to maternal and child health (MCH) epidemiology. Readings from the textbook will be supplemented with several journal articles. Guest speakers from the discipline of MCH, obstetrics, and neonatology will deliver selected lectures. (Prerequisite: GSPH 5307). (F, O, H, IVC)

**5336. Digital Media in Public Health (3:3:0:0).** This class will explore the use of social and digital media as it is currently being used in the field of public health. Class will include discussions of innovative public health programming ideas, and evidence-based practices using social and digital media. (F, O, H, IVC)

**5340. Data Management and Analysis for the Health Sciences (3:3:0:0).** This is a three credit hour course for master's degree students in public health. This course covers practical issues related to public health design, data management, and data analysis using SPSS and SAS software packages. (F, O, H, IVC)

**5360. Comparative Effectiveness & Quality Improvement of Public Healthcare (3:3:0:0).** The course will provide the student with an in-depth understanding of public health delivery systems across the globe. Topics will include: historic development, organization and characteristics of the U.S. public health delivery system as compared to other countries' public health delivery systems. Comparative effectiveness research and quality improvement techniques will be used to draw comparisons about current payment and reimbursement systems; healthcare accrediting agencies; functions and organizations of providers; organization of health facilities; and health information management to optimize patient care in many different countries. Prerequisites: GSPH 5311 and GSPH 5310. (F, O, H, IVC)

**5388. Special Topics (3:3:0:0).** This three-credit hour course will cover topics of temporal or special interest which are not being offered as part of the Master of Public Health degree curriculum. Experimental courses may also be offered as special topic courses and subsequently proposed as a regular course. (F, O, H, IVC).

**5399. Integrated Learning Experience (3:0:0:3).** The Integrated Learning Experience requires the student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply theory and principles in a situation that approximates some aspect of professional practice. The student will choose between four alternative integrated learning



experiences. The first option is the research thesis. The second option is a public health project. The third option is a comprehensive exam. The fourth option is a capstone course.

Prerequisites: GSPH 5304, GSPH 5307, GSPH 5309, GSPH 5310, GSPH 5311, GSPH 5313, and GSPH 5334. (F, O, H, IVC)

### **GSPO Courses (Online Program):**

**5090.Integrated Learning Experience-Extended (V1-6).** The Integrated Learning Experience requires the student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply theory and principles in a situation that approximates some aspect of professional practice. The course will be taken by students who have not completed their project or thesis ILE. (O) Prerequisites: GSPO 5304, GSPO 5307, GSPO 5309, GSPO 5310, GSPO 5311, GSPO 5313, and GSPO 5334.

**5099.Independent Study (V1-6).** (O)

**5110.Leadership Seminar (1:1:0:0).** The course will provide the student with the opportunity to learn leadership lessons from the careers of a diverse group of leaders who are successful executives and entrepreneurs from multiple sectors, including public health, hospitals, government, nonprofit. It will present the chance to discuss and reflect on leadership styles, provide exposure to leadership theory, and assist in the development of effective networking skills. It will prepare students for effectively engaging with their peers, personal network, and potential employers. (O).

**5230.Scientific Writing and Communication in Public Health (2:2:0:0).** This two-credit hour course applies an active, participatory approach to help public health and health care professionals learn how to better communicate more effectively both in written communications and oral presentations. Students will work in small groups to critique and peer review each other's written assignments as well as practice oral presentations. Free-form in-class discussions enable class members to learn from one another's experiences. The course focuses on selecting written and oral communication strategies for a diverse range of public and professional audiences, with further attention to cultural competence in targeting messages to specific populations. (O)

**5250.Public Health Ethics and Law (2:2:0:0).** This course is intended to introduce students to key concepts of law and ethics as applied to public health. It seeks to demonstrate, with both current and historical examples, constraints in public health decision-making and actions. This course will help students identify and appropriately assess legal and ethical issues that underlie the field of public health. (O)

**5304.Introduction to Social and Behavioral Sciences (3:3:0:0).** This three-credit hour course will focus on the behavioral sciences and their influence on public health. As a core course, this is an overview and introduction to social and behavioral health theories and issues – briefly covering several aspects of the behavioral sciences such as: individual, community, organizational, and social impacts on health status; cultural competence; effective communication strategies; and engagement of rural and urban communities using theory-informed models. (O)

**5305.Social and Behavioral Sciences (for SBS majors) (3:3:0:0).** This course is intended for students majoring in the area of Social and Behavioral Sciences. The focus of this course is on the use of behavioral science theories in the development of interventions to change individual or group behavior. We will briefly cover many aspects of the behavioral sciences, including individual, community, organizational, and social impacts on health. (O)**5307.**

**Introduction to Epidemiology (3:3:0:0).** This course will introduce students to the fundamental principles of epidemiology. Students will be introduced to quantitative data collection methods as well as being taught how to interpret results of data analysis for public health research, policy or practice. Ultimately, this course will equip students with the necessary information to apply epidemiological methods to the breadth of settings and situations in public health practice. (O)

**5309.Basic Environmental Health Sciences (3:3:0:0).** This course is an overview of the major areas of environmental health and provides students with an understanding of hazards in the environment, the effects of environmental contaminants on health, and various approaches to address major environmental health problems. Areas of emphasis are environmental epidemiology, toxicology, agents of environmental disease and policy and regulation. (O)

**5310.Public Health Policy (3:3:0:0).** This course presents competencies surrounding public health policy formulation. The main focus will be on the policy issues in the U.S. health care system, but some global health will be explored. The course will include application of principles of policy formulation, development budgeting, implementation, evaluation and analysis. An historical overview of seminal health policy events in U.S. history is also explored through competing stakeholder dynamics. (O)

**5311.Introduction to Biostatistics (3:3:0:0).** This course will introduce students to basic biostatistics as used in public health practice. Through the utilization of SPSS software, students will learn how to analyze quantitative data. Additionally, students will learn to interpret their statistical analysis results in order to describe, measure, and analyze public health problems. Applications of these interpretations will be useful in several avenues of public health including research and policy making. Prerequisite: leveling exam will be given to incoming students. (O).

**5312.Intermediate Biostatistics (3:3:0:0).** The objective of this course is to expand upon the basic concepts of statistical reasoning developed in GSPH 5311 (Introduction to Biostatistics) to selected applications of biostatistical analysis: simple and multiple linear regression, contingency table analysis, logistic regression, and analysis of variance. The course also includes introductions to survival analysis, repeated measures data, and nonparametric methods. Prerequisite: GSPH 5311 or equivalent. (O)

**5313.Introduction to Public Health (3:3:0:0).** This introductory course will explore the history of public health, the successes and challenges faced by public health practitioners over the years, and the current trends in public health in the United States. Students will learn the core competencies of public health and the essential functions of public health, and how public health is practiced in the United States. (O)

**5314.Planning and Development Health Promotion Interventions (3:3:0:0).** This course will take the student through the process of intervention development, beginning with the assessment needed to understand determinants of health and behavior through the mapping of determinants, development of strategies and methods, and preparing for evaluation. Students

will work in small groups on a complex public health problem and will develop an intervention to address that problem. Prerequisite: GSPO 5304. (O)

**5315. Organizational Leadership and Management (3:3:0:0).** This three credit course provides an overview of theory and practice of leadership and management as applied to public health. Public health managerial concerns such as leadership, strategic planning, decision making, negotiations, and budget and resource management, will be introduced in this course. This course is intended primarily for MPH students with little or no previous graduate-level academic preparation in leadership and management (O)

**5316. Responsible Conduct of Research and Communication in Public Health (3:3:0:0).** This three-credit hour course applies an active, participatory approach to help public health and health care professionals learn about the regulatory environment as well as the normative ethics of conducting public health research as well as how to better communicate more effectively in written and spoken communications. (O).

**5319. Applied Practice Experience (3:0:0:3).** The Applied Practice Experience is an integral component of professional training in public health, enabling students to observe from professionals in the field. The Applied Practice Experience also allows students to apply theoretical learning toward achievement of practical goals and skills while under the supervision of a preceptor and Applied Practice Experience advisor. Prerequisites for the practicum are GSPO 5304, GSPO 5307, GSPO 5309, GSPO 5310, GSPO 5313, GSPO 5311, and GSPO 5334. (O)

**5321. Program Evaluation (3:3:0:0).** Students will learn the basics of public health program evaluation. Combining the CDC Framework for Program Evaluation with theory-based evaluation principles, students will learn how to engage stakeholders, describe public health programs, design evaluations, gather credible evidence, and justify conclusions to ensure maximum use of evaluation findings for program stakeholders and evidence-based public health programming. Prerequisites: GSPH 5304 or GSPH 5305, GSPH 5311. (O)

**5323. Public Health Culminating Experience (3:3:0:0).** The culminating experience requires the student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply theory and principles in a situation that approximates some aspect of professional practice. The student will choose between three alternative culminating experiences. The first is the research thesis. The topic will be decided by the student and student advisor. The second option is a public health project which will be reported to faculty in both writing and oral presentation. The third option is the comprehensive exam. (O)

**5327. Social Epidemiology (3:3:0:0).** This class focuses on social, behavioral, and environmental contributors to population health and well-being. The course will include analysis and discussion of the data, methods, and research ethics relevant to social epidemiology, and students will be expected to develop and refine population based solutions to complex social and structural factors that impact population health. The course examines how structural biases and social inequality impact health at the local, national, and global level, and considers how issues of cultural competence are relevant to addressing health disparities. (O)

**5329. Issues in Rural Health (3:3:0:0).** This three-credit hour course focuses on rural health issues and their influence on public health. This course will delve deeper into these challenges, addressing the specific physical and cultural characteristics of rural areas that make them so different from their urban counterparts. Additionally, this course will address epidemiological

methods to assess rural health issues such as ethical principles and environmental hazards. Students will be challenged to interpret results of data, assess population needs specific to rural communities, propose strategies to build coalitions using partnerships. During the course of study students will apply systems thinking tools to research public health issues, solving skills to identify interventions and present findings both in writing and using oral presentations. They will also look at public health program planning from a community-focused lens and focus on overcoming specific barriers that are driving disparities in rural areas. Prerequisites: GSPO 5304, GSPO 5307, GSPO 5311. (O).

- 5330. Toxicology and Public Health (3:3:0:0).** This course is designed to cover basic concepts of toxicology, including an examination of major classes of pollutants, mechanisms of toxicity and the relationship between human disease and exposure to environmental chemicals. This course also applies these concepts to effects on general and susceptible populations, risk communication and public health practice (O)
- 5331. Global Health Issues (3:3:0:0).** This course will explore issues of global health and public health responses to those needs. (O)
- 5334. Community-Based Research Methods and Practice (3:3:0:0).** This class deals with public health practice at the community, organizational, and political levels and Community Based Participatory Research methods. We want you to feel comfortable with all of these levels, and would like you to be able to work on health issues at all levels. In this class you will learn how to select qualitative methods and how to do them (focus groups, photo voice, key informant interviews, nominal group process). In this class you will develop a community-based project, intervention, or program. (O)
- 5350. Comparative Effectiveness & Quality Improvement of Public Healthcare (3:3:0:0).** The course will provide the student with an in-depth understanding of public health delivery systems across the globe. Topics will include: historic development, organization and characteristics of the U.S. public health delivery system as compared to other countries' public health delivery systems. Comparative effectiveness research and Quality Improvement techniques will be used to draw comparisons about current payment and reimbursement systems; healthcare accrediting agencies; functions and organizations of providers; organization of health facilities; and health information management to optimize patient care in many different countries. Prerequisites: GSPO 5411 and GSPO 5310. (O)
- 5360. Comparative Effectiveness & Quality Improvement of Public Healthcare (3:3:0:0).** The course will provide the student with an in-depth understanding of public health delivery systems across the globe. Topics will include: historic development, organization and characteristics of the U.S. public health delivery system as compared to other countries' public health delivery systems. Comparative effectiveness research and quality improvement techniques will be used to draw comparisons about current payment and reimbursement systems; healthcare accrediting agencies; functions and organizations of providers; organization of health facilities; and health information management to optimize patient care in many different countries. Prerequisites: GSPO 5311 and GSPO 5310. (O)
- 5388. Special Topics (3:3:0:0).** This three-credit hour course will cover topics of temporal or special interest which are not being offered as part of the Master of Public Health degree

curriculum. Experimental courses may also be offered as special topic courses and subsequently proposed as a regular course. (O)

**5399. Integrated Learning Experience (3:0:0:3).** The Integrated Learning Experience requires the student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply theory and principles in a situation that approximates some aspect of professional practice. The student will choose between four alternative integrated learning experiences. The first option is the research thesis. The second option is a public health project. The third option is a comprehensive exam. Prerequisites: GSPO 5304, GSPO 5307, GSPO 5309, GSPO 5310, GSPO 5311, GSPO 5313, and GSPO 5334. (O)

## ***Translational Neuroscience and Pharmacology (GTNP)***

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GTNP Courses:

- 5101, 5201, 5301. Topics in Translational Neuroscience and Pharmacology (1:1:0:0, 2:2:0:0, 3:3:0:0).** Specific areas of pharmacology not normally included in other courses. May be repeated for credit with change in content. (F)
- 5225. Techniques in Translational Neuroscience & Pharmacological Research (2:0:6:0).** 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. (F)
- 5303. Principles of Translational Neuroscience and Pharmacology (3:3:0:0).** 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. (F)
- 5312. Medical Pharmacology I (3:8:0:0).** A study of pharmacology with emphasis on mechanisms of drug action, interaction, and therapeutics. (F)
- 5326. Pharmacology of the Autonomic Nervous System (3:3:0:0).** A conceptual study of drugs which alter the function of the autonomic nervous system. Emphasis will be on mechanisms by which drugs affect transmitter synthesis, release, uptake, and metabolism as well as receptor function. (F)
- 5336. Molecular and Cellular Pharmacology (3:3:0:0).** 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. (F)
- 5337. Neuropsychopharmacology (3:3:0:0).** A structured in-depth study of specific topics concerning neurochemical pharmacology, behavioral pharmacology, and neuropsychopharmacology. Topics to be studied will vary each semester. The course will consist of lectures, discussions, and oral presentations of original papers by the class. (F)
- 6000. Master's Thesis (V1-6).** (F)



**7000.Research (V1-12). (F)**

**7101.Translational Neuroscience and Pharmacology Seminar (1:1:0:0).** 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 for Translational Neuroscience & Pharmacology graduate students, it is taken during the fall and spring semesters. The course is designed such that students must interact by participating in the question and answer component of all seminars as well as during lunch with invited speakers. Grades are determined by faculty evaluation of seminar presentation and by participation during seminars. (F, IVC)

**7102. Readings in Pharmacology (1:1:0:0).** 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 for the 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. (F)

**8000.Doctoral Dissertation (V1-12). (F)**