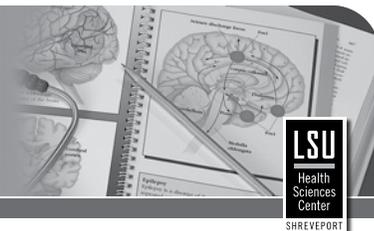


School of Graduate Studies



SANDRA C. ROERIG, Ph.D., DEAN

Appointed to the Deanship on April 1, 2004

Appointed to the Health Sciences Center Faculty on October 1, 1991

Telephone Number: (318) 675-7676

Faculty Academic Rank: Professor of Pharmacology, Toxicology and Neuroscience

The Louisiana State University Health Sciences Center in Shreveport

School of Graduate Studies Homepage:

<http://www.sh.lsuhscc.edu/gradschool/>

ADVISORY COUNCIL

SANDRA C. ROERIG, Ph.D.
Dean of Graduate School and
Associate Dean for Research, Chairman

ROBERT E. RHOADS, Ph.D.
Biochemistry and Molecular Biology, appointed

KELLY TATCHELL, Ph.D.
Biochemistry and Molecular Biology, elected

JOHN BEAL, Ph.D.
Cellular Biology and Anatomy, appointed

OMAR SKALLI, Ph.D.
Cellular Biology and Anatomy, elected

DENNIS J. O'CALLAGHAN, Ph.D.
Microbiology and Immunology, appointed

MARTIN I. MUGGERIDGE, Ph.D.
Microbiology and Immunology, elected

D. NEIL GRANGER, Ph.D.
Molecular and Cellular Physiology, appointed

TAK YEE AW, Ph.D.
Molecular and Cellular Physiology, elected at large

NORMAN HARRIS, Ph.D.
Molecular and Cellular Physiology, elected

NICHOLAS GOEDERS, Ph.D.
Pharmacology, Toxicology and Neuroscience, appointed

LISA SCHROTT, Ph.D.
Pharmacology, Toxicology and Neuroscience, elected

KEVIN McCARTHY, Ph.D.
Cellular Biology and Anatomy, elected at large

DALTON GOSSETT, Ph.D.
Biological Sciences, LSU-S representative

MICHAEL NEALY
Microbiology and Immunology, student

HISTORY

In 1965, the same year that the School of Medicine in Shreveport was authorized by an act of the Louisiana Legislature, a School of Graduate Studies was established as part of the LSU Medical Center. The first class of graduate students on the Shreveport campus was accepted in 1974. In 1978, the first Ph.D. degree was awarded from the Shreveport campus of the School of Graduate Studies. The LSU Medical Center was renamed the LSU Health Sciences Center in 1999, and the first Chancellor for the Shreveport campus was appointed on November 3, 2000. In 2004, the School of Graduate Studies on the Shreveport campus was administratively separated from the School of Graduate Studies in New Orleans and placed under the leadership of the Shreveport Chancellor. The first Dean of the School of Graduate Studies in Shreveport was named on April 1, 2004.

Shreveport campus program directors:

1974-1982	R. Don Brown, Ph.D. Coordinator of Graduate Studies
1982-1984	Harry Gilleland, Ph.D., Coordinator of Graduate Studies
1984-1992	Joseph Manno, Ph.D, Assistant Dean for Graduate Studies
1992-1996	Ronald Korthuis, Ph.D., Assistant Dean for Graduate Studies
1996-1999	Robert Chervenak, Ph.D., Assistant Dean for Graduate Studies
1999-2000	Leonard Seelig, Ph.D., Assistant Dean for Graduate Studies
2000-2004	Sandra C. Roerig, Ph.D., Assistant Dean for Graduate Studies
2004-Present	Sandra C. Roerig, Ph.D., Dean for Graduate Studies

LSUHSC-SHREVEPORT SCHOOL OF GRADUATE STUDIES

Mission Statement

The mission of the School of Graduate Studies at the LSU Health Sciences Center at Shreveport (LSUHSC-S) is to educate and train students in programs leading to the Master of Science and Doctor of Philosophy degrees in the biomedical sciences. Graduates of these programs are qualified for positions in academic, industrial, government and health care environments.

Graduate education in academic health centers is changing dynamically due in part to rapid advances in the basic sciences and biotechnology. The School of Graduate Studies is constantly developing and refining its programs so that graduates are trained to contribute to and compete in a changing world environment.

Goals of the School of Graduate Studies in support of its mission are:

1. To provide a strong program of instruction and research experience by providing high quality faculty, modern equipment and research facilities and a comprehensive approach to education.
2. To train biomedical scientists who can contribute to advances in health care and biotechnology.
3. To develop educators who will contribute to the graduate education of basic scientists, physicians and other health care professionals.

ADMISSION AND REGULATIONS

REQUIREMENTS FOR ADMISSION

The requirements for admission to the School of Graduate Studies are:

1. A baccalaureate degree from a college or university approved by a regional accrediting agency.
2. A grade point average of at least 2.5 for undergraduate work, and 3.0 for graduate work, on a 4 point scale and based upon all work for which a grade is given.
3. Satisfactory scores on the Graduate Record Examination.
4. Satisfactory standing at the most recent educational institution attended.
5. Acceptance in a departmental program.
6. It should be noted that individual departments may establish requirements more rigid than the minimal standards of the School of Graduate Studies so that a student meeting minimal school requirements may not be adequately prepared to enter graduate study in a particular program.

In addition, all international students must present acceptable scores (550 or better) on the Test of English as a Foreign Language (TOEFL) examination before they will be accepted as graduate students. These examinations are offered several times a year throughout the world.

Final acceptance is contingent upon acceptance by one of the departments offering graduate instruction leading to advanced degrees.

MEDICAL REQUIREMENTS

A physical examination and selected blood work and immunizations are mandatory prior to registration at the Health Sciences Center.

Students will receive information and instructions pertinent to student health in their acceptance packet.

EXPERIENTIAL CREDIT

The School of Graduate Studies does not award credit or advanced placement for any previous work experience or professional work certificate obtained by a student prior to admission. All required course work for each individual program must be completed. At the recommendation of a Department, and approval by the Dean of the Graduate School, some coursework may be exempted for students

who enter a Ph.D. program after having completed an advanced degree program such as M.S., M.D. or D.V.M.

TYPES OF ADMISSIONS

A student meeting all requirements is normally granted **unconditional admission**. Applicants who fail to meet all qualifications but who are nevertheless judged by the departments concerned and by the Dean to show promise for successful graduate work may be considered for **probationary admission** on the merits of their individual cases. Applicants who appear to be admissible but who are unable, for good reason, to supply the required credentials prior to the stated deadline may request **provisional admission**. In such cases complete credentials must be received not later than sixty days after the first day of classes (forty five days in the Summer term). International applicants who require an I-20 form must be unconditionally accepted.

ADMISSION PROCEDURE

The student should request information from the Office of Graduate Studies. The completed application form should be returned to the Office of Graduate Studies or to the Department of the application. One copy of each official transcript should be sent directly from the Registrar of each college or university the student has attended (including the various institutions in The LSU System) to the School of Graduate Studies of the Health Sciences Center. Letters of recommendation from two former professors are required. Students should request that results of the Graduate Record Examination (GRE) and the TOEFL Examination be sent directly to the School of Graduate Studies by the Educational Testing Service.

The completed application, including transcripts and GRE scores, will be sent to the Department concerned for review and recommendation. Those students acceptable to the Department of their choice will be notified of acceptance to the School of Graduate Studies by the Dean.

DEADLINES

Deadline dates for each department vary, depending upon number and quality of applicants, so early application is advised. Individual departments should be contacted for their deadlines.

RE-APPLICATION

Students once registered in the School of Graduate Studies who wish to resume work after an absence of more than one semester will be required to submit an application for re-admission at least ten days before registration. Supplementary transcripts must be submitted if any work has been taken at another institution during the interim. Exceptions to this requirement must be by successful petition to the Dean.

Instructions for Making Application to the LSU Health Sciences Center at Shreveport School of Graduate Studies

Completion of the application process requires the following:

1. The application form must be completed and sent to the School of Graduate Studies at the address shown below.
2. The official report of the Graduate Record Exam scores must be sent from the Educational Testing Service to the School of Graduate Studies. To expedite the application process, a copy of the GRE scores may be submitted. These will be verified from ETS, but will not substitute for the official report.
3. International Students must submit scores for both the Graduate Record Exam and the Test of English as a Foreign Language (TOEFL). The TOEFL must be taken unless the applicant has received at least a Bachelor's degree from a University in the United States.
4. One (1) copy of the official transcript must be sent to the School of Graduate Studies directly from each college or university attended. Transcripts which show transfer credit from other colleges attended are not acceptable. International students, please note that transcripts must be sent directly from the Registrar's (or equivalent) Office on official letterhead stationery of the University to the School of Graduate Studies. Transcripts issued to students are not considered official.
5. Two (2) letters of recommendation, preferably from professors who have taught the applicant in the basic sciences, must be sent to the School of Graduate Studies. The "Recommendation of Applicant" forms provided by the Graduate Office should be used.

All of the above should be sent to:

LSU Health Sciences Center at Shreveport
School of Graduate Studies
1501 Kings Highway
P.O. Box 33932
Shreveport, LA 71130

The application is the responsibility of the students. There will be no notification of incomplete applications. Inquiries about the application may be made to 318-675-7676. No collect calls.

FINAL DEADLINES FOR APPLICATION: Each department has its own deadline for receiving new applications. The departments may be contacted individually, or a call can be transferred from the Graduate Office (318-675-7676) to the department.

GRADUATE ASSISTANTSHIPS: Graduate stipends are available each year in each department. They are awarded by the department head. The department may be contacted for information regarding consideration for a stipend.

STATEMENT OF SATISFACTORY ACADEMIC PROGRESS

The Departments and the Dean review the qualitative and quantitative academic progress of each student. A student may be permitted to remediate upon the recommendation of the student's Department and concurrence by the Dean.

The student's qualitative and quantitative academic information will be submitted to the Office of Student Financial Aid Office to assist the Financial Aid staff with determining if the student has met the academic requirements for receiving financial aid. See the Student Financial Aid section for information on how academics affect financial aid.

CALENDAR, 2009-2010

August 2009 (Fall Semester)

Monday 3 - Orientation for new students
Wednesday 5 - Registration for Fall Semester
Monday 10 - Classes begin

September 2009

Monday 7 - Labor Day holiday

October 2009

Monday 12 - Columbus Day observed

November 2009

Friday 6 - Final date to submit request for Dissertation/ Thesis Defense and Final Examination to graduate at Fall Commencement. Final date to circulate announcement of M.S. or Ph.D.
Friday 20 - Final date to convene M.S. or Ph.D. defense to graduate at Fall graduation
Thursday/ Friday 26-27 - Thanksgiving holiday
Monday 30 - Classes resume

December 2009

Friday 4 - Final date to submit approved Dissertation/ Thesis Defense Final Examination Report for Fall awarding of degrees
Monday 7 - Registration for Spring Semester
Friday 18 - Fall Semester ends Commencement - May, 2010
Thursday/ Friday 24/ 25 - Christmas holiday
Thursday 31 - New Year's holiday

January 2010 (Spring Semester)

Friday 1 - New Year's holiday
Monday 4 - Classes begin
Monday 18 - Martin Luther King Jr.'s birthday observed

February 2010

Monday 22 - Mardi Gras holiday

April 2010

Friday 2 - Spring holiday
Monday 5 - Spring holiday
Friday 16 - Final date to submit request for Dissertation/ Thesis Defense and Final Examination to graduate at Spring Commencement. Final date to circulate announcement of M.S. or Ph.D. Final Examination for Spring Commencement to Graduate Faculty
Friday 30 - Final date to convene M.S. or Ph.D. defense to graduate at Spring Commencement

May 2010

Friday 7 - Graduate Research Day
Monday 11 - Registration - Summer semester

Friday	14 - Final date for submission of approved theses, dissertations and committee examination reports for Spring Commencement
Friday	28 - Spring Semester ends
Saturday	29 - Commencement (December and May graduates)
Monday	31 - Memorial Day Holiday

June 2010 (Summer Semester)

Monday	7 - Classes begin
Friday	25 - Final date to submit request for Dissertation/ Thesis Defense and Final Examination to graduate at Summer Commencement. Final date to circulate announcement of M.S. or Ph.D. Final Examination for Summer Commencement to Graduate Faculty.

July 2010

Monday	5 - Independence Day Holiday
Friday	9 - Final date to convene M.S. or Ph.D. defense to graduate at Summer Commencement.
Friday	23 - Final date for submission of approved theses and dissertations and committee-examination reports for Summer Commencement.

August 2010

Friday	6 - Summer Semester ends
Saturday	14 - Commencement

August 2010 (Fall Semester)

Wednesday	4 - Registration
Monday	9 - Classes begin

September 2010

Monday	6 - Labor Day holiday
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October 2010

Monday	11 - Columbus Day observed
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November 2010

Wednesday	5 - Final date to submit request for Dissertation/ Thesis Defense and Final Examination to graduate at Fall Commencement. Final date to circulate announcement of M.S. or Ph.D.
Wednesday	19 - Final date to convene M.S. or Ph.D. defense to graduate at Fall Commencement
Thursday/ Friday	25/ - Thanksgiving holiday 26

December 2010

Friday	3 - Final date to submit approved Dissertation/ Thesis Defense Final Examination Report for Fall awarding of degrees
Monday	6 - Registration - Spring semester
Friday	17 - Fall Semester ends Commencement - May, 2011

January 2011 (Spring Semester)

Tuesday	4 - Classes begin
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Monday	17 - Martin Luther King Jr.'s birthday observed
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March 2011

Monday	7 - Mardi Gras holiday
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April 2011

Friday	15 - Final date to submit request for Dissertation/ Thesis Defense and Final Examination to graduate at Spring Commencement. Final date to circulate announcement of M.S. or Ph.D. Final Examination for Spring Commencement to Graduate Faculty
Friday	22 - Spring holiday
Monday	25 - Spring holiday
Friday	29 - Final date to convene M.S. or Ph.D. defense to graduate at Spring Commencement

May 2011

Friday	13 - Final date for submission of approved theses, dissertations and committee examination reports for Spring Commencement
Friday	27 - Spring Semester ends
Saturday	28 - Commencement

May 2011 (Summer Semester)

Monday	9 - Registration
Monday	30 - Memorial Day Holiday

June 2011

Monday	6 - Classes begin
Friday	24 - Final date to submit request for Dissertation/ Thesis Defense and Final Examination to graduate at Summer Commencement. Final date to circulate announcement of M.S. or Ph.D. Final Examination for Summer Commencement to Graduate Faculty.

July 2011

Monday	4 - Independence Day Holiday
Friday	8 - Final date to convene M.S. or Ph.D. defense to graduate at Summer Commencement.
Friday	22 - Final date for submission of approved theses and dissertations and committee-examination reports for Summer Commencement.

August 2011

Friday	5 - Summer Semester ends
Saturday	13 - Commencement

STUDENT FINANCIAL AID

A complete detailing summary of all provisions governing financial aid available to Graduate Studies students may be found in the general section of this publication under the heading: "STUDENT FINANCIAL AID."

SPECIAL STATUS STUDENTS

An applicant may seek to enroll in Graduate School courses as a non-matriculating Special Status student. The applicant must have earned a baccalaureate degree from an accredited college or university.

An official transcript must be sent from the college or university to the School of Graduate Studies. A minimum undergraduate GPA of 2.5 and 3.0 for graduate work is required. The applicant must submit a letter signed by the director of the course in which the applicant wishes to enroll, to the School of Graduate Studies. The letter must state the course number, title and number of credit hours, as listed in this publication. The applicant letter must arrive in the Graduate School Dean's office for approval at least two weeks before registration. If approved, the applicant must fill out an application form and pay the application fee at least one week before registration. This procedure applies for each term in which the student wishes to enroll in a course. At registration, the student will pay the registration fees according to the Graduate School fee schedule. A maximum of 12 credit hours of graduate credit earned as a Special Status student will be considered for meeting a graduate degree requirement in the School of Graduate Studies. Credit hours earned as a Special Status student may not be used to meet degree requirements in the School of Medicine or the School of Allied Health Professions.

COMBINED DEGREE PROGRAM M.D. AND Ph.D.

LSUHSC SHREVEPORT M.D./Ph.D. DEGREE PROGRAM

The combined M.D./Ph.D. program is an option for a limited number of students with superior academic records and unusual research potential. In the course of the program, a student will pursue the medical curriculum for two years, spend three to four years as a graduate student to acquire the Ph.D., and finally spend two years completing the medical curriculum. Prospective students must first apply to and be accepted to the medical school. When applying, they should state their desire to enter the M.D./Ph.D. program. Criteria for consideration of admission are: MCAT scores of 28; GPA 3.5 (on a 4.0 scale); and GRE combined Verbal, Quantitative and Analytical score of at least 1200. The GRE is required. Students must maintain a B average or the equivalent, during the entire program. Students must fulfill all the requirements of the Doctor of Medicine and the Doctor of Philosophy degrees.

If a student withdraws from either the M.D. or Ph.D. portion of the program the student is required to reimburse all tuition and fees paid or waived.

COURSE DESCRIPTIONS

Below are listed the courses of instruction carrying graduate credit which are offered by the School of Graduate Studies. No credit is given for any course unless the student has been duly registered in that course.

The amount of credit given for the completion of a course is based on the number of student contact hours, including lectures, group discussions and exams. For each credit hour, 17 contact hours are required. When a course consists of laboratory research, 7-8 hours is considered the equivalent of one lecture hour. One hour of credit per term is given for courses such as Seminar and Journal Club, that consist of research lectures and group discussions, usually held once per week for the duration of the term.

If the number of credits listed for a course is variable (for example, "2-4 cr."), the credit hours to be obtained by a student must be determined and recorded at the time of the student's registration. Any subsequent increase in the amount of credit will be equivalent to adding a new course, and this will not be permitted after the expiration of the period during which course changes may be made.

Graduate courses may be offered only when required by a minimal number of students enrolled for degrees.

BIOCHEMISTRY AND MOLECULAR BIOLOGY (M.S., Ph.D.)

Robert Rhoads, Ph.D., Professor and Head

The goal of graduate education in biochemistry is to provide the foundation necessary to design and execute biochemical experiments and to communicate the findings to others. Highly developed skills in the use of the scientific methods enable the graduate to pursue a career in biomedical science at a university, research institute, hospital or in industry. The program is flexible and individually designed to meet the needs of the student. Concepts and principles are stressed in teaching and research. Laboratory research and investigation are vigorously emphasized at all stages in the program. Basic introductory and advanced courses are offered.

Before registering for any course, a student should consult the course director to determine adequacy of preparation for the course.

Core Requirements

The Program for obtaining the Ph.D. is tailored to the requirements of individual students, but the core requirements for all students are:

Credits

IDSP 111-113A&B, Basic Biochemistry, Molecular and Cellular Biology, I-III --	6
IDSP 114, Molecular Signaling -----	1
IDSP 115, Molecular Genetics -----	2
IDSP 116, Biochemical and Molecular Methods -	1
IDSP 117, Recombinant DNA and Cell Biology --	1
IDSP 225, Introductory Biostatistics -----	1
IDSP 240, Philosophical and Ethical Issues in Science -----	1
BCHM 207, Introduction to Special Methods of Research -----	1-6
BCHM 223, Physical Biochemistry -----	2
BCHM 282, Topics in Biochemistry and Molecular Biology -----	1
BCHM 288, Scientific Writing -----	1
BCHM 298, Journal Club -----	4
BCHM 299, Research Seminar -----	4
BCHM 400, Dissertation Research -----	1-9
Elective Courses -----	8

BIOCHEMISTRY AND MOLECULAR BIOLOGY

COURSE DESCRIPTIONS

BCHM 207 Introduction to Special Methods of Research. 1-6 Credits, (Credit to be specified at time of registration.) Theoretical discussions and laboratory work in an area of research methodology, directed by an expert in the use of the method.

BCHM 223 Physical Biochemistry. 2 Credits, Discussions of physical and chemical techniques used to study macromolecular architecture and interactions.

BCHM 271 Biochemistry, Special Topics in Cell Signaling. 1 Credit, Description: This course is a one credit course designed

from current literature. The topic of the course will change for each offering. The format of the course is lecture and discussion, with the latter led by students. Here will be two or three subtopics for each offering. Each subtopic will be introduced by a lecture from one of the faculty directors, followed by discussion. The next meeting concerning that subtopic will be led by a student, with each participant presenting a paper dealing with one aspect of the subtopic.

BCHM 281 Molecular Mechanisms of Posttranscriptional Control. 1 Credit, A literature-based course on the molecular mechanisms associated with posttranscriptional control. Course material will be derived from the current literature and will focus on the most recent findings concerning splicing, polyadenylation, mRNA stability, translation, and protein targeting.

BCHM 282 Topics in Biochemistry and Molecular Biology: Current Topics in Protein Chemistry. 1 Credit, A series of lectures on state-of-the-art approaches to studying proteins and their functions. This will include protein structure, protein folding and protein-ligand interactions.

BCHM 283 Topics in Biochemistry and Molecular Biology: Molecular Mechanisms of Transcriptional Control. 1 Credit, A literature-based course covering the role of promoter-specific activators and repressors, the nature and role of the general transcriptional machinery, and the role of nucleosomes and higher-order chromatin structures in regulating transcription.

BCHM 285 Topics in Biochemistry and Molecular Biology: Eukaryotic Developmental Biology. 1 Credit, A literature-based course that is focused on developmental regulatory mechanisms in higher animals. Topics include cell fate specification, differentiation, and pattern formation.

BCHM 286 Topics in Biochemistry and Molecular Biology: Classical and Molecular Genetics. 1 Credit, This course will emphasize classical genetic methods as they apply to modern molecular biology. The course content will rely on yeast as an experimental organism, although the intent is to teach genetic principles as they apply to eukaryotic organisms in general.

BCHM 287 Topics in Biochemistry and Molecular Biology: Applications of Spectroscopic Techniques to Biochemical Problems. 1 Credit, Lectures cover the use of state-of-the-art spectroscopic techniques to deduce kinetic and mechanistic aspects of proteins and nucleic acids.

BCHM 288 Scientific Writing. 1 Credit, A course designed to teach the fundamentals of writing and critiquing scientific papers and grant proposals. This includes the identification of topics and laboratory approaches suitable for development in grant proposals.

BCHM 289 Special Topics in Biochemistry and Molecular Biology: Molecular Carcinogenesis. 1 Credit. A literature based discussion course covering current advances in the molecular biology of carcinogenesis. Topics will include cancer initiation and progression, cancer cell cycle, angiogenesis and metastasis and molecular therapeutics.

BCHM 290. Introduction to Bioinformatics. 3 Credits, This course is designed to provide an introduction to the computational and biological concepts and skills required for the field of bioinformatics. It provides an overview of the field and trains students in the use of some current bioinformatics programs. Some topics to be covered are biological data bases, pairwise sequence alignment BLAST searching, analysis of gene expression data, proteomics, multiple sequence alignment, protein structure prediction, molecular

phylogeny, genomic analysis, and PERL for bioinformatics. By the end of the course students should be able to search for novel genes of unknown function, identify homologous proteins, and develop hypotheses regarding the function of novel genes.

BCHM 298. Journal Club. 1 credit. Each year, all doctoral students are expected to make a one hour presentation from the current literature and to participate in all journal club meetings scheduled in the Fall and Spring semesters. First and second year students should choose a faculty advisor who is not their dissertation or rotation director to advise in choice of topic and to critique the journal club both prior to and after the presentation. Senior level students, although not registered for BCH 298, are expected to continue full participation in the Journal Club, including presenting once each year.

BCHM 299. Research Seminar. 1 credit. This course offers credit for participation in the departmental seminar program and student seminar program. Each student is expected to present a formal research seminar on their research project at least once during his/her degree candidacy and to participate in all departmental seminars scheduled in the Fall and Spring semesters.

BCHM 300. Thesis Research. 1-6 credits. This course offers credit for research work applied to the Masters thesis.

BCHM 400. Dissertation Research. 1-9 credits. This course provides students credit for their research work applied to their Ph.D. dissertation.

CELLULAR BIOLOGY AND ANATOMY (M.S., Ph.D.)

John Beal, Ph.D., Professor and Acting Head

The goal of graduate education in the Department of Cellular Biology and Anatomy is to provide a broad-based foundation in the anatomical sciences, including anatomy, cell biology, neuroscience, developmental biology, and pathology while providing students with the necessary background to design and perform experiments in the modern biomedical sciences. Programs leading to either an M.S. or Ph.D. degree in Cellular Biology and Anatomy are flexible and individually designed to meet the needs of a student who may wish to pursue a career in biomedical research in an academic or industrial environment or to pursue a teaching career in the biomedical or allied health professions. Concepts and principles of biomedical research are stressed in both the classroom and the laboratory. Competitive laboratory research and investigation are stressed from the beginning of the student's career. Basic introductory and advanced courses are offered in various disciplines, but particularly in the areas of neuroscience, cell biology, cancer biology, immunology, and pathology. Permission from the course director is required for registration in any advanced course.

The Department offers programs of study in cell biology, immunobiology, neuroscience, pathology, and cancer research which are tailored for individual students. Students in the M.S. program select at least 23 credits from the core curriculum, and students in the Ph.D. program generally complete the core curriculum and two advanced courses in their research areas, before beginning full-time research to complete a thesis (M.S.) or a dissertation (Ph.D.).

Core Requirements

	<u>Credits</u>
IDSP 111-113, Basic Biochemistry, Molecular and Cellular Biology, I-III	----- 6
IDSP 114, Molecular Signaling	----- 1
IDSP 115, Molecular Genetics	----- 2

IDSP 116-117, Biochemical and Molecular Methods, Recombinant DNA -----	2
IDSP 211-214, 216-219, Foundations of Biomedical Science -----	10
IDSP 225, Introductory Biostatistics -----	1
IDSP 240, Philosophical and Ethical Issues in Science -----	1
CEBIO 200C, Integrative Structural Biology, Histology -----	2
CEBIO 230, Experimental Cell Biology -----	3
CEBIO 250, Research Methods (Laboratory Rotations) -----	2-8
CEBIO 280-2, Special Topics in Anatomy -----	4
CEBIO 289, Current Topics in Cell Biology (Journal Club) -----	4
CEBIO 299, Research Proposal in Anatomy -----	3
CEBIO 400, Dissertation Research -----	1-9
Elective Courses -----	2-8

Molecular Pathology Track

The Molecular Pathology Track within the Department of Cellular Biology and Anatomy promotes a translational approach to the study of the mechanisms of disease initiation and progression. In addition to the required courses listed above, the students in this track will complete the following required courses:

Credits

CEBIO 223, Molecular Basis of Disease -----	2
CEBIO 224, Molecular Basis of Disease Journal Club -----	1

Research advisors for students participating in this track will have appointments in the Department of Pathology. Dissertation research will involve an area of Molecular Pathology.

**CELLULAR BIOLOGY AND ANATOMY
COURSE DESCRIPTIONS**

CEBIO 200A Integrative Structural Biology: Human Anatomy. 2 Credits. An introduction to the structure and function of the human body. The course consists of 17 hours of lecture and 34 hours of laboratory experience (2 hours per lecture). There will be two written examinations based on the topics covered and will consist of short answers, cross-section identification, or essay questions.

CEBIO 200C Integrative Structural Biology: Histology. 3 Credits. An introduction to the microscopic anatomy and function of human tissues.

CEBIO 216. Human Developmental Biology. 3 Credits. Three hours of lecture. Lectures on human development correlated with films and laboratory demonstrations. Participation of students will be encouraged in the form of discussions and presentations.

CEBIO 223 Molecular Basis of Disease. 2 Credits. Faculty member in charge: Kevin McCarthy, Ph.D., Cellular Biology and Anatomy. The course will serve to integrate basic science knowledge obtained by students in first year of graduate school with mechanisms of disease progression. The course will consist of five modules. Module 1, taught by the basic science faculty in the Division of Research of the Department of Pathology, will consist of 10 hours

of lectures on the cellular response to disease from the basic science perspective i.e. the integration of the basic science information gained in year 1 of the curriculum into the context of disease initiation and progression. Modules 2 through 5 will focus on four “benchmark” diseases. Each module will consist of seven lectures, two of which will be given by Faculty with significant expertise in the clinical manifestations of the disease (basic pathology and pathophysiology) and five by the Basic Science Faculty within the Division of Research in Pathology. The pathology and pathophysiology aspects of the course will emphasize: 1) what is known about the disease from a clinical perspective; 2) unanswered clinical questions that need to be addressed from a basic science perspective. The Basic Science Faculty involved in the course will give lectures that 1) summarize what is known about the basic mechanisms of disease initiation and progression; 2) discussion how adverse modulation of well known cellular pathways/events contributes to disease progression; 3) provide insights to necessary venues of translational research.

This course will be run within the Pathology track of the graduate program in the Department of Cell Biology and Anatomy.

CEBIO 224 Molecular Basis of Disease Journal Club. 1 Credit. Faculty member in charge: Kevin McCarthy, Ph.D., Cellular Biology and Anatomy. The journal club, which has been a constant weekly meeting in the Department of Pathology since 1997, serves to integrate basic science knowledge with mechanisms of disease progression. The journal club will consist of weekly presentations and discussions by students and faculty of current research reports. For student enrolled in the Cell Biology Course “Molecular Basis of Disease” enrollment in the journal club is mandatory. Each student will be expected to present and discuss at least one paper during the semester. Evaluation criteria for students enrolled in the journal club for academic credit include the quality of student presentations and the student participation in weekly discussions during the journal club.

This course will be run within the Pathology track of the graduate program in the Department of Cell Biology and Anatomy. At present the role in the course development is primarily faculty members with joint appointments in the Departments of Cell Biology and Anatomy and Pathology.

CEBIO 230 Experimental Cell Biology 1. 3 Credits. Lecture and laboratory course for the design and implementation of experiments in cell biology. Includes instruction in animal handling and care, morphologic tissue preparation, computerized image-analysis, experimental design, data management and prepublication preparation. The course involves extensive student involvement and a laboratory report.

CEBIO 250 Research Methods. 2-8 Credits. A laboratory course in which students rotate through selected faculty-research laboratories and become acquainted with the research techniques and laboratory routines in each.

CEBIO 280-2 Special Topics In Anatomy. 2-4 Credits. Two to four hours of lecture per week to be arranged appropriate to topic and credit. Lectures, discussions and/or laboratories on areas not adequately covered in other scheduled courses. In addition, this course is designed to permit graduate students to explore one or more areas of particular interest to the staff in detail. Examples of selected topics: Biological rhythms, connective tissue biology, cranial-nerve embryology, uterine biology, neuronal plasticity, central nervous system development in an altered environment, patterns of visual connectivity. etc.

CEBIO 289 Current Topics in Cell Biology. 1 Credits. In the fall and spring semesters, students will participate in a course offered in the format of a journal club, in which significant recent contributions to the research literature are discussed. This course offers students an opportunity to keep abreast of current research and to develop public speaking skills. The interpretation of results

and critical analysis of experimental data will be emphasized. May be repeated for credit.

CEBIO 290 Seminar. 1 Credits. Students will attend and participate in the seminars conducted by the Department of Cellular Biology and Anatomy. Periodically, each student will prepare and present to the group a seminar on the subject topic under discussion at that particular period of time. Emphasis will be placed upon such subjects as fine structure, correlation of biochemical information with ultrastructure, and the cytophysiology of the various organ systems.

CEBIO 299 Research Proposal in Anatomy. 3 Credits. A required course for all doctoral candidates in which the student prepares, in National Institutes of Health grant applications format, a written proposal on the candidate's doctoral problem. The proposal is comprised of sections on a) Background of the problems, b) specific aims, c) rationale of the experimental approach, (d) preliminary findings, e) experimental methods. This proposal will be reviewed by the student's major advisor and examining committee. After the proposal is approved, the student may continue dissertation research. Deviations from the program outlined in the proposal must be approved by the student's examining committee.

CEBIO 300 Thesis Research. 1-6 Credits. Registration by permission of the Head of the Department. Amount of credit to be stated at time of registration. Laboratory investigation which the student conducts to acquire information for the presentation to the faculty of a thesis is a necessary part of graduate study.

CEBIO 400 Dissertation Research. 1-9 Credits. Registration by permission of the Head of the Department. Amount of credit to be stated at the time of registration. Laboratory investigation of the problem selected by the student for the student's doctoral dissertation must be pursued by every candidate.

MICROBIOLOGY AND IMMUNOLOGY (M.S., Ph.D.)

Dennis O'Callaghan, Ph.D., Boyd Professor and Head

The Department of Microbiology and Immunology offers programs of study leading to the degree, doctor of philosophy. The research facilities include a variety of equipment such as ultracentrifuges, scintillation counters, a computerized spectrophotometer system and laser densitometer, as well as specialized suites designed for computing, DNA sequencing, high performance liquid chromatography, photographic processing, germ free animal research, monoclonal antibody production, virus cultivation and tissue culture work, isotope experimentation, polymerase chain reaction technology, flow cytometry and recombinant DNA-gene cloning research. The major research emphasis of the faculty currently involves: cell and molecular biology of prokaryotic and eukaryotic cells and animal viruses; cellular, tumor, and molecular immunology; pathogenesis of bacterial, viral, and parasitic diseases; and tumor virology; basic research on the development of vaccines for bacterial and viral diseases. Ongoing research includes investigation of agents related to bioterrorism. The curriculum is composed of courses in the areas of cell and molecular biology, bacterial structure/function, microbial and mammalian cell genetics, virology, immunology and pathogenesis. The primary emphasis of the doctoral program concerns, however, the training of graduate students to become independent researchers in the biomedical or university environment. In the seminar and journal club courses, emphasis is placed on training students how to organize and present scientific information and to develop skills in teaching. Students are required to write and to defend two major research proposals in order to obtain experience and skills in scientific writing and in composing grant applications that present a carefully crafted research plan. Collaborative research efforts are encouraged

between members of the department and with faculty and students at LSUHSC and other research institutions.

Core Requirements

The Program for obtaining the Ph.D. can be tailored to the requirement of each individual student, but the core requirements for all students are:

Credits

IDSP 111-113A&B, Basic Biochemistry, Molecular and Cellular Biology, I-III	-----	6
IDSP 114, Molecular Signaling	-----	1
IDSP 115, Molecular Genetics	-----	2
IDSP 116, Biochemical and Molecular Methods	-	1
IDSP 117, Recombinant DNA and Cell Biology	--	1
IDSP 240, Philosophical and Ethical Issues in Science	-----	1
MICRO 276, General and Molecular Virology	---	3
MICRO 289, Molecular Pathogenesis of Infectious Diseases II	-----	3
MICRO 291, Bacteriology and Molecular Pathogenesis I	-----	3
MICRO 292, 293, 295 or 296, Discussions in Advanced Virology, Advanced Immunology, Bacteriology, Cellular Microbiology	-----	3
MICRO 298, Seminar	-----	3
MICRO 297, Immunology	-----	3
MICRO 400, Dissertation Research	-----	1-9

MICROBIOLOGY AND IMMUNOLOGY COURSE DESCRIPTIONS

Part 1: Required Courses

IDSP 111, 112, 113A&B, 114, 115, 116, 117

MICRO 276 GENERAL AND MOLECULAR VIROLOGY. 3 Credits. An introduction to the structure, replication, biology, and molecular biology of animal viruses. Emphasis is also given to virus-cell interactions at the molecular level, including the immune response to viral infections, and current research on mechanisms of viral replication and its effect on regulatory mechanisms of host cells. Lectures, discussions, and seminars.

MICRO 289 MOLECULAR PATHOGENESIS OF INFECTIOUS DISEASES 2. 3 Credits. An advanced study of the mechanisms whereby bacteria and viruses cause infectious disease. The interactions between these pathogens and the host will be examined in detail utilizing various animal and human models. Pathogenesis will be presented ecologically following the events of the pathogen's entry into the host, its encounters with the host, its encounters with the host's defense mechanisms, strategies employed by the bacteria and viruses to counteract host defenses and to spread throughout the host, mechanisms of cell and tissue damage, etc. Emphasis will be placed on the molecular aspects of virulence factors and host defenses.

MICRO 291 BACTERIOLOGY AND MOLECULAR PATHOGENESIS OF INFECTIOUS DISEASES 1. 3 Credits. An advanced course of lectures and discussions in the

areas of structure, function, genetics and physiology of bacteria. In the first portion of the course, genetic exchange mechanisms, gene regulation mechanism and genomics will be discussed. In addition, lectures will address topics in medical mycology and parasitology.

MICRO 297 IMMUNOLOGY. 3 Credits. An advanced course, employing both lecture and discussion formats, that is designed to cover many of the important aspects of modern cellular and molecular immunology. Strong emphasis is placed on understanding the myriad of molecular interactions involved in the development, function, and regulation of the cells responsible for immune phenomena. By the supplemental reading of crucial journal and review articles, students are encouraged to examine and interpret recent experimental findings.

IDSP 240 PHILOSOPHICAL AND ETHICAL ISSUES IN SCIENCE. 1 Credit. The objective of this course is to provide an understanding of the underlying philosophy in scientific endeavors and the ethical issues that face scientists. The course will involve detailed discussions about the history of scientific thought, the scientific method, experimentation and data collection, and current ethical issues. Weekly sessions will include lectures and discussions by faculty, students and guest speakers.

Part 2. Journal Club Courses

First year students rotate through Journal Clubs during the first semester. Every student must become a member of a Journal Club beginning in January of the first year.

MICRO 292 DISCUSSIONS IN ADVANCED VIROLOGY AND MOLECULAR BIOLOGY. 1 Credit. A journal club format is used for students to present and discuss developing concepts and new information about techniques and research findings from the disciplines of molecular virology and cellular-molecular biology. Emphasis is given to teaching the student to develop the skills required for a critical assessment of the scientific literature and for understanding how new information can be applied to research problems.

MICRO 293 DISCUSSIONS IN ADVANCED IMMUNOLOGY. 1 Credit. A journal club/research in progress format is used for the discussion of new findings in immunology and related fields. Experimental observations published in the literature as well as those from the student's own research activities are explored. Emphasis is placed on the development of communication skills as well as the ability to critically evaluate experimental data and improve experimental design.

MICRO 295 DISCUSSIONS IN BACTERIOLOGY. 1 Credit. A journal club/research in progress format is used for discussion of recent published and unpublished research in the field of bacteriology. Emphasis is placed on critical evaluation of experimental design, data and conclusions as well as on the development of communication skills and knowledge of new developments in prokaryotic biology.

MICRO 296 DISCUSSIONS IN CELL BIOLOGY. 1 Credit. A journal club format is used for the discussion of recent findings in cell and molecular biology. Emphasis is given to teaching the student skills required to both critically evaluate published experiments and to accurately communicate scientific reasoning.

Part 3. Required Research and Seminar Courses

MICRO 298 SEMINAR IN MICROBIOLOGY. 1 Credit. The student prepares and presents selected findings from either the current literature or his/her research in a 45-minute public seminar. The

seminar consists of a brief and informative introduction, explanation of the experimental procedures and strategies employed, presentation and critical assessment of the findings, and a questions/discussion period. Prior to the seminar, the student must prepare and circulate a written abstract announcing the seminar and summarizing the key findings to be presented. One seminar each year must concern the research in progress by the student. The student is provided a written critique of the seminar by each faculty member and discusses these critiques with the faculty member responsible for the course.

MICRO 400 DISSERTATION RESEARCH. Credit to be arranged. Research for the doctoral degree is conducted under the supervision of the student's Advisor in concert with the members of the student's Advisory Committee. Registration is by consent of the Head of the Department. The amount of credit is to be stated at the time of registration.

MOLECULAR AND CELLULAR PHYSIOLOGY (M.S., Ph.D.)

D. Neil Granger, Ph.D., Boyd Professor and Head

The goal of the graduate training program in physiology is to provide the skills necessary for the graduate to pursue an independent career in biomedical research at a university, research institute, hospital, or in industry. The program provides graduate training through introductory and advanced courses, participation in seminars and national meetings, and preparation of grant proposals. Laboratory research is vigorously emphasized at all stages of the program. The major research emphasis of the faculty is focused on cardiovascular physiology, pathophysiology, and cell and molecular physiology. Current topics of investigation relate to the function of the microcirculation in health and disease, vascular biology of nitric oxide, liver pathophysiology and obesity, DNA repair, cell signaling mechanisms, the role of granulocytes and free radicals in inflammation and postischemic cellular injury, glutathione-dependent detoxification, and mitochondrial responses to ischemia and reperfusion. These problems are addressed at the subcellular, cellular, and organ levels.

Core Requirements

The Program for obtaining the Ph.D. can be tailored to the requirement of each individual student; but the core requirements for all students are:

	<u>Credits</u>
IDSP 111-113A&B, Basic Biochemistry, Molecular and Cellular Biology, I-III -----	6
IDSP 114, Molecular Signaling -----	1
IDSP 211-214, 216, 217, 219, Foundations of Biomedical Sciences -----	8
IDSP 116, Biochemical and Molecular Methods -	1
IDSP 117, Recombinant DNA and Cell Biology --	1
IDSP 225, Introductory Biostatistics -----	1
IDSP 240, Philosophical and Ethical Issues in Science -----	1
PHYS 201-203, Research (Laboratory Rotations) -----	4
PHYS 211, Skills in Investigative Research --	2
PHYS 230, Physiological Chemistry of Reactive Oxygen Metabolites -----	4
PHYS 235, Physiological Role of Reactive Oxygen Species in Signal Transduction ---	5
PHYS 270, Special Topics; Journal Club -----	4

PHYS 277, Advanced Cardiovascular Physiology I: Cardiac -----	5
PHYS 278, Advanced Cardiovascular Physiology II: Microcirculation -	5
PHYS 279, Advanced Gastrointestinal Physiology -----	4
PHYS 298, Seminar -----	4
PHYS 400, Dissertation Research -----	6
Elective Courses -----	6

MOLECULAR AND CELLULAR PHYSIOLOGY

COURSE DESCRIPTIONS

PHYS 201 and 203 Laboratory Rotations / Research. (Hours and credits by arrangement) Theory and application of specialized techniques and instrumentation used for studying various physiological phenomena. Emphasis is in one or more of the following areas: Gastrointestinal transport, cardiovascular dynamics, radioimmunoassay, blood gas analysis, and computer techniques applied to analysis of biological data.

PHYS 211 Skills in Investigative Research. 2 Credits. This course provides a practical introduction to first year graduate students to the basic oral and written skills that are fundamental in investigative research. Students will be instructed in the theory and practice of how to write a scientific paper, to present a scientific talk, to critique and present research papers, and grantsmanship. Student participation is a major emphasis.

PHYS 230 Physiological Chemistry of Reactive Oxygen Metabolites. 4 Credits. This course is designed to introduce the student to the basic concepts of oxygen-derived free radical chemistry with particular emphasis on the physiological consequences of normal and/or aberrant free radical production in vivo.

PHYS 235 Physiological Role of Reactive Oxygen Species in Signal Transduction. 5 Credits. Reactive oxygen species (ROC) are generated in cells through normal cellular metabolism, as well as by exogenous sources. At low levels, ROS can act as signals, whereas at high levels can damage the macromolecules of the cell and result in cell death or aberrant function. The physiological low level of ROC can be required for cellular growth and initiates a different type of cellular signaling than the high levels of ROS that upset the redox balance in the cell and cause oxidative stress. This advanced course aims to introduce the students to the chemistry and biochemistry of ROS and redox status of the cell. They will gain an understanding of oxidative stress and the different signaling pathways related to ROS. The course is divided into 4 sections: (1) the chemistry and biochemistry of ROS, (2) signal pathways related to ROS, (3) redox, oxidative stress and cell signaling and (4) the signaling in biological processes and disease. This latter section will integrate the knowledge acquired from sections 1-3 and demonstrate the biological importance of ROS and signal transduction to the physiological workings of the cell.

PHYS 270 Special Topics: Journal Club. 1 Credit. Course covers journal reviews and articles on diverse topics in Molecular Physiology including inflammation, microcirculation, imaging, genomics and therapeutics approaches.

PHYS 278 Advanced Cardiovascular Physiology. 5 Credits. A comprehensive summary of physiology of the peripheral circulation. The major emphasis is on the functions of various components of the microcirculation including a consideration of the

biophysics of vascular smooth muscle contraction and its relation to the regulation of blood flow distribution within and among organs, substrate transport across the microcirculation, the endothelial cell as a metabolic barrier to substrate transport, regulation of blood flow in the various organs, and angiogenesis.

PHYS 279 Advanced Gastrointestinal Physiology. 4 Credits. A comprehensive summary of digestive system physiology using the organ systems approach in which the physiologic concepts relevant to individual organs are systematically presented. The approach lets the student track a bolus of food through the entire gastrointestinal tract, learning on the way each organ's physiologic junctions as the bolus directly or indirectly contracts it.

PHYS 298 Seminar. 1 Credit. A maximum of two credits towards the M.S. or four credits toward the Ph.D. may be earned.

PHYS 300 Thesis Research. 1-6 Credits. Amount of credit to be stated at time of registration.

PHYS 400 Dissertation Research. 1-9 Credits. Amount of credit to be stated at time of registration.

PHARMACOLOGY, TOXICOLOGY AND NEUROSCIENCE (M.S., Ph.D.)

Nicholas Goeders, Ph.D., Professor and Head

Training is available in diverse areas of pharmacology, toxicology, and neuroscience. The program is designed to provide graduate training through advanced courses, seminars, and laboratory research leading to the Doctor of Philosophy degree in Pharmacology. The Master of Science degree program is available to selected students at the discretion of the faculty. Special opportunities exist in the fields of neuropharmacology, molecular pharmacology and toxicology. Students enrolled in the doctoral program are required to take core courses that emphasize biochemistry, physiology, biometry, methods in pharmacology, principles of pharmacology, and general pharmacology. Other courses may be required depending upon the student's background and interests.

The area for dissertation research is chosen by the student in consultation with the faculty. Students may register for graduate courses only after consultation with the course director.

Core Requirements

The program for obtaining the Ph.D. can be tailored to the requirement of each individual student, but the core requirements for all students are:

	<u>Credits</u>
IDSP 111-113A&B, Basic Biochemistry, Molecular and Cellular Biology, I-III -----	6
OR	
PHARM 221-223, Advanced Topics in Pharmacology -	5
IDSP 211-214, 216-219, Foundations of Biomedical Sciences -----	10
IDSP 116, Biochemical and Molecular Methods -	1
IDSP 225, Introductory Biostatistics -----	1
IDSP 240, Philosophical and Ethical Issues in Science -----	1
PHARM 203, Methods in Pharmacology -----	9
PHARM 260, Molecular Pharmacology -----	2
PHARM 200, Grant Writing -----	1
PHARM 210, Methods in Pharmacology -----	2

PHARM 233, Neuropharmacology, and PHARM 245, Toxicology -----	2 each
PHARM 258, Pharmacokinetics & Pharmacodynamics	1
PHARM 270, 271 or 272, Discussions in Neuropharmacology, Toxicology or Pharmacology (Journal Club) -----	6
PHARM 298, Seminar -----	4
PHARM 400, Dissertation Research -----	6
Elective Courses -----	3

Biotechnology Track

The Department offers a unique Biotechnology Track which is designed to provide training to Ph.D. students interested in pursuing careers in the biotechnology and pharmaceutical industries. Students wishing to complete this track will complete the following required courses:

	<u>Credits</u>
IDSP 120, Biotechnology and the Pharmaceutical Industry -----	1
IDSP 121, Biotechnology Entrepreneurship ----	1
IDSP 122, Methods in Biotechnology -----	2

In addition, students will complete a six month internship at a biotechnology or pharmaceutical company. Students will have an option of carrying out a second six month internship with a venture capital firm after receiving their Ph.D. degree.

PHARMACOLOGY, TOXICOLOGY AND NEUROSCIENCE

COURSE DESCRIPTIONS

PHARM 200 Grant Writing. 1 Credit. A review of the process of grant writing and submission. Lectures will review the structure of the major granting agencies and the mechanisms for submission, review and awarding of grants. The application form for NIH grants will be studied in detail, with discussions on the requirements for budgetary justification, the use of animals and humans, and other ethical considerations. The course will include a mock study section in which students will review and evaluate grant applications.

PHARM 203 Methods in Pharmacology. 1-3 Credits. Hours and credit by arrangement. Course consists of many of the classical methods used in investigating the action of drugs.

PHARM 210 Methods in Pharmacology Demonstrations. 2 Credits. The class will focus on methods relevant to pharmacology, toxicology, and neuroscience. Drug action *in vivo* and *in vitro* will be considered. Much of the course will focus on assessment of functional outcomes following drug exposure. The lab portion will consist of hands-on demonstrations of pharmacological research techniques employed in the department.

PHARM 219 Special Topics in Toxicology 1-4 Credits. Discussion and critical review of selected literature in the fields of environmental, industrial, forensic, and experimental toxicology.

PHARM 221-231 Advanced Topics in Pharmacology. 1-4 Credits. Hours and credits as well as lecture and laboratory to be arranged depending upon the special topic. This course is designed for advanced studies of special groups of drugs such as steroids, antibiotics, antihistaminic, analgesics, etc.

PHARM 233 Neuropharmacology. 2-3 Credits. A study of chemical transmission in the central nervous system with special emphasis on drug modifications of transmitter action and neuronal function. The topics presented include: the biochemical basis of neuropharmacology, drug modification of physiological function and behavioral pharmacology.

PHARM 238 Cardiovascular Pharmacology. 2 Credits. Two hours of lecture. The study of drugs used to treat cardiovascular disorders with primary emphasis on their fundamental mechanism of action.

PHARM 240 Behavioral Pharmacology. 2 Credits. Basic principles of the experimental analysis of behavior, including operant and classical conditioning, and schedules of reinforcement. Definition and scope of behavioral pharmacology. Behavioral mechanisms of drug action. Drug environment interaction.

PHARM 242 Pharmacology of Drugs of Abuse. 2 Credits. This course will discuss the behavioral and physiological effects of drugs of abuse and the mechanisms of action of these substances. Topics will include the rewarding and additive properties, the teratogenic effects and the immunosuppressant effects of drugs of abuse. Specific classes of drugs to be discussed will include, but not limited to, stimulants, cannabinoids, opiates, alcohol, hallucinogens and depressants.

PHARM 243 Environmental Toxicology. 2 Credits. Two hours of lecture and classroom discussion. A study of the effects of industrial, agricultural and other human produced pollutants on the deterioration of the environment. The control of environmental problems will be illustrated in case histories.

PHARM 245 Toxicology. 2 Credits. A study of the general principles of toxicology, including the biochemical and physiological mechanisms by which injury is produced. Specific organ systems and toxic compounds will be discussed for illustration.

PHARM 248 Neuroendocrinology. 3 Credits. The course in Neuroendocrinology will examine basic features of the hypothalamo-pituitary unit and the fundamental mechanisms of neuroendocrine regulation. Specific topics will include in depth studies of the axes regulating stress responses, reproductive function, hunger/satiety, water balance, and other metabolic bases. The course will examine psychiatric aspects of neuroendocrine activity and will also include aspects of the bi-directional communications with the immune system.

PHARM 250 Neurochemistry. 4 Credits. The biochemistry of nervous tissue: the metabolism and function of carbohydrates, amino acids, nucleotides, lipids, proteins, glycoproteins, peptides, and nucleic acids. To include axoplasmic transport and functional aspects such as neurotransmission and neuroendocrinology, as well as the relationship of brain neurochemistry to function as expressed in physiology and behavior.

PHARM 251-254 Research in Pharmacology. 1-8 Credits. This course offers in depth experience in research development, design, methodology and implementation. Students will undertake specific projects of limited scope and develop their findings under the guidance and direction of faculty preceptors.

PHARM 258 Pharmacokinetics and Pharmacodynamics. 1 Credit. Two hours of lecture, twice a week. In depth presentation of receptor quantification and drug pharmacokinetics. Material is covered in lecture and examination performance and take home problems.

PHARM 260 Molecular Pharmacology. 2 Credits. The course will study pharmacological principles from a molecular perspective. Lectures will focus on the study of receptors, enzyme systems, transmitters, growth factors, and ion channels in order to provide an understanding of the molecular components and processes involved in cellular events such as signal transduction. Finally, the molecular mechanisms of action of pharmacological agents that affect these systems will be discussed. Faculty lectures and student-led discussions.

PHARM 270 Discussions in Neurochemistry and Neuropharmacology. 1 Credit. A journal club/research presentation format in which students present and discuss new concepts and research findings in neurochemistry and neuropharmacology. Students will be taught critical assessment of research data and how new techniques can be applied to research problems. Grading will be by faculty on the basis of student presentations and participation in class discussions.

PHARM 271 Discussions in Toxicology. 1 Credit. A journal club/research presentation format in which students present and discuss new concept and research findings in all areas of toxicology, including biochemical, clinical and environmental. Students will be taught to critically assess research data and how to apply new techniques to research problems. Grading will be based on student presentations and participation in class discussions.

PHARM 272 Discussions in Pharmacology. 1 Credit. A journal club/research presentation format in which students present the content of new research publications and discuss the new concepts and research findings. A wide variety of topics relating to pharmacology will be covered. Students will learn the critical assessment of research data and how new techniques can be applied to research problems. Grading will be by faculty on the basis of student presentations and participation in class discussions.

PHARM 298 Seminar. 1 Credit. Students are required to attend and participate in oral presentations of research data and reviews of current topics of interest in pharmacology and toxicology. A maximum of two credits toward the M.S. or four credits toward the Ph.D. may be earned. Students are required to participate in seminar each semester regardless of credit earned.

PHARM 299 Research Proposal in Pharmacology. 3 Credits. A required course for all doctoral candidates. The student will write a proposal for his/her dissertation research in National Institutes of Health grant application format. The proposal should contain sections on a) Specific Aims, b) Background and significance, 3) Preliminary Studies, d) experimental methods, as well as detailed budget and justification, and rationale for the use of animals and/or humans if applicable. The proposal will be reviewed by the student's Research Advisory Committee, which will include an expert in the research field from outside the University, and presented by the student before this Committee. The grade will be assigned by the Advisory Committee based on the scientific quality of the written proposal and its verbal defense.

PHARM 300 Thesis Research. 1-6 Credits. Registration by permission of instructor. Amount of credit must be stated at time of registration.

PHARM 400 Dissertation Research. 1-9 Credits. Registration by permission of instructor. Amount of credit must be stated at time of registration.

MASTER OF SCIENCE DEGREE PROGRAM

LSU-Shreveport in Cooperation with LSUHSC in Shreveport School of Graduate Studies

A Master of Science Degree in cooperation with LSU-Shreveport (LSU-S) is designed to meet the needs of students who wish to pursue laboratory research based graduate training at the Master's level. The Program is flexible and designed to meet the needs of students wishing to pursue technical careers in both academic and industrial environments. Prospective students include graduates with Bachelor's degrees from area colleges and research associates currently employed at LSU Health Sciences Center - Shreveport (LSUHSC-S) or other science-based industries in the area.

Students will complete the required 30 hours with a maximum of 15 credit hours at LSU-S for transfer to LSUHSC-S. The remaining required nine hours would be taken on a space available basis from courses currently offered at the LSUHSC-S that are not part of the medical curriculum. Select LSU-S faculty are admitted to the graduate faculty at LSUHSC-S and can serve as thesis directors for an additional six hours of credit, or LSUHSC-S graduate faculty can serve if desired. Completion of the program is required before application to LSUHSC-S School of Medicine can be considered.

One academic year, two semesters or four summer terms in residence are required but two years' residence is a more realistic average. Students are required to register and pay tuition and fees at the campus that is offering the appropriate coursework. Students taking courses at both campuses must register at each campus.

The approval of both institutions is required to grant a student admission to the program. Each student's committee should include at least one member of the LSUHSC-S graduate faculty along with the appropriate LSU-S faculty.

Courses at LSU-Shreveport

Required Course

BCHM 722 Instrumental Analysis and Experimental Design

Elective Courses

BCHM 610, 612 Biochemistry and Molecular Biology I, II

BCHM 610L, 612L Biochemistry and Molecular Biology Laboratory I, II

BCHM 630 Biophysical Chemistry

BCHM 740 Plant Biochemistry

BIOS 660 Microbial Genetics

BIOS 665 Applied Biotechnology

BIOS 670 Evolution

BIOS 671 Biogeography

BIOS 690, 785 Special Topics in Biology

BIOS 745 Plant Molecular Biology

BIOS 750 Ecotoxicology

Courses at LSUHSC-S for Incorporation *

IDSP INTERDISCIPLINARY COURSES

IDSP 111 Basic Biochemistry, Molecular and Cellular Biology I

IDSP 112 Basic Biochemistry, Molecular and Cellular Biology II

IDSP 113A&B Basic Biochemistry, Molecular and Cellular Biology III

IDSP 114 Molecular Signaling

IDSP 115 Molecular Genetics
 IDSP 116 Methods in Biomedical Sciences
 IDSP 211 Foundations of Biomedical Sciences:
 General Principles
 IDSP 212 Foundations of Biomedical Sciences:
 Cardiovascular System
 IDSP 213 Foundations of Biomedical Sciences:
 The Renal System
 IDSP 214 Foundations of Biomedical Sciences:
 Respiratory System
 IDSP 216 Foundations of Biomedical Sciences:
 Gastrointestinal System
 IDSP 217 Foundations of Biomedical Sciences:
 Endocrine System
 IDSP 218 Foundations of Biomedical Sciences:
 Nervous System
 IDSP 219 Foundations of Biomedical Sciences:
 Inflammation, Infection and Cancer
 IDSP 240 Philosophical and Ethical Issues in Science

BIOCHEMISTRY

BCHM 223 Physical Biochemistry
 BCHM 281 Molecular Mechanisms of Post-transcriptional Control
 BCHM 282 Protein Structure/Function
 BCHM 283 Molecular Mechanisms of Transcriptional Control
 BCHM 285 Eukaryotic Developmental Biology
 BCHM 286 Classical and Molecular Genetics
 BCHM 287 Applications of Spectroscopic Techniques

CELLULAR BIOLOGY AND ANATOMY

CEBIO 216 Human Developmental Biology
 CEBIO 223 Molecular Basis of Disease
 CEBIO 224 Molecular Basis of Disease Journal Club
 CEBIO 280-282 Special Topics in Anatomy

MICROBIOLOGY AND IMMUNOLOGY

MICRO 276 General Molecular Virology
 MICRO 291 Bacteriology and Molecular Pathogenesis I
 MICRO 289 Pathogenesis of Infectious Disease II
 MICRO 297 Immunology

PHARMACOLOGY, TOXICOLOGY AND NEUROSCIENCE

PHARM 258 Pharmacokinetics and Pharmacodynamics
 PHARM 260 Molecular Pharmacology (required)
 PHARM 233 Neuropharmacology
 PHARM 238 Cardiovascular Pharmacology
 PHARM 240 Behavioral Pharmacology
 PHARM 242 Pharmacology of Drugs of Abuse
 PHARM 243 Environmental Toxicology
 PHARM 245 Toxicology
 PHARM 248 Neuroendocrinology
 PHARM 250 Neurochemistry

MOLECULAR AND CELLULAR PHYSIOLOGY

PHYS 230 Physiological Chemistry of Reactive Oxygen Metabolites
 PHYS 278 Advanced Cardiovascular Physiology
 PHYS 279 Advanced Gastrointestinal Physiology
 PHYS 298 Physiology Seminar Series

* Other advanced courses may be available with permission of the appropriate instructors and department chairs.

INTERDEPARTMENTAL

THE PROGRAM FOR OBTAINING THE PH.D. IS TAILORED TO THE REQUIREMENTS OF INDIVIDUAL STUDENTS, AND DEPARTMENTS. THE IDSP COURSES ARE TAUGHT BY FACULTY IN ALL DEPARTMENTS.

IDSP 111 Basic Biochemistry, Molecular, and Cellular Biology I, 2 Credits. This course provides an introduction to the basic biochemical properties of amino acids and proteins, a discussion of protein assembly and folding into the three dimensional structures required for function, and an introduction to basic principles of enzyme kinetics, examples of enzyme active site structure, and mechanism of action. Topics on membrane lipids, membrane transport, carbohydrates, and the important biochemical processes and enzymes that cells utilize to generate metabolic energy are also included in this section.

IDSP 112 Basic Biochemistry, Molecular, and Cellular Biology II, 2 Credits. Selected features of the metabolism of carbohydrates, lipids, amino acids and nucleotides are presented with discussions of the important mechanisms cells utilize to regulate these processes. The course concludes with a basic introduction to nucleic acids structure and function: replication, transcription, RNA processing, and protein synthesis.

IDSP 113A Basic Biochemistry, Molecular, and Cellular Biology III, 1 Credit. An introduction to cell structure and the mechanisms underlying cell division and protein trafficking. The course will focus on the cell biology of the nucleus, regulation of the cytoskeleton, secretory pathways, endocytosis, protein targeting, and ubiquitin-mediated proteolysis. Lectures and discussions of the current literature will comprise the course. Course is offered: Fall, Annually. Prerequisites for course: IDSP 111, 112.

IDSP 113B Basic Biochemistry, Molecular, and Cellular Biology III, 1 Credit. An introduction to cell structure and the mechanisms underlying cell division and protein trafficking. In this course, emphasis will be placed on apoptotic mechanisms, mechanisms of cell division and cell cycle control, the mechanisms involved in protein and membrane trafficking, and adhesion-mediated biology. Lectures and discussions of the current literature will comprise the course. Course is offered: Spring, Annually. Prerequisites for course: IDSP 111, 112, 113A.

IDSP 114 Molecular Signaling, 1 Credit. A modern comprehensive course concerning the regulation of cellular signaling processes in eukaryotic cells. Emphasis will be placed on the molecular mechanisms involved and approaches used to understand receptor-mediated signaling and signal transduction pathways. Attention is also focused on the current molecular and cellular biological techniques used today in the investigation of these important cellular processes.

IDSP 115 Molecular Genetics, 2 Credits. This course will provide the student with an overview of classical genetics as well as an in-depth consideration of several fundamental processes

involving DNA, including its recombination, repair, transposition and transcription in the context of chromatin. The course will also explore the emerging areas of genomics and proteomics, gene transfer, siRNA and model systems of eukaryotic gene expression. Lectures and discussions of the current literature.

IDSP 116 Biochemical and Molecular Methods. 1 Credit.

The principles and application of common methods used for detection and analysis of macromolecular structure, function, and interaction will be discussed. This course covers biochemical methods of separation and detection of macromolecules as well as molecular analysis. Three hours of introductory biostatistics are also included. The goals of the course are: to develop an understanding of basic methods applied to the study of proteins and nucleic acids; to become familiar with the instrumentation used for these methods – familiar in the sense that students should be aware what instrumentation is required and have a basic idea how it is used; and to become aware of the ways that these methods and techniques are applied to study of macromolecules, i.e., have some idea what methods can/should be used to study a particular problem. There will be some form of out of class work for most lectures, including problems, literature reviews, and visits to core facilities and major equipment and use of some equipment. There will be one exam at the end of the course. Course is offered: Fall, Annually. Prerequisites for course: to be taken concurrently with IDSP 111, 112.

IDSP 117 Methods in Biomedical Sciences: Recombinant DNA and Cell Biology. 1 Credit.

Goals are the same as for IDSP 116. An recombinant DNA methods including cloning and gene expression, DNA sequencing, PCR, mutagenesis and nucleic acid and protein labeling. There will be one exam at the end of the course. Course is offered: Fall through Spring, Annually. Prerequisites for course: to be taken concurrently with IDSP 113.

IDSP 120 Biotechnology and the Pharmaceutical Industry, 1 Credit.

This course introduces students to what is involved in pharmaceutical research and drug discovery, including a general overview of the discovery and development process. In addition to LSUHSC-S faculty, lectures will be presented by senior managers from biotechnology and pharmaceutical companies.

IDSP 121 Biotechnology Entrepreneurship, 1 Credit.

This course will introduce the student to the components necessary to get a biotechnology company started by reviewing and discussing the generation of a business plan. The student will learn the importance of developing a SWOT analysis and of building a management team.

IDSP 122 Methods in Biotechnology, 2 Credits.

This course will introduce students to technologies used in pharmaceutical research and drug discovery. Initially, each week, lectures by faculty and/or papers relevant to the topic will be read and discussed and then a speaker from industry with expertise in the use of the technology will be brought in to lecture. In addition, four labs will be carried out; high throughput screening, FACS, gene arrays and mass spec where students will get practical experience in setting up experiments and analyzing results.

IDSP 201 Introduction to Human Cancer-Research, Treatment and Prevention. 2-3 Credits.

This will be a three credit introductory course team taught by basic scientists and clinical scientists. Four topics will be covered including: 1) An introduction and overview of cancer; 2) cancer cell biology; 3) the diagnosis, treatment and prevention of cancer and 4) the molecular pathogenesis and treatment of specific cancers. The focus of this course will be to provide information concerning what is currently understood about the biochemical mechanisms operating during neoplasia and will include up to date information about oncogenes, tumor suppressor genes, metastasis, angiogenesis, tumor immunology, diagnostic approaches (conventional and molecular) and treatment modalities. The course will consist of lectures that stress the research approaches and finding that currently form the basis for our understanding of how neoplastic cells arise and form

cancers. This course will form the basis for more advanced courses in the cell and molecular biology of cancer.

IDSP 202 Mechanisms of Cancer Invasion and Metastasis. 1 Credit.

An advanced course, involving lecture and discussion, to study the processes involved in the development of metastatic disease. Students will learn the fundamentals, including the key molecules, events and signaling pathways that are directly involved in the invasive/metastatic process. Import seminar papers as well as current literature will be used in student discussion.

IDSP 211 Foundations of Biomedical Sciences I – General Principles. 1 Credit.

An integrative introduction to cell physiology/anatomy and to the general principles of pharmacology. Course is offered: Fall, Annually. Prerequisites for course: None.

IDSP 212 Foundations of Biomedical Sciences I – Cardiovascular System. 2 Credits.

An integrative approach to the physiology, anatomy, histology and pharmacology of the cardiovascular system. Course is offered: Spring, Annually. Prerequisites for course: None.

IDSP 213 Foundations of Biomedical Sciences I – The Renal System. 1 Credit.

An integrative approach to understanding the kidney's role in maintaining homeostasis. Emphasis will be on global regulation of salt, water and acid/base balance seen from a traditional as well as molecular perspective. Where available "knockout" animals and functional expression analyses are incorporated. Course is offered: Spring, Annually. Prerequisites for course: None.

IDSP 214 Foundations of Biomedical Sciences I Respiratory System. 1 Credit.

In integrative course covering the physiology, anatomy/histology and pharmacology of the respiratory system. Course is offered: Spring, Annually. Prerequisites for course: None.

IDSP 216 Foundations of Biomedical Sciences II – Gastrointestinal System. 1 Credit.

Integrative course in the anatomy, physiology and pharmacology of the gastrointestinal tract. Course is offered: Fall, Annually. Prerequisites for course: None.

IDSP 217 Foundations of Biomedical Sciences II – Endocrine System. 1 Credit.

An integrative course covering the physiology, anatomy, histology and pharmacology of the endocrine system. Course is offered: Spring, Annually. Prerequisites for course: None.

IDSP 218 Foundations of Biomedical Sciences II – Nervous System. 2 Credits.

Integrative anatomical, physiological and pharmacological examination of the nervous system. Course is offered: Summer, Annually. Prerequisites for course: None.

IDSP 219 Foundations of Biomedical Sciences II – Inflammation, Infection and Cancer. 1 Credit.

An integrative approach to the anatomy, histology, physiology and pharmacology of inflammation and immunity to include discussion of antimicrobial and anti-cancer therapy. Course is offered: Spring, Annually. Prerequisites for course: None.

IDSP 221 Biometric Methods in the Health Sciences I. 2 Credits.

Three hours of lecture per week. General introduction to descriptive and inferential statistics: The role of biometry in the health sciences, techniques and principles for summarizing data, estimation, hypothesis-testing and decision-making. Examples and problems from the health sciences are used.

IDSP 222 Biometric Methods in the Health Sciences II. 2 Credits.

Three hours of lecture per week. Continuation of 221. Additional biometric techniques in health sciences: Hypothesis testing

via the general-linear model, including analysis of variance and linear regression, methods of correlation-analysis, and multiple-regression techniques. Non-parametric techniques and curve fitting are also covered. Examples and problems from the health sciences are used

IDSP 225 Introductory Statistics – 1 Credit. This course is intended for graduate students in the Departments of Cellular Biology & Anatomy, Biochemistry & Molecular Biology, Molecular & Cellular Physiology, and Pharmacology, Toxicology and Neuroscience who seek a working knowledge of statistical methods and their applications. Topics include measures of central tendency and dispersion; probability; common probability distributions, including the binomial, normal, Chi-square, and F; sampling distributions; hypothesis testing confidence interval estimation, comparison of means and proportions, sample size calculation; overview of simple and multiple regression diagnostics, one and two way analysis of variance; chi-square tests; common nonparametric procedures.

IDSP 230 Advances in Gene Therapy. 2 Credits. An overview of gene therapy emphasizing the clinical history, the types of diseases that could benefit the most, and ethical issues. Some of the major gene transfer vector systems will be covered in detail, highlighting advances in this rapidly developing field. Student's grades will be based on participation in discussion of current research and review articles, as well as exams.

IDSP 240 Philosophical and Ethical Issues In Science. 1 Credit. The objective of this course is to provide an understanding to the underlying philosophy in scientific endeavors and the ethical issues that face scientists. The course will involve detailed discussions about the history of scientific thought, the scientific method, experimentation and data collection, and current ethical issues. Weekly sessions will include lectures and discussions by faculty, students and guest speakers.

IDSP 250 Current Trends in Toxicology. 1 Credit. A discussion format in which students, postdoctoral fellows, research personnel and faculty from the Health Sciences Center with a common interest in Toxicology and Environmental Health meet to present emerging concepts, research data and hypothesis-driven research proposals in all toxicological sub-specialties. Topics will be selected from peer-reviewed Toxicology-based literature, from research findings from the participant's own laboratories, or from proposals in preparation for external funding. Class sessions will include occasional, scheduled meetings with Toxicologists from nearby institutions in the tri-state area. Students will be taught oral presentation skills, methods of evaluating current trends in Toxicology literature and research, and fundamentals of the grant-writing and review process. Grading will be based on student presentations and participation in class discussion.

IDSP 251 Current Trends in Addiction. 1 Credit. A discussion format in which students, postdoctoral fellows, research personnel, faculty and physicians from the Health Sciences Center with a common interest in Addiction meet to present emerging concepts, empirical data, and hypothesis-driven research proposals in all Addiction sub-specialties. Topics will be selected from peer-reviewed Addiction-related literature, research findings from the participant's own laboratories, clinical practice, or proposals being prepared for external funding. Class sessions will include occasional scheduled meetings with Addiction Specialists from educational and scientific institutions in the tri-state area. Students will be taught the following skills: oral presentations, techniques for evaluating current Addiction literature and research, and the fundamentals of grant-writing and reviews. Grading will be based on student presentations and participation in the classroom discussions.

