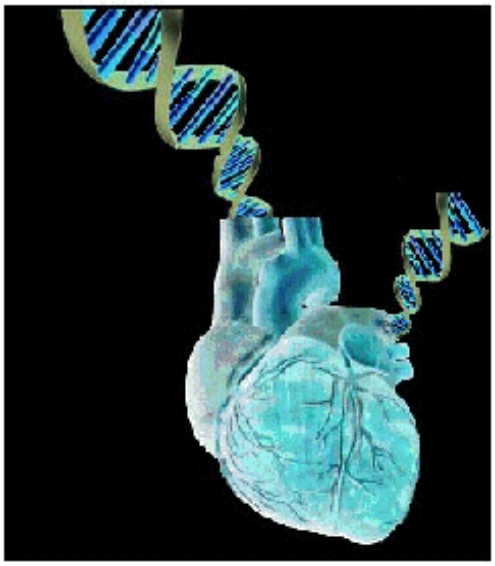
INTEGRATIVE BIOLOGY GRADUATE PROGRAM



DIVISION OF BASIC SCIENCE

THE UNIVERSITY OF TEXAS SOUTHWESTERN
GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

February. 12, 2009; C:\MyDocument\IBGPGuidelines.doc

INTEGRATIVE BIOLOGY GRADUATE PROGRAMM

I. PROGRAM DESCRIPTION

The Integrative Biology Graduate Program fosters training in scientific investigations that relate biological processes to normal or pathological organismal functions. Principles and techniques used to study multicellular biological preparations are applied to investigate and verify hypotheses arising from knowledge of molecular and cellular biology. Multicellular preparations may include cocultures of different cell types, isolated tissues, organ systems, or whole animals. Thus, cells and tissues are studied in their "social" context. This program will promote effective cross-disciplinary research involving faculty in basic science and clinical departments with the goal of training a student for a career as an independent investigator. Some areas of interest in this program include response and adaptation to physiological (exercise, microgravity and pregnancy), and pathological stresses (ischemia, hypertension, inflammatory and immune diseases, diabetes, sepsis and cancer). Specific subjects of investigation involve cell-cell signaling including the basis of fertilization, exocrine secretion, renal tubular transport, gene regulation in development and differentiation, regulation of cardiovascular function and metabolism, regulation of muscle contraction and protein turnover, sensory regulation of behavior, carbohydrate and lipid metabolism, and tumor biology.

II. REQUIREMENTS FOR ADMISSION

Students wishing to join the Integrative Biology Graduate Program must be enrolled in the Division of Basic Science and be in good standing academically. Usually, students seek enrollment in the program following completion of the set of research rotations and selection of a mentor.

III. CURRICULUM

A. Coursework. A minimum of 24 semester hours of course credit are required for graduation. Students should consult with the Graduate Student Advisor to develop a course plan.

First Year: 18 semester hours coursework: Division First-Year Core Course, short courses, plus 3 laboratory rotations.

Second Year: 6 semester hours. The advanced courses are completed by the end of the second year.

1. <u>Required: Human Biology and Disease (3 semester hours)</u>

Students in the Medical Scientist Training Program (M.D./Ph.D.) who have successfully completed courses in the first two years of medical school have the option of selecting advanced courses from the list below to satisfy the required semester hours.

2. <u>Electives: At least 3 semester hours</u>

Courses on the following list should be viewed with higher priority than others, although other courses offered by the graduate or medical school may also be considered.

a.	Responses to Stress	1.5 semester hours
b.	Fundamentals in Neuroscience	3.0 semester hours
c.	Advanced Genetics I: Genetics of Model Organisms	1.5 semester hours
d.	Advanced Genetics II: Human Genetics	1.5 semester hours
e.	Molecular Basis of Metabolic Regulation	1.5 semester hours
f.	Signal Transduction – From Hormone to Genome	3.0 semester hours
g.	Topics in Developmental Biology	1.5 semester hours

h.	Cancer Biology	1.5 semester hours
i.	Experimental Approaches to Complex Genetic Disease & Gene Therapy	1.5 semester hours
j.	Special Topics (see Appendix III)	1.5 semester hours

B. Laboratory Rotations and Selection of Mentor. A student entering the Division Basic Science with an interest in integrative biology participates in three laboratory rotations during the first year of study. Students may select rotation faculty from among those in the Integrative Biology Graduate Program, as well as any in the Division. It may be helpful for students to discuss rotation plans with the Graduate Student Advisor of the Integrative Biology Graduate Program. Insofar as possible, students should seek rotations that expose them to a wide variety of technical and intellectual approaches. By the beginning of the summer after the first year in residence, the student selects a laboratory for dissertation research. The dissertation project should combine studies on multicellular culture preparations, isolated tissue or organs, organ systems or whole animals with aspects of cell or molecular biology. The Program encourages the recruitment of two mentors where this requirement is not met in a single laboratory. The two-mentor system is intended to promote ongoing or newly initiated cross-disciplinary studies providing a broad-based education for the student. In the fall semester of the first year in the Integrative Biology Graduate Program, the student will briefly review the intended dissertation research project with the Graduate Student Advisor.

C. Integrative Biology Works in Progress. Students are required to attend and participate in this weekly series and to present once each academic year. The goals are to keep students abreast of recent research advances, to sharpen their critical thinking abilities, and to develop their public speaking skills. Students will present their dissertation research.

D. Integrative Biology Journal Club. Students are required to attend and participate in this monthly series. Details see attached in Appendix II.

E. Student Poster Session. Following successful completion of the qualifying examination, students are required to present annually a poster summarizing results and progress toward completion of the dissertation project. The Graduate Program Chairman will schedule a day for presentation of all posters.

IV. QUALIFYING EXAMINATION

Students must independently identify a research topic distinct from that selected for the dissertation and prepare a written research proposal that they will defend orally before an *ad hoc* examining committee of four faculty. See Appendix I for detailed instructions. This examination is scheduled following completion of the required course work. Successful completion of this examination and required course work advances the student to candidacy for the Ph.D. degree.

V. DISSERTATION COMMITTEE

By **April 1** of the second year of graduate school (preceding the start of the oral examination qualifying exam process), the student proposes to the Graduate Program Chairman a dissertation committee comprising at least four members of the faculty, at least two of whom are members of the Integrative Biology Program. The constitution of the dissertation committee must be approved by the Steering Committee.

Before the oral exam of the qualifying examination, the student should present the dissertation committee with a written summary (between 2 to 4 pages, double spaced) of his/her proposed topic and preliminary research progress toward the project's goals. This initial meeting generally involves a

thirty-minute oral presentation by the student, followed by discussion and suggestions from the members of the committee.

Every student must hold at least one meeting of his/her dissertation committee each year. Additional meetings may be called at any appropriate time by the student or by the committee. The dissertation committee monitors the student's progress based on research accomplished, course grades, and journal club and other presentations and submits a written summary of progress towards the Ph.D. degree to the Graduate Program Chairman. Annual Student Seminar/Poster Presentation (generally held in April) provides an opportunity for dissertation committee members to review research progress. After reviewing the poster with a student, if the committee members are satisfied with the interval progress, the Committee Chairman should submit a written summary with the student's research accomplishments and progress to the Graduate Program Chairman. If the progress report is not received within two weeks of the poster session or concerns exist about progress, then students must have a meeting with their full committee before August 1.

VI. DISSERTATION DEFENSE

A complete copy of the dissertation must be approved by the dissertation committee before a public dissertation defense can be scheduled. The defense is composed of a public lecture describing the main observations of the research, followed by an oral examination by the dissertation committee.

VII. COURSE DESCRIPTIONS

Human Biology and Disease – Required (3.0 semester hours)

This course reviews the cellular and molecular mechanisms responsible for the integrated functioning of a number of physiologic systems, including cardiovascular, neuromuscular, respiratory, renal, metabolic and endocrine. Overviews are provided, but selective topics considered to be most important are highlighted. The course also addresses mechanisms of disease, integrating normal physiology with the genetic and pathophysiologic basis of disease. Emphasis is placed on how physiological investigation increases our understanding of disease processes and how investigating the mechanisms of disease increases understanding of normal physiology.

Special Topics (1.5 semester hours)

Students are highly encouraged to develop, in collaboration with the Graduate Student Advisor and appropriate faculty, special topic courses dealing with the topics related to future dissertation research. These tutorial-type courses may cover fundamental knowledge as well as methodological approaches and recent primary literature. See Appendix III for details.

Responses to Stress (1.5 semester hours)

Biological responses to various types of stress serve to illustrate the adaptive functions of physiological systems. Molecular, cellular, and/or organismal responses and adaptations to genetic and environmental stresses will be used to teach principles of feedback regulation in different systems. Responses to thermal, hypoxic, and osmotic stress, as well as to fasting, exercise, and infection will be discussed in context of recent research.

Fundamentals in Neuroscience: (1.5 or 3 semester hours)

Fundamentals of Neuroscience introduces students to a broad range of topics relevant for an in-depth understanding of modern neurobiology. The goal of this introductory course is to convey a basic understanding of fundamental elements and a broad overview of important developments in the diverse field of neuroscience. An in-depth analysis of more narrowly focused topics will be provided in the advance courses offered by the Neuroscience program.

Advanced Genetics I: Genetics of Model Orgainsms (1.5 semester hours)

The course emphasizes the application of mutational analysis to the investigation of biochemical and cell biological problems. The logic and language of genetics (Mendelism, statistics, and other

basic concepts) are reviewed in the first meeting. At subsequent meetings advanced concepts and techniques are discussed using as various model organisms as experimental system. The course meets weekly for three hours for eight weeks and uses mainly the primary literature. Introductory and supplemental materials are provided in brief lecture-style presentations, and students are expected to read one to three papers each week. Grading is based on classroom participation, problem sets, and one examination.

Advanced Genetics II: Human Genetics (1.5 semester hours)

Human genetics consists of discussions of research papers on human genetic studies.

Molecular Basis of Metabolic Regulation (1.5 semester hours)

The complexity of animals, their tissues, and even individual cells require multi-level systems for regulation of metabolism. In this course we discuss important cellular functions such as the transport of molecules into cells, the use of fuels for energy generation and energy storage, and integration of metabolic pathways. This discussion includes new information about the impact of gene expression and isozyme diversity on control of metabolic flux, hormonal control of metabolism, and consideration of more acute control mechanisms operating at the level of allosteric and covalent modification of enzymes. There is a strong emphasis on presentation of these concepts in the context of genetically programmed metabolic diseases. Also emphasized are metabolic flux and control as a means for cellular signaling, with specific examples gleaned from regulatory strategies for hormone and enzyme secretion from the pancreas. Finally, the prospects for gene therapy in metabolic disease are considered, including a discussion of new methods for identification of disease-susceptibility genes and mechanisms of gene transfer.

Signal Transduction (1.5 or 3 semester hours)

This course offers an in-depth study of the interactions of neurotransmitter, polypeptide, and steroid hormones with receptors and their subsequent regulation of cellular events. The first part of the course considers basic physicochemical concepts of ligand interactions with biological systems and mechanisms of common signaling pathways with an emphasis on pathways deriving from the cell surface. The second part integrates these themes into various endocrine pathways and examines regulation at the nuclear level. Quantitative approaches and current controversies are stressed where appropriate. Lectures are supported by discussion of classic and current research articles.

Topics in Developmental Biology (1.5 semester hours)

Developmental Biology covers the scientific questions addressed and the specific strategies pursued in modern research in developmental biology. Research papers relevant to a particular topic are drawn principally from the literature of flies and mice. Investigations with other model systems are discussed where appropriate and may be given greater emphasis by other instructors. Topics to be covered are maternal and paternal contributions to the embryo, formation of the blastula, gastrulation, organ primordia, sex determination and dosage compensation, conserved developmental strategies, and oncogenes as regulators of development.

Cancer Biology (1.5 or 3 semester hours)

The aberrations in cancer cells involve some of the most fundamental aspects of cell physiology including many aspects of signal transduction, transcriptional and translational control, the cell cycle, cellular aging, programmed cell death, cell adhesion, and cell motility. Each of these areas is highly complex. Obviously, one overview course cannot go into each of these areas in detail; instead, the course will center on concepts, and only illustrative examples will be given. In cancer biology, one potential unifying theme is the analysis of the physiological mechanisms that act to prevent cancer development. While the body is not highly effective in eliminating cancer once it has arisen, a variety of mechanisms exist which greatly decrease the likelihood that cancer will develop. Some of these are likely to have evolved in response to the selection against propensity for cancer. In addition to a broad overview into the causes and prevention of cancer, the course will also focus on experimental models for studying cancer. Organ based cancer overviews will be included to provide the students with a basic

understanding of the differences in cancer type. There will also be lectures on contemporary methods in cancer diagnostics and therapeutics. This course is designed via groups of lectures and discussions to provide an overview of most areas of cancer biology including: cell and molecular basis of cancer; diagnostic cancer imaging and pre-clinical models for human cancer; systems oncology; and drug discovery and treatment of human cancer.

Experimental Approaches to Complex Genetic Disease & Gene Therapy (1.5 semester hours)

This course offers a broad survey of currently available techniques for gene manipulation in cells and animals. Vectors and methods will be reviewed first to allow a later survey of applications focused on experimental models of genetic diseases. In addition, several sessions will be aimed at evaluating realistic prospects for gene therapy in areas such as cancer, cardiovascular disease, immunology and metabolic diseases.

VIII. FACULTY AND RESEARCH INTERESTS

Bezprozvanny, Ilya, PhD; Physiology; Neuronal calcium signaling and neurodegeneration, molecular mechanisms of Huntington's and Alzheimer's disease, calcium channels and synaptic transmission

Brekken, Rolf, PhD; Surgery & Pharmacology; Tumor-host interactions in the context of tumor cell metastasis. We study the interplay between neoplastic genetic alterations, changes in the extracellular matrix, and angiogenesis in the development and progression of pancreatic cancer

Brown, Michael, MD; Molecular Genetics; Unraveling the mechanism by which the SREBP pathway regulates cholesterol metabolism at the molecular, cellular, and whole body levels

Cannon, Stephen, MD, PhD; Neurology; Ion channel biophysics; Neuromuscular disorders; Mathematical modeling

Chen, Benjamin, PhD; Radiation Oncology; DNA Damage Response and DNA Double Strand Break Repair

Chen, Zhijian (James), PhD; Molecular Biology; Ubiquitin and NF-kappaB Signaling, and Innate Immunity

Cobb, Melanie, PhD; Pharmacology; Function and regulation of protein kinases in signal transduction pathways

Coppari, Roberto, PhD; Internal Medicine; Unraveling the physiological roles of Sirtuin family members (e.g.: SIRT1 and SIRT6) in the brain on whole body energy and glucose homeostasis.

DeMartino, George, PhD; Physiology; Cell physiology; regulation of growth and atrophy; protein degradation; intracellular proteases; ubiquitin/proteasome pathway of protein degradation

DiMaio, J. Michael, MD; Surgery, Collaborator of the LCBCC Consortium – University of Texas SPORE in Lung Cancer; Reynolds Associate with Reynolds Center-New Measures to reduce death and disability from ASHD

Eisch, Amelia J., PhD; Psychiatry; Adult mammalian neurogenesis and growth factors. Cell cycle analysis of adult neural stem cells *in vivo*, regulation of endogenous cell cycle proteins (specifically in regards to psychiatric disorders such as addiction, depression, Alzheimer's Disease), and transgenic manipulation of adult mammalian neurogenesis.

Elmquist, Joel K., DVM, PhD; Internal Medicine & Pharmacology; Uses mouse genetics and systems neuroscience approaches to study the pathways in the brain that control homeostasis including the hypothalamic control of food intake, body weight and glucose homeostasis

Friedberg, Errol, MD; Pathology; Cellular responses to DNA damage and their relationship to neoplasia

Garcia, Christine, MD, PhD; Internal Medicine; Genetic approaches to identify primary determinants of lung disease

Garcia, Joseph, MD, PhD; Internal Medicine; Integrative biological studies of hypoxia-inducible transcription factors. Identification of genetic factors controlling the cardiovascular-respiratory response to hypoxia

Garg, Vidu, MD; Pediatrics; Understanding the genetic basis of congenital heart disease and the molecular pathways regulating normal and abnormal cardiac development

Garrard, William, PhD; Molecular Biology; Regulation of the terminal stages of apoptosis in the nucleus; regulation of gene expression, chromatin structure, and V(D)J recombination of antibody genes

German, Dwight, PhD; Psychiatry; Mechanisms of neurodegeneration in neurological and psychiatric disorders, using human post-mortem tissue and animal models

Goldstein, Joseph, MD; Molecular Genetics; Unraveling the mechanism by which the SREBP pathway regulates cholesterol metabolism at the molecular, cellular, and whole body levels

Grinnell, Frederick, PhD; Cell Biology; Cell migration and extracellular matrix organization; Tissue engineering and biomaterials; Wound repair

Halvorson, Lisa M., MD; Obstetrics & Gynecology, Anterior pituitary gland function; regulation of gonadotropin gene expression, reproductive aging

Herz, Joachim, MD; Molecular Genetics; Genetic manipulation of neuronal apoE receptors in mice – mechanisms of brain development, neurogenesis and Alzheimer's disease

Hill, Joseph, MD, PhD; Internal Medicine; We are interested in molecular signaling processes in cardiac hypertrophy and failure. Based on genetic and surgical models in mice, we study mechanisms of structural, functional, and electrophysiological remodeling.

Hofmann, Sandra, MD, PhD; Internal Medicine; Role of lipid-metabolizing enzymes in cell metabolism and signal transduction; covalent modification of proteins by the fatty acid palmitate and the study of enzymes that transfer the palmitate on and off modified proteins

Horton, Jay D., MD, Molecular Genetics & Internal Medicine; Elucidating the molecular mediators of hepatic steatosis and in the study of proteins that regulate plasma lipid levels

Huang, Chou-Long, MD, PhD; Internal Medicine; Ion channels and human diseases caused by dysregulation of ion channels, including hypertension, polycystic kidney disease, kidney stone disease, and genetic diseases of K+ and Mg2+ disorders

Igarashi, Peter, MD; Internal Medicine; Transcriptional control of tissue-specific gene expression and organogenesis; polycystic kidney disease

James, Leighton R., MD; Internal Medicine; Understanding interaction of glucose disposal pathways (like the hexosamine pathway) and cytokines (e.g. connective tissue growth factor, CTGF) in the pathogenesis of diabetic kidney disease using gene-targeted mice models and cells (mesangial cells, embryonic fibroblast) derived from these lines to study *in vivo* and *in vitro* mechanism(s) of progressive kidney disease due to diabetes.

Kamm, Kristine, PhD; Physiology; Muscle physiology; regulation of contractility in smooth, skeletal and cardiac muscle and motility in nonmuscle cells

Kernie, Steven, MD; Pediatrics, Role of stem cells in brain remodeling following traumatic injury using both an *in vivo* injury model and *in vitro* techniques of culturing neural stem cells from wildtype and genetically altered mice

Kuro-o, Makoto, MD, PhD; Pathology; Understanding molecular mechanisms of aging in mammals through elucidating the function of an anti-aging hormone Klotho

Le, Lu Q., MD, PhD; Dermatology & Developmental Biology; Tumor cell of origin; Roles of tumor microenvironment in cancer development; Cellular and molecular mechanisms of Neurofibromatosis; Stem cell and Cancer biology

Liang, Guosheng, PhD; Molecular Genetics; Dyslipidemia in Pathogenesis of Diabetes and Obesity; Transcriptional Regulation of Lipid Metabolism

Liu, Yi, PhD; Physiology; Molecular mechanisms of circadian clocks, photoreceptor, protein degradation, gene silencing

Lutter, Michael, MD, PhD; Psychiatry; Understanding mechanisms of food reward, metabolic consequences of psychiatric disorders, gut-brain regulation of mood and motivation

Mahendroo, Mala S., PhD; Obstetrics & Gynecology; Parturition (the process of labor); Cervical Ripening; Reproductive Biology (male and female)

Mangelsdorf, David J., PhD; Pharmacology; Mechanism of action of nuclear hormone receptors; transcriptional regulation of lipid metabolism; role of retinoids and cancer

McKnight, Steven, PhD; Biochemistry; Subset of transcription factors that are gene specific, understand the regulation of transcription factor function at a biochemical level with keen attention to biological relevance

Mendelson, Carole, PhD; Biochemistry; Molecular mechanisms in tissue-specific, developmental, and hormonal regulation of eukaryotic gene expression

Moe, Orson, MD; Internal Medicine; Our laboratory studies the regulation of mammalian water and electrolyte homeostasis. Our interest includes sodium, calcium and acid-base metabolism and epithelial transport. The model systems range from humans and whole animals to intact organs, single renal tubules, cells, and purified proteins

Monteggia, Lisa, PhD; Psychiatry; Development of animal models for psychiatric diseases; growth factors and depression; role of MeCP2 in mediating autistic-like behavior; transcriptional repression in neurons

Muallem, Shmuel, PhD; Physiology; Ca^{2+} signaling and ion transport in secretory cells

Olson, Eric, PhD; Molecular Biology and Oncology; Transcriptional control of cell differentiation; muscle development

Pascual, Juan M., MD, PhD; Neurology, Physiology and Pediatrics. Animal and cellular models of neurogenetic disorders. Synaptic transmission in experimental epilepsies. Disorders of brain energy metabolism. Developmental neurobiology. Genotype:phenotype correlations in novel childhood encephalopathies.

Repa, Joyce, PhD; Physiology; Research in the lab focuses on how nuclear hormone receptors control the expression of ABC transport proteins, and the consequences of this regulation on lipid balance with respect to atherosclerosis, diabetes, and brain physiology

Rosenfeld, Charles, MD**;** Pediatrics and Ob/Gyn; Cardiovascular adaptation during development and pregnancy; maturation and ontogeny of visceral and vascular smooth muscle protein expression and function; regulation and function of angiotensin II receptor subtypes during development and pregnancy; mechanisms related to estrogen-induced vasodilation and modulation of uteroplacental blood flow in pregnancy

Savani, Rashmin C., MB, ChB; Pediatrics; Cell and mouse models to investigate the mechanisms of extracellular matrix regulation of lung development and injury. In particular, the interaction of hyaluronan (hyaluronic acid, HA) with specific receptors to regulate cell migration in pulmonary vascular development, innate immunity and inflammatory responses to injury

Scherer, Philipp E., PhD; Internal Medicine and Cell Biology; Identification and physiological characterization of novel secretory proteins that serve as potential links between the adipocyte and the processes of whole body energy homeostasis, inflammation and cancer, thereby identifying novel targets for pharmacological intervention and further defining the role of adipose tissue as an endocrine organ.

Schwarz, Margaret A., MD; Pediatrics; Developmental pulmonary vascular biology interactions with distal lung morphogenesis and extracellular matrix deposition. Identification of the factors that govern the contradictory proliferative / antiangiogenic roles of endogenous negative vascular regulators during development.

Shaul, Philip, MD; Pediatrics; Developmental biology of the pulmonary circulation and airways; molecular mechanisms underlying pulmonary hypertension

Shay, Jerry, PhD; Cell Biology; Defining the molecular interrelationships between aging and cancer

Snell, William J., PhD; Cell Biology; Understanding the mechanisms of cell-cell adhesion-induced signaling and cell-cell fusion during fertilization

Stull, James, PhD; Physiology; Molecular and biochemical regulation of contractile protein phosphorylation; responses and adaptations of cardiac, skeletal and smooth muscles

Tansey, Malú, PhD; Physiology; TNF signaling, neuroinflammation and neurotoxicity in neurodegenerative disease; mechanisms of neural induction of adipose-derived adult neural progenitor cells, their functional characterization and neurogenic potential in neurotrauma and neurodegenerative lesion models

Thomas, Gail D., PhD; Internal Medicine; Neurogenic control of the cardiovascular system during exercise, local metabolic regulation of adrenergic vasoconstriction in skeletal muscle, estrogen and cardiovascular function, cardiovascular pathophysiology in muscular dystrophy

Thomas, Philip J., PhD; Physiology; Function and structural development of ATP-dependent membrane proteins, including CFTR

Tu, Benjamin P, PhD; Biochemistry; Metabolic oscillation and the mechanisms by which cellular processes are coupled to cyclic changes in metabolic or redox state in time

Unger, Roger, MD; Internal Medicine; Diabetes; obesity; lipotoxicity; internal medicine; islet physiology and pathophysiology

Vernino, Steven, MD, PhD; Neurology; Autoimmune disorders of the nervous system. Animal models of autonomic failure. Synaptic transmission in autonomic ganglia. Nicotinic acetylcholine receptors

Victor, Ronald, MD; Internal Medicine; Neurogenic reflexes; hypertension; syncope (vasodepressor)

Wan, Yihong, PhD; Pharmacology; Transcriptional regulation of development, metabolism and cancer by nuclear receptors using the skeleton and the mammary gland as model systems.

Wang, Xiaodong, PhD; Biochemistry; Biomedical studies of apoptosis

Wharton, Keith, MD, PhD; Pathology, Pattern formation in development and disease. Regulation of Wnt signaling by Naked proteins

Wilkie, Thomas, PhD; Pharmacology; G-protein signaling during mouse development, energy homeostasis and feeding behavior

Yanagisawa, Hiromi, MD, PhD; Molecular Biology; Molecular components of the vascular wall during development and disease

Yanagisawa, Masashi, MD, PhD; Molecular Genetics; Identification and characterization of new signaling molecules that regulate vital functions such as sleep, appetite and blood pressure

Ye, Jin, PhD; Molecular Genetics; replication of hepatitis C virus, and cellular lipid that affect viral replication

Yin, Helen L., PhD; Physiology; Actin cytoskeletons of nonmuscle cells, including reorganization in response to extracellular signals and structure/function relationships of the gelsolin family of actin regulatory proteins

Zhang, Chengcheng (Alec), Ph.D.; Physiology; .Mechanisms by which the cell fates of adult stem cells are regulated, and the interaction of adult stem cells and their in vivo microenvironment; ex vivo expansion of HSCs for cell therapy and gene therapy; the interplay between stem cells and cancer

Zhang, Chun-Li, PhD; Molecular Biology; Nuclear hormone receptor and epigenetic signaling in adult neural stem cells and central nervous system

Zigman, Jeffrey M., MD, PhD; Internal Medicine; Identification of CNS targets of ghrelin action; the study of ghrelin cell physiology; functional neuroanatomy of the mammalian hypothalamus

Zinn, Andrew R., MD, PhD; McDermott Center for Human Growth and Development; Human genetic diseases; infertility, obesity, sex chromosome abnormalities

IX. ADMINISTRATION

Chairman: Yi Liu
Director: MoD Track: Helen Yin
Seminar/Journal Club Coordinator: Ilya Bezprozvanny
Student Advisor: Kris Kamm
Curriculum Committee Chairman:
Admissions Committee Representative: Phil Thomas
Qualifying Exam Coordinator: Mala Mahendroo
Ad-hoc member: George DeMartino
Program Administrator: Priyarama Sen

APPENDIX I

QUALIFYING EXAMINATION FOR ADMISSION TO CANDIDACY

FOR THE Ph.D. DEGREE

The Chairman of your individual committee will be both a member of Integrative Biology and have expertise in your proposal's topic. As you develop your proposal, please email the abstract and a list of three appropriate Chairpersons to the Qualifying Exam Faculty Coordinator (Dr. Mala Mahendroo; email: Mala.Mahendroo@UTSouthwestern.edu; phone: 214-648-7380). The Faculty Coordinator of the Qualifying Exam Process should be consulted when questions arise. He will arrange your committee and handle preliminary questions. Subsequently, your qualifying exam committee will review and evaluate your abstract, proposal, and exam performance. Please note that the Chairman of the student exam and Faculty Coordinator of the Qualifying Exam Process are distinct individuals

1. Content of the Student's Committee

Students are expected to submit ONE suitable abstract no later than **Feb. 6** of the second year of graduate school. Students must have completed all their course work, clearing up any incompletes, meeting with their dissertation committee, etc. prior to the oral examination. The Integrative Biology Graduate Program (IBGP) faculty who will serve on the examination committees will be assigned by Qualifying Exam Faculty Coordinator. The committee will consist of:

(a) Three examining members of the qualifying committee (one of whom serves as Chairman), all from IBGP.

(b) The Chairman will be selected from the IBGP faculty with specific expertise in the area of the written proposal's abstract and will serve as one of the examiners. When possible, this person will be selected from the students' list of three appropriate faculty members in consultation with Dr. Mahendroo.

(c) One observer (non-questioning) from the IBGP Steering Committee, whose purpose is to ensure consistency among exams. The Chairman of the student exam must confirm the exam date with Qualifying Exam Faculty Coordinator so an observer can be appointed.

(d) Two other faculty members from the IGBP will be appointed.

(e) The student's adviser will not be present during the exam. However, the student's adviser will provide additional information regarding the student's progress at a separate meeting of the IBGP faculty, allowing a fuller discussion of the qualifying exam results, grades, lab work, progress to date, and the appropriateness of promotion to candidacy for a Ph.D. degree.

2. Role and Responsibilities of the Student Exam Chairman

The Chairman has a formal role to oversee the administration of all aspects of the student's exam, to act as liaison between the student and faculty members serving on the committee, to provide constructive feedback (expertise and guidance) on the proposal, and to report the results of each examination by memorandum to Qualifying Exam Faculty Coordinator. Most importantly, it is the Chairman's responsibility to ensure that the student will be treated in a fair and professional manner and to seek instructions from Qualifying Exam Faculty Coordinator when the proper course of action is unclear. To minimize ambiguity and miscommunications, the Chairman should inform the student in writing about any decisions made by the committee regarding the contents of the abstract and proposal, or other matters that require some action by the student.

In the rare event that a breach of ethics (especially, but not limited to, plagiarism) is discovered during the exam process, it is the responsibility of the Chairman to immediately halt proceedings and refer the case to the Dean of the Graduate School.

3. The Examination Process

Submission of abstracts by Feb. 6: The student must prepare ONE abstract (no more than 3 page double-spaced), which must be a suitable foundation for a written proposal. The subject of the proposal must be distinct from that of the student's dissertation research or previous research in which he or she participated and may not have been used by other students for previous qualifying exams or term papers. The subject of the proposal may be the same as was used for other previous coursework assignments by the student, but both the abstract and proposal for the qualifying exam must be original writings. If there is any doubt about the eligibility of a topic, the student should consult the qualifying exam coordinator before preparing the abstract. The Chairman of the committee shall decide the adequacy and suitability of the abstract for being developed into a written proposal. After being assigned a committee, the student should distribute the abstract (as a PDF) directly to committee members with copies to Qualifying Exam Faculty Coordinator and Priya Sen. If the Chairman approves of the abstract, he/she will meet with the student to discuss a course of action.

To obtain a rough idea of the content and format, students are encouraged to examine abstracts and proposals of students who have successfully completed the qualifying exam process. You are free to contact them.

By Feb 28. The student should have already met with his or her committee Chairman to revise his or her abstract if necessary and to discuss the outline and format of the proposal. The proposal format should be similar to an NIH grant application.

April 3. First full length draft submitted to the Chair of the student's committee. The Chairman at this point should ensure that the document conforms to the standard format (see below) and instructs the student on how to improve and polish the proposal. The Chairman may elect to instruct the student to make revisions and stylistic changes before distribution to the other committee members. The student and the Chairman can meet more than once to discuss the proposal.

April 21*. Final written proposal (after approval by the Chairman) must be submitted to the entire committee on or before this date. The Chairman should agree that the proposal is sufficient in scope, creativity, and importance and notify Priya Sen (Priyarama.Sen@UTSouthwestern.edu; Staff Coordinator) and cc: Qualifying Exam Faculty Coordinator.

May 5-16*. Oral Examination. A date that is mutually agreeable to the student and the committee will be arranged by the student and scheduled by contacting Priya Sen to reserve a room via online signup. **The oral exam cannot be given until the student has formed and meet with a dissertation committee (see #6 below).** The student's Exam Committee and a Program Observer will attend. Mentors of the students are not allowed to be present.

The student will give a short presentation (≤ 15 min) summarizing the key components of the written proposal. New information or altered directions may be presented based on recent publications. The exam should test the student's potential as a scientist, including the student's understanding of the scientific concepts underlying the proposal, the student's understanding of the scientific method, their basic fund of knowledge, the ability to think through problems, and the student's level of preparation. Questions should originate from the proposal, but may radiate in other directions in a logical progression at the discretion of the committee.

After the exam, the Qualifying Committee will make a recommendation (Unconditional Pass, Conditional Pass, Re-examination or Failure) to the Integrative Biology Steering Committee, which will make a final decision on advancement to candidacy at an IBGP faculty meeting. When arriving at their decision, the Qualifying Exam Committee members should only take into account the student's performance in the exam and NOT the student's performance in the laboratory, course work, and other aspects of the student's training. The Chairman will meet with the student immediately after the recommendation has been made to describe specific issues or concerns if a decision is not unconditional pass.

Between the end of May and early September; An IBGP faculty meeting will decide the appropriateness of advancement to Ph.D. candidacy of students. When arriving at the final decision, the participants of the meeting should take into account the student's performance in the qualifying examination, the laboratory, course work, and other aspects of the student's training. To assist in this process, the committee should review the student's records (see Priya Sen, ND12.120B) and consult with the student's mentor after the exam. Students who have not completed the qualifying exam by the end of the May of the second year in IBGP will be considered for academic probation.

* These dates should be strictly followed. Exceptions can be made only with the approval of Qualifying Exam Faculty Coordinator and the Chairman of the Qualifying Committee.

4. Mock Qualifying Exams

For practice, students may conduct mock examinations with other graduate students in the DBS as examiners. Post-doctoral fellows and members of the faculty should not participate.

5. Preparation of Abstract and Proposal

The abstracts and the written proposal are the work and responsibility of the student, although reasonable scientific advice may be sought from the committee members and others in the program. It is important for faculty to read carefully the abstract as well as written proposal before the exam so constructive feedback may be provided to the student. Faculty should use their professional judgment and experience in guiding their decisions as to what level of advice is appropriate, and it may be helpful to treat this as a training exercise as well as an examination. In general, faculty should instruct students where to look, but not what to find.

Avoid Plagiarism: Independence and Originality of Integrative Biology Students' Written Work

Written work by students in the Integrative Biology Graduate Program is to be original and not the work of another individual, published or unpublished. This applies to all documents designed to demonstrate the students' independence of effort and includes (but is not limited to) the abstract and research proposal component of the qualifying examination, research papers prepared for courses, answers to examination questions, publications, and the doctoral dissertation.

In the rare case where it is necessary to reproduce the written work of another individual, such as the quotation of a historic hypothesis or finding, the section of reproduced text must be clearly indicated. This can be done by quotation marks or a change of font, and must always be referenced. Figures which are reproduced in their original or modified forms must also be clearly referenced to identify the source.

Abstracts:

One short, distinct proposal (3 double-spaced pages) that is unrelated to the dissertation project, or any other project in which the student may have played a major role in the recent past. The student's exam committee is responsible for determining that the selected research area is sufficiently distinct from prior work to provide a supplementary educational experience over and above the dissertation project. The abstract should contain a clear statement of the problem, the hypotheses, the specific aims, and the experimental approach. The discussion of the experiments should indicate how they will be interpreted and what information will be gained from them. This should include sufficient information to ensure that someone not in the field of the proposal can understand and evaluate the experimental design. The student should limit discussion of the initial abstract to Chairman of their Qualifying Exam Committee. The abstract will be evaluated by the Chairman who will approve, recommend revision, or reject the proposed topic. As necessary, the abstract will be returned to the student for clarification or additional focus.

The abstract is a statement of the problem, the hypotheses, the specific aims and the experimental approaches. The approach should be hypothesis driven involving mechanistic insights into an integrative biological problem, not simple descriptive or screening experiments. It is not a comprehensive document. It should indicate that the student is on the right track and has chosen a project of reasonable scope. It is analogous in function to abstracts that must be submitted to some funding agencies (such as March of Dimes) before an application will even

be sent. The abstract should convince the examining faculty that the proposal to be prepared will provide a sufficient basis for testing the student's qualifications for admission to candidacy.

It is appreciated that students may get ideas for abstracts from advanced course work. However, it should not be assumed that abstracts prepared for courses will be of a format or scope suitable for the qualifying exam. The qualifying exam proposal should not be based on written papers for coursework at UT Southwestern or other institutions.

Written Proposal:

A written proposal following the format for a grant application to the NIH (instructions below) should then be prepared. Students may consult proposals written by faculty members for style and approach. **With the understanding that the written proposal must be the original work of the student,** the student may discuss its **general features** with faculty, postdoctoral fellows, or other students. In particular, the student is encouraged to discuss the proposal with committee members to ensure the proposal is of sufficiently high quality.

INSTRUCTIONS FOR PREPARATION OF THE WRITTEN PROPOSAL

The proposal should have the following format:

A. Abstract:

Summarize the objectives of the proposed research in a concise abstract. Maximum one double-spaced page.

B. Specific Aims:

List the hypotheses to be tested and the specific goals to be achieved in this research project. Maximum 2 double-spaced pages.

C. Background and Significance

Critically analyze the literature related to this proposed research and summarize the current status of the field. Describe concisely the importance of the proposed research and the gap in knowledge to be filled (i.e, what's known vs. what's unknown). Maximum 6 pages, double-spaced. This section is not an extensive review of the entire field, but areas of the research related to the proposal. Figures of the pathway and models are encouraged.

D. Experimental Design and Methods of Procedure:

Detail the experimental approaches, procedures and methods to be used to accomplish the specific aims of the project. Be as specific as possible and estimate the timetable (expected time; i.e., don't propose more than 5 yrs of experiments) to be followed. Comment on expected outcome, any experimental problems and/or particularly difficult steps and means to deal with them. Include in this section a discussion of the methods to be used in interpreting the results. Maximum 12 pages, double-spaced.

E. Bibliography

Provide a bibliography of all references cited.

6. Formation of the Dissertation Committee before the Qualifying Exam

Before you take the oral qualifying exam, you must first have a meeting with your dissertation committee. This meeting must be documented by a memo to the Program Chairman, (written by the chairman of the committee) and must indicate "Satisfactory Progress." Without it, you will not be permitted to take the exam. By forming your committee prior to your qualifying exam, you will (a) be able to identify and correct deficiencies, (b) "induce" critical thinking skills that will help you prepare for the exam, and (c) avoid the hassle of forming the committee later on!

Please don't worry that your research project might change significantly in the future or that you don't feel you have enough significant findings to date; form a committee and get

them to meet presenting what you have. Over time, some members of your dissertation committee will no longer be appropriate. Since your committee is not official until after you have passed your qualifying exam (and until your committee selection form has been approved) it is not a problem to change the membership of your committee later on. Even when committees do become "official", changes can be made if there is a reasonable justification.

Be sure to have the chairman of your dissertation committee send a memo to Qualifying Exam Faculty Coordinator and Priya Sen. The memo should indicate that you have made reasonable progress. For "reasonable progress," the committee should feel that you are starting to get the hang of things and that you have been learning something, even if you don't have any publishable results yet. This meeting will show that you are simply on track and there are no unusual problems that should be discussed and resolved.

Examples of problems that might indicate unsatisfactory progress include: a student who shows no understanding of the goal of the project he/she is currently working on; a student who has no understanding of the methods being used; a student with a glaring knowledge deficiency, like not knowing the relationship between protein synthesis and protein folding; or a student who is busy rebuilding 1975 sports cars and is rarely in the lab.

If your dissertation committee chairman would like clarification of the term "Satisfactory Progress," please have him/her call the Program Chairman.

The members of your dissertation committee cannot serve on the committee of your qualifying exam.

Possible Resources to Consult on Grant Writing

Reif-Lehrer, Liane. *Grant Application Writer's Handbook*. Jones and Bartlett Publishers. Sudbury, Massachusetts:1995.(See Part V on "Writing the Research Plan" and Appendix III with a General Checklist)

Internet resources

NIH web site on grants – "All about grant tutorials" from NIH / NIAID
http://www.niaid.nih.gov/ncn/grants/default.htm

"*Grantspersonship: An Instruction Manual*" by Beth Fischer and Michael Zigmond's
(PDF free download; See p. 3 their concept of FITS)
http://www.survival.pitt.edu/library/documents/grantspersonshipmanual.pdf

The Art of Grantsmanship by Jacob Kraicer
http://www.utoronto.ca/cip/sa_ArtGt.pdf

Hints for Writing Successful NIH grants by Prof. Ellen Barrett
http://www.wm.edu/grants/PROP/Ellens_how_to.html

Submit your abstracts & proposals as a PDF file with your Name in the filename.

PDF generator software is available to help you save your documents as PDFs. Please note that when naming your file put your name in the filename and please do not use special characters or spaces in the file names. Such files are unrecognizable as PDFs to some systems. Only use standard characters in file names: A through Z, a through z, and 0 through 9, Hyphen (-), underscore (_). Also, Disable all security features in the PDF document. Protected documents prevent NIH from opening and processing the document. Security settings vary by PDF tool, but please ensure security settings are not marked. The list below contains some of the PDF generators available, many of which are free or very inexpensive.

Create Adobe PDF Online
https://createpdf.adobe.com/index.pl/
Web-based converter. Vendor emails PDF back to you. (For PC or Mac)

CutePDF
http://www.cutepdf.com/
Print driver that will work with any application. (For PC)

Go2PDF
http://www.go2pdf.com/
Print driver that will work with any application. (For PC)

Pdf995
http://site4.pdf995.com/
Print driver that will work with any application. (For PC)

PDFcreator
http://docupub.com/
Web-based converter. View PDF or emails PDF to you. (For PC or Mac)

Win2PDF
http://www.win2pdf.com/
Print driver that will work with any application. (For PC)

SUMMARY OF QUALIFYING EXAM PROCESS

(Please consult Appendix I for details)

NOTE: Disssertation Committee MUST MEET before the Qualifying Exam

Before you take the oral qualifying exam, you must first have a meeting with your dissertation committee. This meeting must be documented by a memo to the Program Chairman, (written by the chairman of the committee) and must indicate "Satisfactory Progress." Without it, you will not be permitted to take the exam.

1. **Feb. 6***. One abstract (no more than 3 pages double-spaced) is submitted to Dr. Mala Mahendroo (Chairman of the Qualifying Exam Committee, Mala.Mahendroo@UTSoutwestern.edu, X87380) on or before this date. The subject of the proposal has to be distinct from dissertation research of the student. Based on the proposal, Qualifying Exam Faculty Coordinator will assign a committee chair (with expertise in the area of the research proposal) and two examiners.

2. **Feb 28**. The student should meet with his or her committee Chair to discuss the outline and format of the proposal on or before this date. The proposal format should be similar to an NIH grant application.

3. **April 3**. First full-length draft submitted to the Chair of the student's committee.

4. **April 21***. Final written proposal must be submitted to the entire committee on or before this date.

5. **May 5-16th***. Oral Examination. Dates will be scheduled by the Program. The student's Exam Committee and a Program Observer will attend. Mentors of students are not allowed to be present. After the exam, the Qualifying Exam Committee will make a recommendation (Unconditional Pass, Conditional Pass, re-examination or Failure) to the Integrative Biology Steering Committee.

6. Qualifying Exam Faculty Coordinator is informed of the outcome by a signed Graduate School form from the Chairman of the Qualifying Exam Committee.

7. **By the end of May**. An IBGP faculty committee meets to make a final decision of promotion to candidacy for a Ph.D. degree based on the student's qualifying exam results, grades, lab work, progress to date, and adviser's perspective.

NOTE: *Dates indicated above should be strictly followed. Exceptions can only be made with approval of Qualifying Exam Faculty Coordinator and the Chair of the Qualifying Committee. All decisions by the committee that required some action by the student should be relayed to the student by the Chairman in writing.

APPENDIX II

Guidelines for Integrative Biology Graduate Program Journal Clubs

Program Goals: Our goal for this Journal Club format is to develop and enhance student skills for reading and analysis of primary research articles. By focusing on a theme, students also should also gain considerable knowledge in a given research area.

Schedule: Journal Club will be held once per month from Oct. to May (8 total). Each group can determine specific meeting days and times. Groups are responsible for reserving their own conference rooms.

Attendance: Student attendance is mandatory for all eight Journal Club sessions; no unexcused absences. Excused absence will be allowed for emergencies only. Please inform Priyarama Sen of all absences or other attendance problems.

Selection of papers: Faculty sponsors can determine the mechanism for selection of papers. However, to ensure that papers are of appropriate quality, learning/discussion value, and compatibility with the theme of the Journal Club, faculty sponsors should be actively involved in the selection process, either by approving student-selected papers, or by making the selections directly. You may wish to consider selecting and announcing early in the year all or most of the papers to be covered, thereby establishing a rational development and presentation for your theme. Please give some thought to "linkage" of papers; obviously, some papers are more interesting and meaningful when considered in light of others.

Format: Format of the Journal Club is up to the faculty sponsor(s) and the students. A paper may be presented entirely by one student or by a group of students. In either case, the presentation should take the form of a discussion with you and the presenter as facilitators. Journal Club presentations should not be lectures. Each student is expected to read each paper and participate actively in its discussion and analysis. Make certain that every student has an opportunity to participate. Don't let the self-assured dominate the group. Many leaders call on students to explain figures, thereby giving those otherwise hesitant to speak (particularly non-native speakers) a chance.

Evaluation of students: At the end of the year, the faculty sponsor(s) will assign a grade of "satisfactory" or "unsatisfactory" to each student, based on his/her performance. This may be done on a session-to-session basis to identify and correct any troubling trends during the year. Lack of participation in discussion is sufficient grounds for an "unsatisfactory" grade.

APPENDIX III

Integrative Biology Special Topics (IB 5096-01)
An Independent Study

The Integrative Biology Graduate Program strongly encourages students to develop, in collaboration with the mentor, the Graduate Student Advisor and appropriate faculty, a special topics course dealing with systems related to future dissertation research. This tutorial-type course may cover fundamental knowledge, methodological approaches and/or recent primary literature. Students are encouraged to review the basic tenets of their field by reviewing classic papers selected in consultation with the mentor. Other options for basic knowledge could include reading assignments for and attendance at selected lectures in formal courses, with approval of the course instructor. Focused sessions on specific topics can be arranged with individual faculty members. Students may consider sessions with faculty who use methods might be applied to their own research. In some cases, sessions might contain hands-on elements. The development of a tutorial course directly relevant to the student's research field is viewed as a significant educational benefit.

Students are required to submit a tentative topic list during the second week of the semester, an updated list by week 9 and a completed list in the last week of the semester. Sessions attended should be initialed on the course list by the faculty participant, or the faculty participant can e-mail comments to Dr. Kamm (Kristine.Kamm@UTSouthwestern.edu, X56036). The final course evaluation is based on a written paper in the format of a "News and Views" article that incorporates elements derived from the independent study. The paper will be read by at least two faculty members (including the student mentor). The primary reader should be expert in the selected topic and should be arranged by the student. This format has the purpose of highlighting a current important finding by putting it in a larger context. The paper will be short (8-10 double-spaced pages) with 10-15 references. Students are not expected to touch on all topics covered during the semester, but to focus on a selected one. Papers are due the last week of the semester.