MEDICAL PHARMACOLOGY & TOXICOLOGY (PHA)

School of Medicine

**PHA 092 — Internship in Pharmacology (1-12 units)**

*Course Description:* Supervised work experience in pharmacology and related fields.

*Prerequisite(s)*: Lower division student with good academic standing; approval of project prior to period of internship.

*Learning Activities:* Internship 3-36 hour(s).

*Grade Mode:* Pass/No Pass only.

**PHA 099 — Special Study for Undergraduates (1-5 units)**

*Course Description:* Special study for undergraduates.

*Prerequisite(s)*: Consent of instructor; lower division standing.

*Learning Activities:* Variable.

*Grade Mode:* Pass/No Pass only.

**PHA 192 — Internship in Pharmacology (1-12 units)**

*Course Description:* Supervised work experience in pharmacology and related fields.

*Prerequisite(s)*: Consent of instructor; upper division standing; approval of project prior to period of internship.

*Learning Activities:* Internship 3-36 hour(s).

*Grade Mode:* Pass/No Pass only.

**PHA 198 — Directed Group Study (1-5 units)**

*Course Description:* Directed group study.

*Prerequisite(s)*: Consent of instructor.

*Learning Activities:* Variable.

*Grade Mode:* Pass/No Pass only.

**PHA 199 — Special Study for Advanced Undergraduates (1-5 units)**

*Course Description:* Special study for advanced undergraduates.

*Prerequisite(s)*: Consent of instructor.

*Learning Activities:* Variable 1-5 hour(s).

*Grade Mode:* Pass/No Pass only.

**PHA 205 — Problem Solving in Pharmacology (1 unit)**

*Course Description:* Introduction to a current biomedical problem that would benefit from a developing drug and will develop an experimental strategy for addressing the issue. Develop model systems for testing various classic and recent pharmacological approaches.

*Learning Activities:* Lecture/Discussion 2 hour(s).

*Enrollment Restriction(s):* Restricted to Graduate Students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students may be accepted with consent of instructor.

*Repeat Credit:* May be repeated 12 time(s) as subject changes every quarter; each course is unique and may be taken as often as desirable; certain students (Trainees of the Training Program in Pharmacological Sciences) must take course for at least three years.

*Grade Mode:* Letter.

**PHA 207 — Drug Discovery & Development (3 units)**

*Course Description:* Survey of the process by which a drug is discovered, developed and made available to the public. Topics include drug identification and optimization, safety testing, clinical evaluation, regulatory issues, intellectual property, formulation, and the global pharmaceutical industry.

*Prerequisite(s):* An equivalent course in general pharmacology, or knowledge of basic pharmacology.

*Learning Activities:* Lecture/Discussion 2 hour(s), Extensive Writing 1 hour(s).

*Enrollment Restriction(s):* Intended for graduate students in Pharmacology and Toxicology, Chemistry and Clinical Research Graduate Groups; other students, including undergraduates, may be accepted with consent of instructors.

*Repeat Credit:* May be repeated.

*Grade Mode:* Letter.

**PHA 208 — Advanced Cardiac Physiology & Pharmacology (3 units)**

*Course Description:* Detailed characterization of the mechanisms involved in cardiac excitation-contraction coupling, alterations that occur in heart disease and pharmacological interventions. Topics include cardiac contractile apparatus, action potential, Ca cycling, excitation- transcription coupling, cardiac inotropy, heart failure and arrhythmias.

*Prerequisite(s):* An equivalent course in general pharmacology or physiology (example, BIM 204), or knowledge of basic pharmacology/physiology.

*Learning Activities:* Lecture 2 hour(s), Lecture/Discussion 1 hour(s).

*Enrollment Restriction(s):* Open to graduate students from the Pharmacology and Toxicology, Molecular, Cellular and Integrated Physiology, Biomedical Engineering and Clinical Research Graduate Groups; other students (including undergraduates) may be accepted upon consultation with the instructors.

*Grade Mode:* Letter.

**PHA 225 — Gene & Cellular Therapies (3 units)**

*Course Description:* Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues.

*Learning Activities:* Lecture/Discussion 3 hour(s).

*Cross Listing:* GGG 225.

*Grade Mode:* Letter.

**PHA 234 — Advances in Computational Physiology & Pharmacology (2 units)**

*Course Description:* Multi-scale biomedical modeling methodologies and applications, with emphasis on ion channel structure-function, computer-aided drug design, and membrane excitability. State-of-the-art techniques used for multi-scale modeling of biomedical systems and their applications.

*Prerequisite(s):* No formal requirements; basic knowledge of mathematics, physics, chemistry, and biology helpful.

*Learning Activities:* Lecture 2 hour(s).

*Cross Listing:* HPH 234.

*Grade Mode:* Letter.
PHA 291 — Pharmacology Research Seminar Series (1 unit)
Course Description: Research seminars on current topics in Pharmacology.
Prerequisite(s): Consent of instructor; upper division or graduate standing.
Learning Activities: Seminar 1 hour(s), Discussion 1 hour(s).
Repeat Credit: May be repeated when topic differs.
Grade Mode: Satisfactory/Unsatisfactory only.

PHA 298 — Group Study (1-5 units)
Course Description: Group study.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Grade Mode: Letter.

PHA 299 — Research (1-12 units)
Course Description: Research.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Grade Mode: Satisfactory/Unsatisfactory only.

PHA 400A — Pharmacology (2 units)
Course Description: Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs.
Prerequisite(s): Approval by School of Medicine Committee on Student Progress.
Learning Activities: Lecture 1 hour(s), Discussion/Laboratory 0.30 hour(s).
Enrollment Restriction(s): Restricted to Medical student only.
Grade Mode: Pass/Fail only.

PHA 400B — Pharmacology (1.5 units)
Course Description: Principles in pharmacology, including autonomic pharmacology, general anesthetics, neuropharmacology and sedative/hypnotics.
Prerequisite(s): Approval by School of Medicine Committee on Student Progress; medical students only.
Learning Activities: Lecture 1 hour(s), Discussion 0.25 hour(s).
Grade Mode: Pass/Fail only.

PHA 400C — Pharmacology (3.5 units)
Course Description: Treatment of respiratory and cardiovascular disease, central nervous system drugs, GI, Toxicology and chemotherapy. Specific topics include: asthma, chronic obstructive pulmonary disease, hypertension, congestive heart failure, and the treatment of arrhythmias. Pain Management, depression, psychosis, acid reflux, IBS and toxicology.
Prerequisite(s): PHA 400A; PHA 400B; approval by School of Medicine Committee on Student Progress; medical students only.
Learning Activities: Lecture 2 hour(s), Discussion 0.50 hour(s).
Grade Mode: Pass/Fail only.

PHA 445 — Introduction to Integrative Medicine (1 unit)
Course Description: Basic principles of alternative medical systems (e.g., traditional Chinese, Ayurvedic, Tibetan), alternative practices (e.g., chiropractic, osteopathy, naturopathy, homeopathy, herbalism, guided imagery/meditation, massage therapy), and mind/body connection are presented as introduction to integrating alternative treatments into traditional medicinal practice.
Prerequisite(s): Medical student in good standing.
Learning Activities: Lecture/Discussion 1 hour(s).
Grade Mode: Honors/Pass/Fail.

PHA 490 — Seminar in Pharmacology for Medical Students (1 unit)
Course Description: Seminar in pharmacology for medical students.
Prerequisite(s): Consent of instructor.
Learning Activities: Seminar 1 hour(s).
Grade Mode: Honors/Pass/Fail.

PHA 497T — Tutoring in Pharmacology (1-5 units)
Course Description: Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine.
Prerequisite(s): Advanced standing or consent of instructor.
Learning Activities: Tutorial 3-15 hour(s).
Grade Mode: Honors/Pass/Fail.

PHA 498 — Special Study for Medical Students (1-5 units)
Course Description: Special study in pharmacology for medical students.
Prerequisite(s): Consent of instructor.
Learning Activities: Lecture, Discussion.
Grade Mode: Honors/Pass/Fail.

PHA 499 — Directed Research for Medical Students (1-12 units)
Course Description: Directed research in pharmacology for medical students.
Prerequisite(s): Consent of instructor.
Learning Activities: Laboratory 3-36 hour(s).
Repeat Credit: May be repeated.
Grade Mode: Honors/Pass/Fail.