

A. BACKGROUND

1. Status of Toxicology Research and Training at UCLA in 1999

In 1999 there were a number of outstanding toxicology researchers at UCLA. However, these investigators belonged to least eight different departments and four different schools/colleges, and despite their laboratories being in close proximity to one another, there were only limited interactions among them. Doctoral students who focused on toxicological problems were similarly dispersed in a number of departments and interdepartmental graduate programs. Recognizing that there were important toxicological problems facing California and the nation, but that the potential impact of toxicological research and training at UCLA was limited because of its lack of cohesion, in 1999, a number of faculty members, including Professors Collins, Froines and Hankinson, initiated several changes in order to enhance and expand toxicological research and training at UCLA. One endeavor involved an application to the University of California Toxic Substances Research and Teaching Program (UC TSR&TP) for a "Lead Campus" in "Toxic Mechanisms" (described below). In another important endeavor, the faculty applied to the University of California to establish an interdepartmental doctoral program in Molecular Toxicology (Molecular Toxicology IDP) at UCLA.

2. Origins and Governance of the Molecular Toxicology IDP

The application to the University of California for the establishment of this IDP was spearheaded by Professor Hankinson. In July, 2000, the IDP was approved by University of California President Richard Atkinson. Ours was the first molecular toxicology graduate program to be established in California.

The original sixteen faculty of the IDP came from eight departments. Common to all the investigators was an emphasis on the mechanisms whereby toxicants cause disease. For this reason, the program was named "Molecular Toxicology". Since 2000, four of the original faculty have left the program (retired or deceased), while fourteen new faculty members have joined, bringing the current number of faculty to twenty-six, and the number of departments in which the faculty have primary appointments to sixteen. All our faculty are located near each other at the south end of the UCLA campus.

The first Molecular Toxicology IDP students entered the program in the fall of 2001. In 2004 the Molecular Toxicology IDP was accepted into the UCLA ACCESS Program in the Molecular, Cellular and Integrative Life Sciences (described more fully later), which recruits students for twelve Ph.D. programs at UCLA. This development increased the potential pool of well-qualified applicants for the IDP. Our current goal is to admit about three predoctoral students per year.

The Molecular Toxicology IDP is governed by the Faculty Advisory Committee (FAC) of six persons. This committee consists of the Director who is appointed by the UCLA Graduate Division, two Associate Directors who are appointed by the Director (with the approval of the UCLA Graduate Division), and three faculty who are elected to three year terms by the IDP faculty. The Molecular Toxicology students elect a student representative each year, who attends the FAC meetings as a non-voting member. The FAC meets monthly. Minutes are generated for the meetings. Once per year there is a general meeting of all Molecular Toxicology IDP faculty, where plans to improve the program are discussed.

3. Research Emphasis of the Molecular Toxicology IDP

There is an overall emphasis on the mechanisms whereby environmental toxins cause disease. Much of the research of the faculty falls into the following four foci of interest and collaboration. (i) The asthma-enhancing and other deleterious effects of diesel exhaust particles and airborne particulate matter (PM). (ii) The molecular mechanisms of chemical carcinogenesis. (iii) The program also recently made a very exciting expansion into neurotoxicology, which has been actively pursued through the recent recruitment into the program of several UCLA faculty in this field. These faculty members, Drs Bronstein, Cheselet and Krantz, together with Drs Ritz

and Schiestl, are pursuing the role of environmental pollutants in the etiology of Parkinson's disease. (iv) Capitalizing on their experience with ambient air particles, several of our faculty have also turned their attention to toxicological studies on manufactured nanoparticles (i.e. nanotoxicology).

4. The University of California Toxic Substances Research and Teaching Program Lead Campuses at UCLA

The UC TSR&TP is a state-funded "University of California Multicampus Research Unit supporting research on toxic substances in the environment and teaching of graduate students through funding of grants, fellowships, and lead campus programs". In 1999, Professor Oliver Hankinson spearheaded an application for a Lead Campus to the UC TSR&TP with the assistance of several Molecular Toxicology faculty at UCLA, and certain faculty from the University of California, Riverside, and the Los Alamos National Laboratory. Our Lead Campus proposal was selected for funding in June, 2000, at nearly the same time that the University of California approved the establishment of the Molecular Toxicology IDP. The Lead Campus was site-visited by the UC TSR&TP in 2003, received an "outstanding" evaluation, and was renewed for five more years, through June, 2008. The Lead Campus, which focused on "Toxic Mechanisms", consisted of a consortium of faculty members from three University of California campuses, and including the faculty members of the UCLA Molecular Toxicology IDP.

The Lead Campus grant in "Toxic Mechanisms" expired on 06/30/08 and could not be renewed. However, in 2005, Professor Andre Nel and Curtis Eckhert (members of the Molecular Toxicology faculty), with the assistance of number of faculty at UCLA and UC Santa Barbara, submitted an application for a new (fourth) UC TSR&TP Lead Campus in "Nanotoxicology." This Lead Campus program was funded for six years, from 07/01/06 to 06/30/12. This training grant provides pre-doctoral and postdoctoral traineeships to students at UCLA and UC Santa Barbara, and is affiliated with the new UCLA Nanosystems Institute. Students in the Mol Tox program are eligible for support from this training program. The Lead Campus will therefore accelerate the expansion of the Molecular Toxicology program into this area.

5. NIEHS training grant in Molecular Toxicology

The Molecular Toxicology IDP was recently awarded a NIH (NIEHS) training grant (2008-2013) in "Training in Molecular Toxicology" (P.I. Oliver Hankinson, co-PI Robert Schiestl) which supports both doctoral students and postdoctoral students in the program. Ours was the first new NIEHS training grant awarded in 2008. Since the NIEHS training grant started immediately after the UC TSR&TP lead campus in "Toxic Mechanisms" terminated, continuity of funding to the Molecular Toxicology IDP was provided. The nine faculty of the NIEHS training grant represents a subset of the Molecular Toxicology faculty; namely those who focus their research on areas included in the NIEHS mission, viz. the effects of industrial chemicals or manufacturing by-products, metals, pesticides, herbicides, air pollutants and other inhaled toxicants, particulates or fibers, fungal or bacterially derived toxins due to ambient exposures. The award of the NIEHS training grant has expanded the activities of the Molecular Toxicology program into the arena of postdoctoral training. Although we realize that such responsibilities are not considered under the purview of an IDP, we think that the involvement of postdoctoral activities greatly strengthens the IDP.

6. The Current Status of Toxicological Research and Training at UCLA

The Molecular Toxicology students participate in a substantial number of activities organized by the IDP. These common endeavors have engendered a strong cohesive spirit among the Molecular Toxicology students. This spirit is exemplified by the "Toxic Substances" co-ed flag football team, consisting primarily of Molecular Toxicology students, which won the UCLA intramural playoffs in three of the last four years! A marked coming together of toxicology faculty members has also occurred as a result of their participation in the activities of the Molecular Toxicology IDP, the UC TSR&TP Lead Campuses, and the NIEHS training grant in Molecular Toxicology, and these interactions continue to develop. In the last few years, the molecular toxicology program has therefore helped catalyze a renaissance and consolidation of molecular toxicological research and training at UCLA.

7. Societal need for Molecular Toxicology

We believe that molecular toxicological research is highly relevant to California, the USA, and the world, and that our program, and our graduates will make, and are making, contributions to the amelioration of significant societal problems. For example, the adverse effects of air pollution are of particular concern in Southern California, and this is likely to become an increasingly important area of research for the molecular toxicology program. California has the largest agricultural industry in the USA. The potential toxicity of insecticides and herbicides is thus of great concern, but also provides research opportunities. The mechanisms whereby pesticides, and other environmental pollutants impact the development of Parkinson's disease will become an increasingly important focus of our program. The potential toxicity of engineered nanoparticles is also of great concern to both the general public and the relevant manufacturers and commercial utilizers. The molecular toxicology program is partnering with the recently established California Nanosystems Institute (CNSI) and the NSF and EPA-funded Center for the Environmental Impact of Nanotechnology (CEIN) in developing research in this area. (Dr. Nel directs the new program in nanotoxicology and the CEIN.) It is our conviction that great strides in the identification, appraisal, and amelioration of the toxicological risks of the above environmental pollutants will emanate from studies into the mechanisms whereby they cause disease. We will position ourselves to address both existing and new toxicological challenges to California and the nation.

Of considerable interest to us, the Governor of California recently established a "Green Chemistry Initiative" whose ultimate goal is to eliminate toxic chemicals in the environment. Furthermore, the European Union recently passed a new law regulating over 30,000 toxic industrial chemicals, which will have a major effect on the US chemical industry.

8. Institutional support for the Molecular Toxicology program

The UCLA Center for Occupational and Environmental Health (COEH), directed by Professor John Froines of the Molecular Toxicology IDP, uses its limited discretionary funds to provide small dollar amounts for new faculty startup, small equipment purchases, and some administrative support. The COEH is strongly committed to supporting and strengthening the Molecular Toxicology IDP.

The UCLA Graduate Division provides approximately \$40,000 each year to the Molecular Toxicology IDP for student support, as well as (sometimes) a Chancellor's prize (\$10,000 student stipend) and a (competitive) Cota Robles fellowship for underrepresented minority applicants (providing fees and partial funding {\$20,000} for the first year and one subsequent year.) (Molecular Toxicology doctoral program minority students have been routinely successful in winning Cota Robles awards.) The Graduate Division has also committed to providing matching funds of an amount equal to 20% of student stipend support awarded by our NIEHS training grant (i.e. about \$10,000/year). The ACCESS program requires pay-back of \$25,000 for any student recruited into the Molecular Toxicology IDP to cover first year expenses. The Department of Pathology and Laboratory Medicine provides 50% of this pay-back for students entering the laboratories of its faculty (Drs. Hankinson, Schiestl and Berliner).

The IDP is administered from the department of Environmental Health Sciences in the School of Public Health, which provides modest administrative support from an administrative assistant. Administrative assistance is also provided by Dr Hankinson's administrative assistant, who is supported by the Department of Pathology and Laboratory Medicine. Administrative support to the IDP is therefore adequate.

9. Predocutorial Trainee Curriculum

The curriculum for the Molecular Toxicology doctoral students is shown in tabular form as appendix 2.

All ACCESS and directly admitted Molecular Toxicology students take the same course during the first two quarters of their first year. These consist of M253, M248, M267A, and 267B. These courses provide a solid foundation in molecular and cellular biology. During their third quarter, the students begin their formal education in molecular toxicology, by taking EHS240. Advanced Molecular Toxicology (Mol Tox 246) and the Laboratory in Toxicological Methods class (Mol Tox 245) are taken in the Fall and Winter Quarters of the second or third year. (Some ACCESS students who join the Molecular Toxicology program may decide to do so only during or after their third quarter, and they may therefore not have taken EHS240 in the third quarter.

They will therefore be required to take this course in their second year.) Trainees may also take electives to fill deficiencies in their academic backgrounds. Starting in the second year of the curriculum and continuing until graduation, the major activity of the students is the performance of original research.

Laboratory Rotations

The students do rotations, each of ten week's duration, in the laboratories of three different Molecular Toxicology faculty members during their first year. In this first year, each student is mentored by the Molecular Toxicology Associate Director for Student Affairs. At the end of their first year, each student chooses his/her thesis mentor. The student is also advised by his/her Thesis Committee, which in addition to the mentor, includes two other Molecular Toxicology faculty members, and one or two faculty members from a different department/IDP.

Teaching Requirements

All students will obtain instruction in teaching skills by serving as teaching assistants (TAs) or readers for at least one quarter.

Qualifying examinations—written and oral

This examination is typically taken towards the end of the student's second year at UCLA. Both a written and oral qualifying examination is required. The format for the written qualifying examination consists of a NIH-style research proposal on a topic which is approved by members of the Thesis Committee. The Thesis Committee consists of four faculty members including the student's advisor, who serves as the Chair.

The oral examination of the written proposal allows the Thesis Committee to fully evaluate the ability of the student to discuss the subject matter in a scholarly fashion. The student must be able to defend the validity and importance of the proposed research, as well as the experimental approaches taken. The oral qualifying examination also provides the Thesis Committee the opportunity to specifically address perceived weaknesses in the student's educational background as well as evaluate the student's communication skills.

After successful completion of both the oral and the written qualifying examinations, the student will advance to candidacy.

Dissertation

A dissertation based on original research is required. The dissertation must be written in the format approved by UCLA. As a general guideline, the dissertation should consist of research equivalent to at least two peer-reviewed publications in reputable journals in the field.

Final examination

A final defense of the Ph.D. thesis is required.

Normative time from matriculation to degree

Students who fail to complete the dissertation within 18 quarters will have their record evaluated to determine if an extension of time is warranted. If an extension is granted, the student will be carefully monitored to make sure the dissertation is completed within the additional time allowed.

Note that all but one of the ten students who joined the program in 2001, 2002 or 2003 and who advanced to candidacy have graduated, testifying to the effectiveness of the program in graduating students in a timely fashion.

10. Retreats/Meetings

All trainees participate in the Molecular Toxicology research retreat/symposium that is organized every two years in a location near Los Angeles.

Trainees are also encouraged to attend the annual meeting of the Society of Toxicology (SOT), and are strongly encouraged to give presentations at this meeting. Our students who give presentations have routinely received SOT travel grants to attend the meeting. These meetings introduce the students to the greater toxicology community, give them the opportunity to present their research to this community, and give them the opportunity to attend useful lectures and workshops. There are also several activities at the annual SOT meeting that address future research and career opportunities for the students. We also arrange a meeting of past and present members of the UCLA Molecular Toxicology program at the annual meetings of the SOT. Students have been, and will continue to be encouraged to attend meetings relating to their special area of interest, such as the annual meeting of the American Association for Cancer Research. Many of our students also attend the scientific meetings of the Southern California Chapter of SOT, and regularly win prizes at these meetings. For example at the annual meeting of the Southern California chapter of SOT held in October, 2008, four of our students won prizes, as listed below:

Oral presentation

1 st place- Kim Henderson

2 nd place- Sudheer Beedanagari

Poster presentation

1 st place- Aya Westbrook

3 rd place- Peter Bui

11. Recruitment

The Molecular Toxicology IDP recruits graduate students directly into the program, as well as recruiting students through the UCLA Programs in the Molecular, Cellular and Integrative Life Sciences (ACCESS). As mentioned previously, the Molecular Toxicology IDP was admitted into the ACCESS program in 2004. This increased the number of highly qualified potential applicants to our doctoral program.

The ACCESS program organizes student recruitment and also administers the first year graduate course of study for twelve Ph.D programs at UCLA (including the Molecular Toxicology IDP). 252 UCLA faculty participate in the program. ACCESS faculty are required to have a recent history of mentoring students and /or postdoctoral fellows, and to have a current NIH RO1 or equivalent grant.

ACCESS recruits approximately forty students each year. Since joining ACCESS, the Molecular Toxicology IDP has participated in the program very actively. Dr. Hankinson currently serves on the ACCESS Steering Committee and also the ACCESS Admissions Committee. The IDP also participates in the annual ACCESS "Affinity Fair" in the Fall Quarter each year, where our research is presented to incoming ACCESS students.

We will also continue to recruit graduate students directly into the Molecular Toxicology IDP. Another potential source of students is the Masters' program in Toxicology in the department of Environmental Health Sciences.

We average two direct admits and one transfer student from ACCESS each year.

12. MINORITY RECRUITMENT AND RETENTION PLAN

Our program has made a considerable effort in minority outreach, recruitment, and retention. Some examples follow.

Robert Taylor is an African-American who recently graduated with a Ph.D. in Molecular Toxicology. The Molecular Toxicology IDP nominated him in 2002 for the Professional Development and Peer Review Workshop sponsored by The Comprehensive Minority Biomedical Branch, National Cancer Institute, and he

attended the two day workshop. In 2004, he was nominated for, and attended, a workshop on "Preparing for the Postdoctorate Institution," hosted by Howard University, and the University of Texas at El Paso Alliance for Graduate Education. In 2005, he was nominated for, and attended, a five day workshop, followed by a four day conference, given by the Biotechnology Institute in Philadelphia, Pennsylvania for the Minority and Indigenous Fellows Program.

In 2005, Dr. Hankinson, representing the Molecular Toxicology Program, participated, along with Robert Taylor, in the UCLA NSF Competitive Edge Graduate Summer Research Program, described above, which was attended by a select group of African-American students in STEM fields who had graduated from traditionally minority institutions, with the objective of recruiting one or more of these students to graduate school at UCLA. In October, 2006 Dr. Hankinson also participated in the one day retreat of the California State University, Los Angeles Minority Opportunities in Research (MORE) program, which serves as a bridge to doctoral programs.

We recruited another African-American woman student, Ashley Terrell, to our Molecular Toxicology program in 2007. She received a fellowship from our NIEHS training grant in Molecular Toxicology to pursue her thesis research under the guidance of Professor David Krantz. She participated in the six week UCLA NSF Graduate Summer Research Program (described above) prior to her first rotation. She was also awarded a two year Eugene Cota-Robles Fellowship from the UCLA Graduate Division, which supports underprivileged applicants. In 2008 an African-American man, Aaron Chapman, transferred to the Molecular Toxicology IDP from the UCLA ACCESS program, in order to pursue his research in the laboratory of Professor Robert Schiestl. Thus three of our past or current students are from an underrepresented minority group.

13. Current positions of Molecular Toxicology graduates

All Molecular Toxicology students admitted in 2001 to 2003 have graduated, attesting to the effectiveness of our program at graduating students in a timely fashion. One of our graduates is an Assistant Professor at a major research university (Northwestern), nine are pursuing postdoctoral studies, three are scientists in major biotechnology companies, and one works for the US FDA.

14. Future of the Molecular Toxicology IDP

Over the next few years we will set out to further consolidate, improve and expand molecular toxicology research and teaching at UCLA.

As described in this report, we believe that there is a great need for persons trained in Molecular Toxicology in California and the nation. We are therefore proud that we are contributing to training such people. Furthermore, the Molecular Toxicology IDP has progressed towards establishing itself as an important player in the biomedical sciences at UCLA. However, there are a number of areas of concern. The most significant of these are noted below.

i) Our faculty members are generally advanced in their careers. There needs to be an infusion of new junior faculty.

As can be seen from Table 1, all but five of our 26 faculty are full professors. Many are expected to retire in the next decade. In order to maintain continuity to and vitality of the program, it is important that we recruit new faculty members, particularly those early in their research careers. To this end, we recently actively recruited UCLA Assistant Professor Jesus Araujo, who will further expand our activities in the area of environmental causation of atherosclerosis. In the last two years, we also recruited UCLA Professors Bronstein, Chesselet, and Krantz.

Despite these recruitments, it is essential that we recruit at least one new faculty member who is a dedicated molecular toxicologist. Currently only five of our faculty can be considered "card carrying" toxicologists. The remainder are focused principally in other areas, with a secondary interest in toxicology. For long-term viability of our teaching and research activities, it is essential that we recruit a new bona fide toxicologist who is early in his/her career. To this end we have pursued a closer relationship with the Nanotoxicology program (directed

by Professor Andre Nel). In conjunction with this program we are exploring the possibility of recruiting a person who is trained in molecular toxicology, and performs research in nanotoxicology. There is the potential for obtaining a half FTE from the California Nanosystems Institute (CNSI) for this person. We are currently trying to solidify this and are looking for the other half FTE. Success in this endeavor requires commitment to the program from senior academic personnel at UCLA. We hope that the review committee for the 8 year review of the IDP will support us in this endeavor, and bring to the attention of the senior academic and administrative personnel at UCLA our need for at least one additional faculty member dedicated to Molecular Toxicology.

We are also pursuing the possibility of closer associations with faculty in the UCLA School of Engineering, particularly from the departments of Bioengineering, Chemical and Biomolecular Engineering, and Civil and Environmental Engineering. Some of these faculty are already integrated into the naotoxicology research program and there are potential projects for our students with several faculty members in these departments.

ii) We need sounder financial support for our students, particularly for the first year of their studies.

If we directly recruit two in-state students, and receive one transfer from the ACCESS program, this will cost us \$37,169 for stipend and fees for each direct admit student and \$12,500 for the ACCESS transfer students, for a total of \$86,800. Assuming that neither of the directly admitted students receive fellowships, this amount exceeds our funding from the UCLA Graduate Division (\$50,000) by \$26,500. It is therefore imperative that we secure additional funds.

Previous Review of the Program

The UCLA Graduate Council undertook a four year review of the Molecular Toxicology IDP in 2006. The report was very positive about the program.

Appendix 1:

Table 1 presents the current number of faculty members in the Molecular Toxicology IDP.

<u>Faculty Member</u>	<u>Rank</u>	<u>Department</u>
Jesus Araujo	Assistant Professor	Medicine
Judith Berliner	Professor	Pathology and Laboratory Medicine
Jeff Bronstein	Professor	Neurology
Gautam Chaudhuri	Professor/ Exec Chair	OB/GYN & Molecular and Medical Pharmacology
Marie-Francoise Chesselet	Professor/ Chair	Neurobiology
Catherine Clarke	Professor	Chemistry and Biochemistry
Michael Collins	Professor	Environmental Health Sciences
Curtis Eckhert	Professor	Environmental Health Sciences
John Froines	Professor, Dir EPA SCPC	Environmental Health Sciences
Richard Gatti	Professor in Rsdn	Pathology and Laboratory Medicine
Hilary Godwin	Professor	Environmental Health Sciences
Oliver Hankinson	Professor, Dir Mol Tox IDP	Pathology and Laboratory Medicine
Louis Ignarro	Professor	Molecular and Medical Pharmacology
David Krantz	Assistant Professor	Psychiatry
William McBride	Professor	Radiation Oncology
William Melega	Professor	Molecular and Medical Pharmacology
Sabeeha Merchant	Professor	Chemistry and Biochemistry
Jeffrey Miller	Professor	Microbiology, Immunology, & Molecular Genetics
Andre Nel	Professor, Div Chief, Dir CEIN, Dir UCLA Asthma Center, Dir UC Nanotox	Medicine
Beate Ritz	Professor	Epidemiology
Wendie Robbins	Professor	Nursing
Michael Roth	Professor	Medicine
Robert Schiestl	Professor	Pathology and Laboratory Medicine
Suzanne Paulson	Professor	Atmospheric Sciences and Oceanic Sciences
Joan S. Valentine	Professor	Chemistry/Biochemistry
Zuo-Feng Zhang	Professor	Epidemiology

Appendix 2: Curriculum

Year	Fall	Winter	Spring
1st Year	M253 (4) ¹ M248 (4) ² 596 Lab rotation (6)	M267A (4) ³ M267B (4) ³ 596 Lab rotation (6)	EHS240 (4) ⁴ 596 Lab rotation (6) M234 (2) ⁵
2nd Year	Mol Tox 246 (4) ⁶ Mol Tox 245 (2) ⁷ Research (M596) 211A Molecular Toxicology Seminars (1) ⁸ One of 296A-296F Research Topics in Molecular Toxicology(2) ⁹	Research (M596) 211B Molecular Toxicology Seminars (1) ⁸ One of 296A-296F Research Topics in Molecular Toxicology(2) ⁹	Research (M596) 211C Molecular Toxicology Seminars(1) ⁸ One of 296A-296F Research Topics in Molecular Toxicology(2) ⁹ Qualifying Exam
3rd, 4th and 5th Years	Research (M599) 211A Molecular Toxicology Seminars (1) ⁸ One of 296A-296F Research Topics in Molecular Toxicology(2) ⁹	Research (M599) 211B Molecular Toxicology Seminars (1) ⁸ One of 296A-296F Research Topics in Molecular Toxicology(2) ⁹	Research (M599) 211C Molecular Toxicology Seminars (1) ⁸ One of 296A-296F Research Topics in Molecular Toxicology(2) ⁹

Footnotes:

(the number of units are shown in parentheses).

- M253: Macromolecular Structure**
Chemical and physical properties of proteins and nucleic acids. Structure, cloning, and analysis of DNA; biosynthesis and processing of RNA; biosynthesis, purification, structure, and analysis of proteins; correlation of structure and biological properties. Letter grading.
- M248: Molecular Genetics**
Basic concepts in modern genetics, with examples from both eukaryotic and prokaryotic systems. Emphasis on use of genetic techniques for addressing fundamental questions in cellular biochemistry. Topics include mutagenesis, repair, recombination, transposition, genetic regulation, developmental genetics, neurogenetics, and immunogenetics. Letter grading.
- M267A: Cell Structure, Signaling and Development**
M267B: Seminar in Cell Structure, Signaling and Development
Cell cycle regulation; chromosomes and DNA repair; protein trafficking and endocytosis; extracellular matrix, cell to cell communication and signal transduction; cell transformation and apoptosis; molecular aspects of development, differentiation, and cancer. Letter grading.
- EHS 240 Fundamentals of Toxicology. (4)**
Lecture, four hours. Essential aspects of toxicology with emphasis on the human species; absorption, distribution, excretion, biotransformation as well as basic toxicological process and organ systems. Letter grading.
- M234 Ethics and Accountability in Biomedical Research (2)**
The course focuses on situations arising in the laboratory that may present ethical dilemmas for graduate students. (Students may take this course any time in their first two years of study.)

6. Molecular Toxicology 246. Advanced Molecular Toxicology (4)
This course addresses advanced topics in molecular toxicology. Students are required to have taken EHS240 or an equivalent course. The first four weeks focus on fundamental aspects of toxicology that are required for a deep understanding of toxicological processes. Weeks five through ten focus on in-depth analysis of several specific areas of molecular toxicology.
7. Molecular Toxicology 245. Laboratory in Toxicological Methods. (2)
Survey of experimental techniques used in the study of toxic substances. Presentation of principles of techniques and methods of data analysis at discussion session prior to laboratory. Letter grading.
8. Mol Tox 211A-C. Molecular Toxicology Seminar. (1)
All Molecular Toxicology students are required to attend two toxicology seminar series, each of which will meet once per month during the academic year. The first series consists of presentations by outstanding toxicological researchers from outside UCLA. Collectively, the Molecular Toxicology graduate students are responsible for selecting and inviting one "Graduate Students –Invited Lecturer" each year. We use funds from the NIEHS training grant to pay for this series. See appendix 3 for the list of speakers for this academic year.
9. The second series consists of internal seminars presented by toxicology students and postdoctoral fellows. Trainees will be required to both attend this seminar, and give a presentation about once per year in this series. See appendix 4 for the list of speakers for this academic year.
10. Mol Tox 296A-E. Research Topics in Molecular Toxicology. (2)
One of sections A to E is chosen. These are research group meetings. Students give presentations to their research group members on their current research. This provides an opportunity for the students to acquire presentation skills in a supportive environment, and to receive expert input into the progress of their research. Research group meetings occur weekly for about 1.5 hours. S/U grading:
11. EHS 280. Nanotoxicology. (4)
This course discusses the established and potential toxic effects of industrial and environmental nanomaterials based on their pharmacological, organic and inorganic properties.

Appendix 3:

2008-2009 MOLTOX SEMINAR SERIES
 THURSDAYS, 12:00PM – 1:00PM
 (EXCEPT FOR 2/25 BRENNAN SEMINAR)

DATE	LECTURER	LOCATION CHS
<u>Fall Quarter</u>		
Nov. 6	“Gene-Environmental Interaction on Cancer Risk” Dr. Zuo-Feng Zhang University of California, Los Angeles	43-105
Nov. 13	“Gene-Environment Interaction in Parkinson’s Disease” Dr. Beate Ritz University of California, Los Angeles	43-105
<u>Winter Quarter</u>		
Jan. 22	“The Role of Oxidative Stress in the Pathogenesis of Particle-induced Cardiovascular and Pulmonary Disease.” Dr. Andre Nel University of California, Los Angeles Joint Seminar with the Nanotoxicology and Molecular Toxicology Programs, and co-sponsored by the California NanoSystems Institute	43-105
Feb 25	“Systems Toxicology Applications in Environmental Risk Assessment” Dr. Richard Brennan GeneGo Inc. Director of Toxicology **NOTE: special seminar held Wednesday, 2/25 from 3-5pm	16-059
March 5	“Dynamic organization of signaling and repair machines at damaged chromosomes” Dr. Jiri Lukas Danish Cancer Institute Director of Genotoxic Stress Program Joint Seminar with UCLA Center for Biological Radioprotectors	43-105
March 12	“Oxidative stress as the Janus caretaker of multipotent stem cell function” Dr. Charles Limoli University of California, Irvine Professor of Radiation Oncology	43-105
<u>Spring Quarter</u>		
April 9	“Green Chemistry: Why Do Good Scientists Make Bad Molecules?” Dr. John Warner President, Warner Babcock Institute for Green Chemistry, Boston, Mass Mol Tox student Invited Speaker	53-105A

April 16	“Fundamental Information on Respirable Particles” Dr. Terence Risby Johns Hopkins University Professor of Environmental Health Sciences Joint seminar with Center for Occupational and Environmental Health (COEH)	53-105A
May 14	“CYP2S1, a novel cytochrome P450 enzyme affecting plasma and organ concentrations of prostaglandins and other eicosanoids, and with a potential role in cancer.” Dr. Oliver Hankinson University of California, Los Angeles	53-105A
May 28	“Perfluorinated Chemicals: The History of an Environmental Issue.” Dr. John P. Giesy University of Saskatchewan Professor & Canada Research Chair in Environmental Toxicology Mol Tox student Invited Speaker	53-105A
June 4	"Parkinson's Disease as a Model of Accelerated Neuronal Aging: An Argument for a Prime Role for Oxidative Stress" Dr. Julie Anderson Buck Institute for Age Research Sonoma, CA	53-105A

Appendix 4:

Molecular Toxicology Interdepartmental Program Seminars

Schedule for 2008-2009

Mondays 12-1 pm, Location: CHS 71-257 (unless otherwise noted)

Fall 2008

Iлона Bebenek (Hankinson Lab) – 11/3/2008

Mike Kovochich (Nel Lab)- 11/17/2008

Karen Young (Robbins Lab)-dissertation defense-date TBA

Winter 2009

Kim Henderson (Eckhert Lab)-Thesis Defense- 1/13/09-10 am, **CHS 14-214U**

Aya Westbrook (Schiestl Lab)-1/26/2008

Lynn Yamamoto (Schiestl Lab)-3/2/2008

Nicole Gatto (Ritz Lab)-3/9/2008

Spring 2009

Sarah Kobylewski (Eckhert Lab)-4/6/2008

Peter Bui (Hankinson Lab) –dissertation defense-date TBA

Parrisa Solaimani (Hankinson Lab)-4/13/2008

Ashely Terrell (Krantz Lab)-5/4/08

Sudheer Beedanagari (Hankinson Lab)-6/1/2008