

**Toxicology Program
Graduate Student Handbook
2017-2018**

<http://bio.sciences.ncsu.edu/graduate/degree-programs/toxicology/>
<https://tox.sciences.ncsu.edu/degree-programs/>

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Toxicology Graduate Student Handbook

This handbook was compiled to introduce new graduate students to the Toxicology program in the Department of Biological Sciences, NC State University. The handbook explains what a new graduate student needs to do upon arrival on campus and how to get started in his/her graduate program. The handbook outlines the steps necessary for the successful completion of his/her degree program and provides information regarding university and departmental procedures and regulations. The handbook is not meant to replace the Graduate Catalog (<https://www.ncsu.edu/grad/catalog/index.php>) but rather to provide an overview of important program and university policies and procedures.

Additional information about the Toxicology Program can be found on our website: <http://bio.sciences.ncsu.edu/graduate/degree-programs/toxicology/> or <https://.tox.sciences.ncsu.edu>

The Graduate School has provided an excellent website for new graduate student survival at NCSU and Raleigh (<http://www.fis.ncsu.edu/grad%5Fpublicns/survival/>).

We thank the Genetics Program for allowing us to use their Graduate Handbook as a template for this handbook. We also thank Ms. Janet Roe, Graduate Services Coordinator, for help with the preparation of this handbook.

Welcome to the Toxicology Program

Drs. F.E. Guthrie and E. Hodgson founded the Toxicology Program at NCSU within the Department of Entomology in 1964. Since the initiation of the toxicology-training program in the Department of Entomology, a number of milestones have been achieved. These include: i) the formation of a university-wide interdepartmental Toxicology Program (1964), ii) the granting of the Ph.D. degree in Toxicology (1979), iii) the creation of the Department of Toxicology (1989); iv) the development and approval of graduate study concentrations in Molecular and Cellular Toxicology, Environmental Toxicology and General Toxicology (2000); v) change of department's name to Department of Environmental and Molecular Toxicology to better reflect its research focus (2000); vi) occupancy of new 59,000 square foot \$14 million state-of-the-art research Toxicology Building (2001) and vii) the establishment of the College of Sciences (COS) and affiliation of the Toxicology Program with the newly assembled Department of Biological Sciences within COS (2013). Over the past 40 years, the Program/Department has been highly successful in training M.S and Ph.D. students and post-doctorates as illustrated by the number of graduates who continue to contribute to the field of toxicology in academia, industry, and government.

Currently, (2017) thirty-two graduate students are enrolled in the program. Of these, twenty-six Ph.D. students and the remaining seven graduate students are working towards their Master's degree. Students are from undergraduate institutions across the U.S. as well as from several countries around the world. The majority of Ph.D. students within the program have undergraduate degrees in biology, chemistry, biochemistry, or in toxicology.

We extend a warm welcome to the new students entering our department and we look forward to a productive scientific relationship. We encourage you to get involved with the Toxicology Graduate Student Association (TGSA) and to participate in the program events including seminars, workshops, and social events.

Toxicology Administrative Personnel

Program Director

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NIEHS Training Grant Preceptors—Molecular Pathways to Pathogenesis in Toxicology

The following faculty members are preceptors on the NIEHS Training Grant. Dr. Smart is the Training Grant Director and Dr. Bonner is the Associate Director. If you have any questions regarding the Training Grant, please see Dr. Smart.

<u>Name</u>	<u>Departmental Affiliation</u>	<u>Phone (919)</u>
Ken B. Adler	Molecular Biomedical Sciences	513-1348
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Michael Cowley	Biological Sciences/Toxicology	513-0818
Jane Hoppin	Biological Sciences/Toxicology	515-2918
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David Reif	Biological Sciences/Genetics	513-3812
Emilie Rissman	Biological Sciences/	
Marcelo Rodriguez-Puebla	Molecular Biomedical Sciences	515-7409
Robert C. Smart	Biological Sciences/Toxicology	515-7245
Yoshiaki Tsuji	Biological Sciences/Toxicology	513-1106
Fred Wright	Statistics/Biological Sciences	515-9060

Upon your Arrival at NCSU

Establishment of North Carolina Residency for US Citizens

For tuition purposes, all US citizens and permanent residents are expected to establish North Carolina residency within the first year of residence in the state. ***It is absolutely important that you complete the necessary steps to become a resident within the first 10 days of living in North Carolina.*** All the steps are described in detail at http://www.ncsu.edu/grad/handbook/section4_6.php. Failure to establish North Carolina residency the first year will lead to costly out-of-state tuition charges in the second year and the student will be required to pay these charges.

Required Forms and Arrival

By the time you arrive, you should have already received an email with information regarding your Graduate Assistantship from the Graduate Services Coordinator, Ms. Janet Roe. Please stop by the main office to finish completing your new hire paperwork and other forms. If you are receiving a stipend, you will need to bring your ID's with you that are listed on the back of the I-9 form you received with the hire for verification. International students need to bring all their immigration papers with them. International Students must also notify OISS upon arrival.

Patent Agreement

You must agree to the University patent agreement by logging into MY PACK PORTAL > Student Self Serve (SIS) > Records & Enrollment > Custom Graduate Records > Graduate Plan of Work. Enter your Emp ID# (Student ID#). Click search. This will bring you to your Plan of Work (POW) page. Click on the 4th tab (Patent Agreement). Read information and check box that you agree. This process should be done upon your arrival after you have been assigned a unity ID.

Getting Paid

You will be paid on a biweekly basis according to the university pay schedule. Your first paycheck will not cover a full 2 week period since the pay period begins **August 12th** and your start date begins **August 16**. Paper checks are no longer an option. You **must** fill out a direct deposit, W4, NC4 forms online through My Pack Portal>Employee Self Serve after you have been added to payroll. Your payment will show up in your bank account on a biweekly basis. Your 1st paycheck will be issued **September 8th**.

Taxes

Taxes will be deducted from your research or teaching assistantship. However, if you are being supported by the NIEHS Training Grant, taxes will not be deducted. It is your responsibility to make arrangements to pay your taxes. Those students on the Training Grant will not receive a W-2 form.

New Student Orientation

There are three orientations for new graduate students that are held shortly before the start of the Fall semester: 1) a Toxicology orientation, 2) a University-wide orientation and 3) an orientation for international students sponsored by the Office of International Scholar and Student Services (OISS).

Graduate Student Support Plan (GSSP)

The Graduate Student Support Plan is a highly competitive support package used to attract top students to NC State. Under the Plan, students supported on a teaching or research assistantship or a fellowship of at least \$666.67 per month and who meet the minimum registration requirement, receive (at no cost to the student) health insurance and tuition. The link below explains the plan in more detail, provides answers to frequently asked questions, and allows you the opportunity to ask questions about the plan.

<https://grad.ncsu.edu/student/gssp>

To find out about plan benefits: Google Student Blue > Find a school > choose NC State University > RA/TA > Plan Benefits > Plan Year

Tuition /Fees

For detailed information about tuition due dates and payment methods, the web address is: <http://www.fis.ncsu.edu/cashier/tuition/> Tuition is due before the beginning of each semester; the date is always posted at that website. Students who will be eligible for tuition under the Graduate Student Support Plan (i.e. anyone on a fellowship or receiving support from any source associated with their degree program; anyone who is not “self-funded”) should make sure that you give Janet Roe a copy of your bill so that she can pay your tuition and fees. Failure to do this could result in your schedule being canceled.

Tuition Remission

If you are an out-of-state student, you may be eligible for tuition remission as described below. Tuition remission is the difference between in-state and out-of-state tuition per semester. The student is allowed to pay in-state tuition, and the program/university pays the difference out of special funds. If you are a US citizen or permanent resident and are awarded tuition remission, it will be in effect for the first year ONLY (Fall & Spring). **Attaining North Carolina residency is important since you will not be eligible to receive tuition remission after the first year. Guidelines for establishing residency are at :** <https://grad.ncsu.edu/admissions/residency/> or <https://www.ncsu.edu/grad/about-grad/docs/residency-handout-2013.pdf>

International students cannot attain residency, and thus will continue to be eligible for tuition remission after the first year.

Health Insurance

If you are a full time student and supported by a research or teaching assistantship, fellowship or traineeship and receiving a monthly stipend of at least \$667 per month, your health insurance will be paid by the Graduate Student Support Plan (GSSP) and you will be automatically enrolled in the health insurance plan. The annual coverage period is August 1 to July 31 of the following year. Child and spouse insurance coverage can be purchased by the student.

Plan benefits can be found on the Student Blue [NCSU RA-TA Plan](#) website listed below. For questions regarding plan benefits or claims, please contact Student Blue directly at 1-800-579-8022 or email@studentbluenc.com.

NCSU RA-TA Website: www.bcbsnc.com/content/studentblue/ncsu-ta/index.htm?page=welcome

NCSU RA-TA Benefits: www.bcbsnc.com/content/studentblue/ncsu-ta/index.htm?page=benefits

All-Campus Card

Permanent photo identification cards are required for all personnel on campus. These “All-Campus Cards” entitle students to the following: use of the library, intercollegiate athletic events, membership in the University Student Center, use of Student Health Services (infirmary), use of NCSU Bookstores, gym and other University facilities, services and programs supported by required fees. The All-Campus Network located in the Talley Student Union. The website is: <http://onecard.ncsu.edu/> For additional information, call the All-Campus Network at 515-3090.

After receiving your All Campus Card, stop by Janet Roe’s office so that she can give you access to the toxicology building and lab wing.

Registration for Classes

The Program Director will advise you on appropriate course registration for your first and second semesters or until you chose your Major Advisor. Your Major Advisor, Advisory Committee, and research project will determine subsequent coursework (see pages 16-18). Each semester, after you have been advised by your advisor, he/she will release a hold so that you may register for classes. You can access the NCSU course catalogue at http://www2.acs.ncsu.edu/reg_records/crs_cat/directory.html

To register for courses, refer to instructions at <http://www.ncsu.edu/registrar/faq/registration.html>

Guidance on Summer Session Registration

Who does not need to register for Summer Session?

- 1) Out of state students
- 2) International students
- 3) Students paid on NIEHS Training Grant
- 4) Students paid on a Research Assistantship (RA) whose appointment doesn’t end before July 21.

If you are required to register, register for TOX 696 (Masters) or TOX 896 (PhD) 1 credit for summer session (10-weeks or both sessions).

TAs and RAs are subject to FICA withholding if you are less than half-time enrolled. One credit of TOX 696 or TOX 896 qualifies as half-time. By enrolling in this summer session, you remain exempt from FICA withholding, and the in-state tuition and fees you pay is less than FICA, so you save money. You also are able to use the gym and health center. Otherwise, the Student Health Center and gym charges for each summer session will apply.

If you are an **international student**, do not register for summer session. You are not subject to FICA withholding and the tuition and fees for out-of-state students are too high to offset the health center fee. You might want to consider paying the fee per session to maintain access to the Student Health Center and gym.

If you are **funded on the NIEHS Grant**, do not register for summer session. You are not subject to FICA withholding. You might want to consider paying the required fee per session to maintain access to the Student Health Center and gym.

If you are not registered for the 1st summer session (10 week), you do not lose your insurance during the summer. However, you will be responsible for a fee to use the gym and Student Health Center. Therefore, during the summer sessions, if an unregistered student covered by health insurance chooses not to pay the Health Center fee, they may visit a private doctor and use their insurance coverage.

Parking

University parking areas are zoned, meter controlled, reserved or restricted. All vehicles parked in zone areas on campus must have an appropriate permit displayed and must be parked in a space marked for parking. Students who desire parking permits can apply and pay online or go to the Transportation Department, Administrative Services Center I, 2721 Sullivan Drive between 7:30 a. m. and 5:00 p.m. Monday through Friday. For more information, contact Parking Services at 515-3424 or visit <http://www2.acs.ncsu.edu/trans/>.

Student parking permits are allocated based on availability of the parking zone requested as well as priority date and time of request. You can apply for permits the summer before you start at the University. Permit fees must be paid by cash, check, and money order or charged to Visa, MasterCard and Discover cards. (Returned check will be charged a service fee).

Parking at the Toxicology Building requires “CC” permit. The “CC” permit is \$370 annually. The “F” permit is \$290 annually and eligibility for the “F” permit is as follows: . Commuters must have a minimum of **24 credit hours (completed coursework) at end of Spring Semester**. Commuting students may place their name on the F perimeter wait list if they have a minimum of 24 credit hours and are an off-campus resident. If permits become available, contact will be made by email.

Centennial Campus has a pay lot located at the Partners Way. It requires a “CC” permit and will be available to students for \$370 annually also. The “CC” permit may be used for CVM parking also (some classes are held there). Please visit the transportation homepage for further information about student parking at: <http://www2.acs.ncsu.edu/trans/index.html> Refunds for the purchase of the permit are based on the date of return of the permit to the Division of Transportation. Refunds will not be given for certain permits. *No refunds will be given to students after a certain date (see NCSU transportation web page), and proper identification and charges must be paid before a refund is given. All outstanding transportation fines, fees, and charges must be paid before a refund is given.*

Wolfline

The Wolfline is the NC State community's own bus service. Wolfline buses run every day that classes are in session, serving all three campuses, two park & ride lots, and official NCSU housing. Wolfline buses are open to the public. No university ID, pass, or fare is required to ride! Wolfline Buses are red and white with black pinstriping. They can be identified by this paint scheme along with the Wolfline logo lettering. Wolfline buses travel along designated routes, stopping only at designated, marked Wolfline stops. For further information regarding Wolfline, the website address is: <http://www2.acs.ncsu.edu/trans/wolfline/index.html>

Mail

You will be assigned a mailbox for US mail and Campus mail in the program's main office. Incoming mail should be addressed to you as follows:

US Mail (NO USPS Ground Delivery)

Toxicology Program
North Carolina State University
Campus Box 7633
Raleigh, NC **27695-7633**
Web address: <http://www.usps.com>

For University (campus) mail:

Person's Name
Toxicology Program
Campus Box 7633

FEDEX, UPS, Airborne, and other courier delivery to a building on Centennial Campus using zip code 27606:

Toxicology Program
North Carolina State University
850 Main Campus Drive
Suite 1104
Campus Box 7633
Raleigh, NC **27606**

For assistance, please contact Mail Services at 515-9860

<http://www.ncsu.edu/facilities/services/mail/>

E-mail

As soon as you register for a class, an e-mail account is automatically established using the first letter of your first and middle names and the first six letters of your last name as your user ID and your social security number (without the dashes) as your password. If you need help accessing your account, contact the information technology help desk (515-HELP or 515-4357) or log onto: <http://oit.ncsu.edu/>.

Graduate Student Association

The Graduate Student Association (GSA) is a campus-wide organization of graduate students that deals with matters pertaining to graduate student life. The GSA also administers travel funds that will reimburse students who have presented their work at a meeting for a portion of their travel expenses (depending on the availability of funds). Programs that have GSA Chapters also get a nominal rebate of funds each semester to use as the Chapter sees fit.

Toxicology Graduate Student Association (TGSA)

The goals of the TGSA are threefold: creating opportunities for program members to interact in a social atmosphere; communicating important program and university issues and policies to students; fostering intellectual exchange between students and the scientific community. To this end, the TGSA hosts three potluck events- the fall picnic, winter holiday party, and the spring picnic. The TGSA also annually hosts an alumni speaker to learn about career opportunities; and, hosts various activities associated with the program's annual student recruitment event. We hope you will take full advantage of the many social and academic opportunities presented throughout the coming year! Welcome again and good luck to you in your future endeavors.

2017-2018 TGSA OFFICERS

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Initiation and Progression of Your Graduate Studies in Toxicology

The Toxicology Program offers the following degrees: M.S., M.TOX (non-thesis), and Ph.D. Course requirements as well as the General Toxicology Option, Environmental Toxicology Option and Molecular and Cellular Toxicology Option are described later in this handbook. Below you will find a chronological outline of the steps needed to begin and progress through your degree program.

First Semester

Meet with Program Director (Dr. Bonner), and if on the NIEHS training grant, the Training Grant Director (Dr. Smart)

The first step for all Toxicology Graduate Students is to contact the Program Director (Dr. Bonner) and, if on the NIEHS training grant, Training Grant Director (Dr. Smart) to select courses for the first semester and for Ph.D. students and some MS students to organize your first laboratory rotation. Each Ph.D. graduate student is expected to conduct three 5-week laboratory rotations during their first semester. At the end of the third rotation, the student will choose their Major Advisor and accompanying research laboratory. Dr. Bonner will serve as the Advisor to all new toxicology graduate students until the student has chosen their Major Advisor at the end of the first semester.

Students enrolled in the **M.S.** degree program are generally funded by an individual faculty member's grant and the student should initiate research in that faculty member's lab (Major Advisor) at the start of their first semester. If a M.S. student is funded by a teaching assistantship, the student should meet with toxicology faculty members to discuss research possibilities and subsequently the student should identify a laboratory (Major Advisor) whose research is of interest. Once the laboratory is identified and approved by both the faculty member involved and the Program Director the student then initiates research in that lab. The **MTOX** degree is a non-research degree program and MTOX students will be assigned a Major Advisor within their first semester.

Laboratory Rotations

All **Ph.D.** students are required to conduct three laboratory rotations within their first semester. Each laboratory rotation should be approximately 5 weeks long; however, depending upon the situation, a lab rotation can be somewhat longer or shorter. Students can read about each toxicology faculty member's research on the program website and then identify laboratories of interest. Students funded on the NIEHS Training Grant should focus on the faculty members who are preceptors on the training grant (**see page 9**). The student and Program Director discuss the student's choices and availability of laboratories for the first rotation. Students are expected to establish their first rotation before or immediately after the beginning of the first semester. Students must discuss their choice with the Program Director or, if appropriate, Training Grant Director. Upon approval, the student then requests the opportunity to rotate with the Principal Investigator. Second and third rotations are established in the same manner. Second and third rotations should be established as soon as possible to ensure that the student will have the opportunity to rotate in the labs of their choice.

Some of our students conduct their research in laboratories at EPA or NIEHS. This is only allowed if the principal investigator of the off-campus laboratory is an adjunct faculty member of the Toxicology Program and there is research overlap and interest with a faculty member from the Toxicology Program, who is willing to serve as co-chair of your Graduate Advisory Committee. It is important to keep this in mind when planning a

laboratory rotation off-campus. The Program Director will help you explore possibilities for off-campus rotations and must approve the rotation.

Second Semester

Selecting a Major Advisor

After the third laboratory rotation, which coincides with the end of the first semester, the student should select their Major Advisor, who must be a member of the Toxicology Faculty. Selecting your Major Advisor is an important decision and the student should have discussions with faculty member being considered and the Program Director. Tips to help students select a Major Advisor can be found in **Appendix A**. Pending approval by the faculty member of interest and the Program Director the student begins research in the selected Major Advisor's laboratory. Subsequently, the student and their Major Advisor develop the general research topic and hypothesis. It is at this time that the student elects whether to remain in the TOX curriculum or whether to change to the MCT (Molecular and Cellular Toxicology option) (TMA) or ETC (Environmental Toxicology option) (TEA)). This form is found at the graduate school home page, type in search "forms". The "change of degree status or curriculum" form will be signed by the student and the Program Director and given to the Graduate Services Coordinator to submit to the Graduate School for approval.

Initiation of the Research Program

All students enrolled in the M.S. and Ph.D. degree program are required to conduct a program of original research. Once the advisor is selected, the student and the advisor select a research topic. The research program should begin in the beginning of the second semester and continue through the entire degree program. It is expected that the research findings will make an original contribution to scientific knowledge and should be suitable for publication in professional scientific journals. Research is a critical aspect of graduate student training and successful completion of the graduate program is dependent upon the quality of this research.

Annual Progress Report

Graduate students are required to submit an annual progress report (**Appendix B**) that details their course work and research progress and have this report signed by all members of their Advisory Committee. These graduate student progress reports are then submitted to the Graduate Services Coordinator, Ms. Janet Roe and evaluated by a program committee, if the committee determines that inadequate progress is being made towards completion of the student's program, the student and the student's advisor are contacted and advised how to rectify the situation.

Second to Third Semesters

Selection of Graduate Advisory Committee

An advisory committee is selected by the M.S. and Ph.D. student in consultation with their Major Advisor. The advisory committee consists of at least four faculty members including the Chair of the Committee (Major Advisor) for Ph.D. students and at least three faculty members including the Chair for M.S. students. MTOX students will be assigned a committee. It is the responsibility of the committee to advise the student and to evaluate the progress of the student. The members of the committee are often chosen because their expertise complements that of the advisor. Committee members should be selected who can help the student and who will be active participants in the training of the student. If the student's Major Advisor is an associate toxicology faculty member then at least one member of the advisory committee must be a core toxicology faculty member. If the student's Major Advisor is an adjunct toxicology faculty member then a core toxicology member must serve as co-chair of the committee. It is recommended that one member of the committee not be affiliated with the Toxicology program and that member also serves as the Graduate School Representative. If all members of the advisory committee are Toxicology faculty members then the Graduate School will assign a Graduate School Representative to the Committee. The Graduate School Representative will sit in on the Preliminary Oral Exam and Final Oral Exam and will assure the exams are conducted fairly and according to Graduate School Policy. Once the student and the advisor have agreed to a list of potential committee members, the student will contact each prospective member to determine if they are willing to serve on the Advisory Committee. The student then submits the committee roster to the Program Director for approval. The committee should be formed and approved no later than the end of the second semester. Students should plan to hold a progress meeting with the Advisory Committee at least annually.

Initial meeting with Graduate Advisory Committee

The first meeting of the Advisory Committee should occur *before the end of the fourth semester*. Students should submit a short research plan to their committee before the meeting. The plan should cover background information, rationale for the project, hypothesis to be tested, and experimental aims. The plan should be presented orally at the first committee meeting. The committee also should be advised of the courses taken and intended to be taken.

Plan of Work (POW)

The Plan of Work includes a list of the courses taken or intended to be taken for the entire degree program. Course requirements for the MTOX, M.S., and Ph.D. are on pages **24-25**. The preliminary Plan of Work is designed by the student in consultation with their Major Advisor. The preliminary Plan of Work is submitted to the Advisory Committee for their input and approval at the first committee meeting. Once approved, the student and the committee sign the Plan of Work form and submit the original document to the Graduate Services Coordinator, Janet Roe. **DO NOT** submit your Plan of Work through My Pack Portal. The GSC or the DGP will submit your POW after reviewing your plan. The paper copy of the Plan of Work form can be obtained from the Graduate Services Coordinator, Ms. Roe. The completed, typed, and signed form is submitted to the Graduate Services Coordinator, Ms. Janet Roe, who will then submit the form to the Program Director for approval. If the Program Director does not approve the form, it will be returned to you for revision. If the Program Director approves the form, Graduate Services Coordinator will submit it electronically to the Graduate School for approval. Any

future changes in the approved Plan of Work will require a written formal request and subsequent approval by the Program Director and the Graduate School. Requests to change the Plan of Work should be submitted to the Graduate Services Coordinator. It should be noted that TOX 696/896 and TOX 699/899 should not be included on the POW.

End of Fourth Semester

Preliminary Written Exam for Ph.D. Students

Required core course work is normally completed by the end of the second year. The Written Exam is offered by the Department annually, usually in May, June or July. After the end of the fourth semester, the student takes the written preliminary exam. This is a take-home exam in which the students have 7 days to provide detailed, insightful responses to 5 questions. Four questions draw upon topics covered in the core course curriculum. In addition, the advisor of each student taking the exam prepares a question that more closely aligns with the students research focus. Students select the fifth question from this pool of questions. A detailed description of the exam process is described in **Appendix C**.

Fifth or Sixth Semester – 3rd year

Preliminary Oral Exam for Ph.D. Students

Following the successful completion of the written exam, the student takes the oral preliminary exam within their third year. The student must be sure the Advisory Committee is available on the date and time selected for the exam. He/she must also reserve a conference room for the date and time chosen. The preliminary Oral Exam is scheduled through the Graduate School and the student must complete the official Graduate School form entitled, "Request for Approval to Schedule Preliminary Oral Examination." The form can be downloaded from <http://www.ncsu.edu/grad/handbook/forms.htm> . This form must be submitted to the Graduate Services Coordinator at least four weeks prior to the date of the exam. The Graduate Services Coordinator will first submit it to the Program Director for approval. After the Director approves the request, the request is forwarded to the Graduate School for approval and official scheduling. It is preferable to take the Preliminary Oral Exam the semester following the completion of the written exam. *At the very latest, the Preliminary Oral Exam must be taken at least four months before the student can request to schedule their Final Oral Examination (defense).* The Preliminary Oral Exam is administered by the student's advisory committee and is based on a grant proposal written by the student in the NIH, NSF or other relevant format. (**Appendix D**). The topic of the grant proposal must be approved by the student's Advisory Committee. The grant proposal must consist of the following sections; Specific Aims, Background and Significance; Research Design and Methods. This exercise will serve two major purposes; i) it will give the student familiarity with grant applications and grant writing and ii) the grant proposal will serve as the basis for the committee to ask the student questions regarding the hypothesis being tested and the scientific basis for it as well as the methodology employed. Students are expected to consult with their Major Advisor while writing the proposal to ensure that the final proposal is of high quality. While the grant is the focus of most questions, the committee may ask questions to probe the student's general knowledge of toxicology. Pending satisfactory completion of the Oral Preliminary Exam the student is admitted to candidacy. Successful completion of the Oral Preliminary Exam is based the students scientific knowledge as judged by the committee and not the quality of the grant proposal.

Last Year of Study (M.S. and Ph.D. Students)

Final Advisory Meeting with Graduate Advisory Committee

The student must meet with the Advisory Committee six to nine months before the expected graduation date to allow the committee to evaluate the research and to approve the final research plan and tentative graduation date.

Preparation of the Thesis or Dissertation

Upon Completion of the research program, the results of this research are presented to the student's Major Professor and Advisory Committee in the form of a thesis (M.S.) or dissertation (PhD). Students should obtain a copy of the University's *Guide for the Preparation of Thesis* from the bookstore, which contains details and information on the preparation of thesis and dissertations, and/or consult their website:

<https://grad.ncsu.edu/students/etd/> The student is responsible for all costs. The Major Advisor must approve the thesis or dissertation before it is submitted to the Advisory Committee for review. It is the responsibility of the student and Major Professor to ensure that the material is in final form and of high quality before review by the committee. *The Advisory Committee is responsible for reviewing the scientific merit of the work and should be given at least two weeks (preferably more) before the final oral examination date to accomplish this.* The final thesis/dissertation may consist of an assemblage of manuscripts that have been published or submitted for publication in peer reviewed scientific journals along with general introduction and discussion. Such individual manuscripts must be submitted to and approved by members of the Advisory Committee prior to submission for publication.

Final Oral Examination

M.S. candidates: M.S. candidates are required to pass an oral comprehensive examination and thesis defense. This examination is taken during the final semester of graduate study after completion of the thesis. In this exam, the student will be required to defend the scientific methodology, merit, and conclusions of the thesis research. The unanimous approval of the Advisory Committee is required to pass the examination. After any revisions in the thesis specified by the committee have been made, the thesis is submitted to the Graduate School.

The Master's student's Request to Schedule the Final Oral Examination form <http://www.ncsu.edu/grad/handbook/forms.htm> must be received by the Graduate Services Coordinator at least four (4) weeks prior to the proposed examination date. The Graduate Services Coordinator will then forward the request to the Director for approval. After the Director approves the request, the Graduate Services Coordinator will then forward the completed, signed form to the Graduate School for final approval. The student is responsible for arranging the date and time with his/her committee and reserving the examination room.

Ph.D. candidates: The oral defense of the dissertation is the third and final examination for Ph.D. students. This occurs in the final semester of graduate study after completion of the dissertation. In this examination, the student will be required to defend the scientific methodology, merit, and conclusions of the dissertation research. The unanimous approval of the Advisory Committee is required to pass the examination. After any revisions in the dissertation specified by the committee have been made, the dissertation is submitted to the Graduate School.

The Ph.D. student's Request to Schedule the Final Oral Examination form <http://www.ncsu.edu/grad/handbook/forms.htm> must be received by the Graduate Services Coordinator at least two (2) weeks prior to the proposed examination date. It also must be received by the Graduate School at least 5-10 working days prior to proposed exam date, and no earlier than 4 calendar months after successful completion of the preliminary exam. After the Director approves the request, the form will be sent to the Graduate School for approval. Once again, it is the student's responsibility to set the date and time of the examination with the committee members *and* the Graduate School representative. (The Graduate School Representative will be the same as first appointed to your committee). It is also the student's responsibility to reserve the examination room. At this time, students also arrange to hold their seminar. The student is also responsible for reserving the seminar room, and must submit a title for his/her seminar to the Graduate Services Coordinator in time for the notices to be distributed.

Thesis/Dissertation Seminar

All M.S. and Ph.D. students are required to present a formal departmental seminar describing their graduate research project (rationale, methods, data, and conclusions). This seminar is presented during the final semester of candidacy, in conjunction with the Final Oral Examination.

Applying for Graduation

After passing the Final Oral Exam, you will be able to apply for graduation. Please follow the following steps in My Pack Portal.

1. Login into My Pack Portal>Student Self Serve>Degree Progress/Graduation>Apply for Graduation
2. Select the academic program in which you wish to apply for graduation by clicking its description
3. Verify program, career, degree, and major (if the information is incorrect, contact your department immediately)
4. Select "I am applying to graduate this term in this degree"
5. Select the Expected Graduation Term from drop down box
6. Select Submit Application

*Please note that if you have a privacy block on your records and would like your name printed in the Graduation Program, you will have to release that block so that your name can be added to the Program.

Thesis and Dissertation Information (ETD)

Thesis and dissertation reviews are 100% electronic. **All** students are required to view the **Thesis and Dissertation Workshop** online. Graduating students must also review the Thesis & Dissertation Guide before writing the thesis/dissertation. Visit the Thesis and Dissertation Review website at: <https://grad.ncsu.edu/students/etd/> **Do NOT** start the review process until after the final examination is completed. However, you must meet specific graduation deadlines, which occur four weeks prior to the last day of class. The T&D Guide covers all of the Graduate School Formatting requirements that the Thesis Editor checks for. The Thesis & Dissertation Guide provides examples for each requirement. The step by step submission process section of the Thesis and Dissertation Guide explains the process.

For the Thesis & Dissertation Review: Within 24 hours of successfully passing the final oral exam **AND** acquiring all required signatures on the title page (*before the deadline*), the student is to upload 2 pdf files in to the ETD submission system. 1) pdf draft file; 2) pdf signed title page (title can be faxed, email, hand-delivered, mailed if unable to scan and upload); 3) the date the thesis editor receives **BOTH** required files in the required Graduate School format is the date of the thesis review. The date replaces the in-person meeting date. Once the Thesis Editor receives both required files, the draft file will be reviewed with 3-5 business days in the order the files are received. The turn-around time may be longer during deadline times. You will have a specified length of time to make corrections and return the thesis/dissertation. If you do not return the document on time, you will not have met the graduation deadline date and will not be allowed to graduate. Therefore, you will need to register the next semester to fulfill the continuous registration policy. If you return the thesis/dissertation on time, you will be cleared for graduation.

Exit Interview

All graduate students are required to have an exit interview with the Program Director (DGP) before leaving the program. The purpose of the interview is for the Director to obtain information directly from the student regarding the graduate training program. Graduating students should obtain an Alumni Data Form from the Graduate Services Coordinator. The information will give us important information regarding your new address, career position, title and organization. At this time you will also turn in keys (lab/building/desk), Toxicology Building Access Card, Books, and departmental laptops, and any other departmental items to the Graduate Services Coordinator.

Graduation

Formal commencement exercises are held at the end of Spring and Fall semesters, but any student who graduates the preceding second summer session is eligible to participate in the December commencement if he or she notifies the Graduate School in writing of such intent at least four weeks in advance of the actual commencement date. Conversely, any student scheduled to graduate in the Spring or Fall semesters but not planning to attend commencement exercises should notify the Graduate School in writing of the desire to have the degree conferred in absentia.

Departure from the University before Completion of the Degree Requirements

Graduate students are expected to complete all requirements for the degree before leaving the University, and it is in their best interest to see that manuscripts are submitted for publication before they depart. In rare cases, students leave the University before their final oral examination, or before the thesis or dissertation is corrected and approved by the Graduate School. Students who leave the University before completion of the degree must agree upon a time limit to finish their degree with the Program Director. The Graduate School must approve the thesis or dissertation by the graduation deadline of the second semester after leaving the University.

Upon Departure from the University

Graduate students using payroll deduction and leaving the university need to return parking permits to Transportation in order to stop payroll deduction and end financial responsibility for the permit. They may return the permit in person or go to www.ncsu.edu/transportation and under forms click on the link: NCSU Parking Permit

Application-Payroll Deduction Return (Printable pdf). This form may be mailed to the Transportation office with the permit attached.

Course Requirements and Toxicology Degree Concentrations

Doctoral students take a core curriculum and elective courses that are relevant to their research interests. Doctoral students select one of three graduate study concentrations; General Toxicology, Molecular and Cellular Toxicology, or Environmental Toxicology. The core curriculum does not vary among study concentrations. Differences in the concentrations reflect research direction of the student, and accordingly, elective course selection

Doctoral Degree (Ph.D.) in Toxicology

Molecular and Cellular Toxicology Concentration (TMA)

Molecular and Cellular Toxicology encompasses the study of the effects of xenobiotics on cells and cellular macromolecules and is focused on understanding the cellular and molecular mechanism of toxic/stressor action. The purpose of the Molecular and Cellular Toxicology (MCT) graduate study Concentration is two-fold: (1) to encourage scientific interactions between faculty and students interested in Molecular and Cellular Toxicology, and (2) to provide students with research training in this discipline. The MCT graduate study concentration provides opportunities for graduate students to utilize modern molecular and cellular approaches to investigate complex biological processes such as carcinogenesis, cell-cycle regulation, cellular signaling, DNA damage and repair, regulation of transcription, genetic susceptibility and polymorphisms, and the molecular/cellular basis of adverse effects of cellular stressors including cytokines, reactive oxygen species, carcinogens, radiation, and a variety of pharmacological and environmental agents. An understanding of the role and function of specific genes in the above processes is a common goal of many of the research programs within MCT. Students electing to join the Molecular and Cellular Toxicology Concentration conduct their dissertation research in areas related to understanding the molecular and cellular mechanisms through which xenobiotics/cellular stressors produce their adverse effects.

Environmental Toxicology Concentration (TEA)

Toxicology is a multifaceted discipline that incorporates mechanistic and descriptive evaluations of the impact of toxic agents at various levels of biological organization ranging from molecules to ecosystems. Students electing the Environmental Toxicology Concentration typically approach toxicology from a top-down perspective. That is, toxicological issues are initially addressed at higher levels of biological organization (i.e., communities, populations, individuals). Research into the issue is often conducted in a downward direction (i.e., organ, cell, and molecule). Research conducted by students enrolled in the Environmental Toxicology Concentration include: 1) evaluating gene expression profiles as related to toxicity and adaptive responses of chemical-exposed populations; 2) assessing the environmental fate and bioavailability of environmental contaminants originating from pesticide use, hazardous wastes, etc.; 3) elucidating mechanisms responsible for altered sexual development of chemical-exposed populations; 4) evaluating phylogenetic relationships in susceptibility to toxicants; 5) modeling and assessing toxicity of environmentally relevant chemical mixtures. Research activities in the Environmental Toxicology Concentration involve many model organisms including fish, crustaceans, insects, and mussels.

General Toxicology Concentration (TOX)

The General Toxicology Concentration is designed to accommodate students who wish to obtain a broad toxicology background, perhaps bridging both the Environmental and the Molecular and Cellular Concentrations. Students electing this option may wish to pursue research in more traditional areas of toxicology including fate and metabolism of toxicants, organ and cellular toxicity, endocrine disruption, mechanisms of insecticide resistance, residue analysis, teratogenesis, etc. Students electing this option may conduct research in any area of Toxicology, but their coursework may reflect a broader base of knowledge than those within the other subdisciplines.

Core course requirements for Ph.D. students

TOX 701	Fundamentals of Toxicology (3 credits)
TOX 710	Molecular and Biochemical Toxicology (3 credits)
TOX 715	Environmental Toxicology (3 credits)
GN 701	Molecular Genetics (3 credits)
GN 820	Professional Development (1 credit)
ST 511 ^a	Experimental Statistics for Biological Sciences (3 credits)
CBS 770	Cell Biology (3 credits)
TOX 801 ^b	Toxicology Seminar (1 credit/Semester)
TOX 820	Responsible Conduct in Research (1 credit)

^a Another graduate-level statistics course can be substituted as recommended by the student's advisory committee

^b Enrollment required for each Fall and Spring Semester registered while in Doctoral Program.

Research Requirements for Ph.D. students

TOX 820	Lab rotation (most Ph.D. Students register for this research course in their first semester)
TOX 895	Doctoral Dissertation Research (6 credits minimum)
TOX 896	Summer Dissertation Research (as needed) (Do not include on PO)

A minimum total of 72 credit hours are required for the Ph.D., with the majority of these credits being dissertation research.

Requirements for a Master of Science (M.S.) Degree (Thesis required)

The M.S. is a research-oriented degree requiring a minimum of 30 credit hours and a written thesis. At least 20 credit hours must be graduate-level courses. The program may include no more than 6 credit hours of research and no more than 2 credit hours of departmental seminar. Courses at the 400 level counted towards the minimal 30-hour requirement may not come from the major field. *Students are required to enroll in either GN 701 or CBS 770. The student's advisory committee must approve all courses.

Core course requirements for a Master of Science Degree in Toxicology

TOX 701	Fundamentals of Toxicology (3 credits)
TOX 710	Molecular and Biochemical Toxicology (3 credits)
TOX 715	Environmental Toxicology (3 credits)
TOX 601	Toxicology Seminar (2 credits maximum)
TOX 620	Responsible Conduct in Research (1 credit)
CBS 770*	Cell Biology
GN 701*	Molecular Genetics (3 credits)
TOX 695	Master Thesis Research (6 credits maximum)

Requirements for a Master of Toxicology (M. TOX) Degree (Option B)

The M.TOX degree (Option B) is a non-thesis master's degree designed for students who desire advanced study in Toxicology, but do not wish to pursue research training. Option B students are not required to take a comprehensive oral exam. Master of Toxicology students may be part-time or full-time, thus this degree option is often sought by professionals seeking graduate training in Toxicology while maintaining a full-time career. A minimum of 30 credit hours is required, with at least 20 credit hours of graduate-level courses and a core curriculum is required. The program may not include research credits and no more than 2 credit hours of departmental seminar, unless the total program exceeds 30 hours. Courses at the 400 level counted towards the minimal 30-hour requirement may not come from the major field. At the discretion of the student's Advisor, a review paper focusing on the student's interest in some aspect of Toxicology might be required as a special problem (TOX 620). *Students are required to enroll in either GN 701 or CBS 770. All courses must be approved by the student's advisor.

Core course requirements for a Master of Toxicology Degree

TOX 701	Fundamentals of Toxicology (3 credits)
TOX 710	Molecular and Biochemical Toxicology (3 credits)
TOX 715	Environmental Toxicology (3 credits)
TOX 601	Toxicology Seminar (2 credits maximum)
TOX 620	Responsible Conduct in Research (1 credit)
CBS 770*	Cell Biology
GN 701*	Molecular Genetics (3 credits)

Brief Description of Core Courses

TOX 620/820 Responsible Conduct in Research (1 credit)

Topics include responsible conduct of research through a case study approach. Topics include conducting research, record keeping, reporting research, responsibility of the research mentor, research involving human subjects, animal welfare, conflicts of interest, genetic research, and misconduct. Offered Fall.

TOX 695 Research (variable credit)

Original research in connection with thesis problem in toxicology. M.S. students should register for this course in Spring and Fall semesters until they have completed all course work.

TOX 696 Research (variable credit) (Do NOT include on POW)

Summer research for M.S. students only, not required, however if student registers for 1 credit, FICA tax will not be taken out and the student will be able to use all university services.

TOX 699 Research (variable credit) (Do NOT include on POW)

M.S. students should only register for this course when they have completed all course work. Three credits are sufficient to be considered a full time student.

TOX 701 Fundamentals of Toxicology (3 credits)

Provides information on how toxicants disrupt organ function and produce a toxic response. The course covers the absorption, distribution, elimination, and metabolism of toxicants; toxic action (acute toxicity, carcinogenesis, mutagenesis, organ toxicity, etc.); chemical classes of toxicants; and toxicity testing. Offered Fall.

TOX 710 Molecular and Biochemical Toxicology (3 credits)

Provides in-depth information describing the underlying biochemical, molecular and cellular mechanisms through which toxicants produce their adverse effects. Offered Spring.

TOX 715 Environmental Toxicology (3 credits)

Examines the scientific principles and processes involved in environmental hazard, exposure, and risk assessment of environmental pollutants. The course focuses primarily upon aquatic systems. Offered Fall.

TOX 801 Toxicology Seminar (1 credit)

Departmental seminar offered Fall and Spring semesters hosts invited speakers including toxicology faculty, students, and postdocs as well as invited speakers from the Research Triangle Area and elsewhere around the U.S. who present their research findings. Offered Fall and Spring.

TOX 820 Special Lab Rotation (variable credit) most Ph.D. students register for this research course in their first semester.

TOX 895 Research (variable credit)

Original research in connection with thesis problem in toxicology. PhD students should register for this in Spring and Fall semesters until they have passed their Preliminary Oral Exam and completed all course work.

TOX 896 Research (variable credit) (Do NOT include on POW)

Summer research for Ph.D. students only, not required, however if student registers for 1 credit, FICA tax will not be taken out and the student will be able to use all university services.

TOX 899 Research (variable credit) (Do NOT include on POW)

Ph.D. students should only register for this course when they have passed their Written Exam, Preliminary Oral Exam and have completed all course work. Three credits are sufficient to be considered a full time student.

ST 511 Experimental Statistics for Biological Sciences I (3 credits)

Basic concepts of statistical models and use of samples, variation, statistical measure, distributions, test of significance, analysis of variance and elementary experimental design, regression and correlation, chi-square. Offered Fall and Spring.

GN 701 Molecular Genetics (3 credits)

A discussion of the structure and function of genetic material at a molecular level. Consideration of both prokaryotic and eukaryotic systems. The aim to describe genetics in terms of chemical principles. Offered every Fall

GN 820 Professional Development (1 credit)

This professional development course will help students understand the skills needed to be successful in a scientific career and provide guidelines of how to acquire these skills. The topics covered include oral presentation, poster presentation, guided proposal writing, scientific writing and editing, an understanding of how scientific journals and grant awarding institutions are organized and render decisions, composing a curriculum vitae, understanding management skills, and learning to evaluate proposals and articles and reviewers. Offered Even Spring

CBS 770 Cell Biology (3 credits)

Advanced cell and organelle structure and function and recent advances in molecular biology. Emphasis on current literature and application of research procedures. Offered Spring.

Selected Elective Courses Offered by the Toxicology Program

TOX 704 Chemical Risk Assessment (1 credit)

Initial lectures are devoted to the presentation and discussion of risk assessment models. Subsequent lectures focus on case studies related to such toxicants as ozone and dioxin. Environmental issues such as toxic waste sites and natural toxicants are also addressed. Offered Spring Odd Years

TOX 771 Cancer Biology (4 credits)

The intention of CBS/TOX 771 is to expose students to modern concepts in cancer biology as well as technologies and strategies developed to characterize and combat tumorigenic cells. By the end of this course, students will be able to explain how tumorigenic cells arise, design experiments to identify specific genetic defects associated with tumorigenic cells, formulate hypotheses regarding the functional impact of such defects, and develop molecular therapeutics that may be useful tools in the battle against cancer. Prerequisite CBS 770 Offered Fall

TOX 860 Free Radicals in Toxicology (1 credit)

This course covers in detail the involvement of oxyradicals and their role in several disease processes including tumor promotion, aging, arthritis, ischemic injury, and the involvement of free radical in the toxicity of a variety of xenobiotics. Ozone toxicity and the use of electron spin resonance to study free radical formation in cells are also discussed. Offered Fall Odd Years

In addition to these courses, there are several graduate-level courses available as electives to students including:

Elective Courses

BIT 510	Core Technologies in Molecular and Cellular Biology (4 cr—prereq for all BIT courses—offered in Spring & Fall)
BIT 562	Microarrays, Gene Expression Analysis
BIT 567	Polymerase Chain Reaction Technologies (2 credit)
BIT 568	Genome Mapping (2 credits)
BIT 569	RNA Purification and Analysis (2 credits)
BIT 595	RNA Interference and Model Organisms (3 credits)
BCH 553	Biochemistry of Gene Expression (3 credits)
BCH 701	Biochemistry - Macromolecular Structure (3 credits)
BCH 703	Biochemistry - Macromolecular Synthesis & Regulation (3 credits)
BCH 705	Biochemistry - Molecular Biology of the Cell (3 credits)
BCH 761	Biochemistry - Advanced Molecular Biology of the Cell (3 credits)
CBS 754	Principles of Analytical Epidemiology (3 credits)
CBS 762	Principles of Pharmacology (3 credits)
CBS 770	Cell Biology (3 credits)
CBS (TOX) 771	Cancer Biology Fall only (4 credits)
CBS 795A	General Pathology (3 credits)
CH 572	Proteomics (3 credits)
GN 735	Functional Genomics (3 credits)
GN 820	Professional Development (1 credit)
HS 707	Environmental Stress Physiology (3 credits)
MB 751	Immunology (3 credits)
MEA 540	Principles of Physical Oceanography (3 credits)
MEA 750	Marine Benthic Ecology (3 credits)
PHY 503	General Physiology I (3 credits)
PHY 504	General Physiology II (3 credits)
PHY 780	Mammalian Endocrinology (3 credits)
ST 512	Experimental Statistics for Bio Science II
TOX 704	Chemical Risk Assessment (1 credit)
TOX 771	Cancer Biology (4 credits)
TOX 860	Free Radicals in Toxicology (1 credit)
ZO 509	Biology of Aquatic Insects (3 credits)
ZO 513	Comparative Physiology (3 credits)
ZO 524	Comparative Endocrinology (3 credits)
ZO 588	Neurobiology (3 credits)

Courses not listed above but approved by the student's advisory committee can also be included toward the 6 credit hour elective requirement. Course descriptions can found at the Graduate School web page:

[Course catalog](#)

Representative Ph.D. Student Program

Year One

Year 1 Fall Semester	Year 1 Spring Semester
TOX 701 Fundamental of Toxicology (3 cr.)	TOX 710 Molecular and Biochemical Toxicology (3 cr.)
GN 701 Molecular Genetics (3 cr.)	CBS 770 Cell Biology (3 cr.)
TOX 820B Responsible Conduct of Research (1 cr.)	TOX 895 Dissertation Research (1 cr.)
TOX 820C Lab Rotations (1 cr.)	TOX 801 Toxicology Seminar (1 cr.)
TOX 801 Toxicology Seminar (1 cr.)	

Year Two

Year 2 Fall Semester	Year 2 Spring Semester
TOX 715 Environmental Toxicology (3 cr.)	Elective Course (see list below) Some examples include; GN 476 Introduction to Bioinformatics (3 cr.); TOX 705 Chemical Risk Assessment (1 cr.)
ST 511 Experimental Statistics for Biological Sciences (3 cr.)	Elective Course - Some examples include; CBS 795A General Pathology (3 cr.) TOX 771 Cancer Biology (3 cr.)
	GN 820 Professional Development (1 cr.)
TOX 895 Dissertation Research (2 cr.)	TOX 895 Dissertation Research (2 cr.)
TOX 801 Toxicology Seminar (1 cr.)	TOX 801 Toxicology Seminar (1 cr.)

Year Three

Year 3 Fall Semester	Year 3 Spring Semester
TOX 895 Dissertation Research (8 cr.)	TOX 895 Dissertation Research (8 cr.)
TOX 801 Toxicology Seminar (1 cr.)	TOX 801 Toxicology Seminar (1 cr.)

Year Four

Year 4 Fall Semester	Year 4 Spring Semester
TOX 895 Dissertation Research (8 cr.)	TOX 895 Dissertation Research (8 cr.)
TOX 801 Toxicology Seminar (1 cr.)	TOX 801 Toxicology Seminar (1 cr.)

Year Five

Year 5 Fall Semester	Year 5 Spring Semester
TOX 895 Dissertation Research (9 cr.)	TOX 895 Dissertation Research (9 cr.)

NOTE: Students funded on the NIEHS training grant must take CBS 770 Cell Biology and GN 820 Professional Development.

Transfer Credits (Master's Degree Only)

Transfer of credits only applies to the Master's degrees. NC State does not allow transfer of credits into a PhD program, but does allow for credits earned prior to enrollment in the PhD program to be applied toward the minimum number of required graduate credits (this is a subtle but important difference, see below).

At least 18 hours of the minimum 30 hours required for the Master's degree must be graduate credits earned while the student is enrolled in a graduate classification at NC State. The remaining 12 credit hours, or more depending on the requirements of the specific program, may be transferred from any of the following sources or any combination thereof.

Transfer of Graduate Credits Earned at Other Universities. A course that was completed at another college or university may be considered for transfer to a master's program provided that the course is classified as a graduate course; it was completed while the student was in a graduate or post-baccalaureate classification; the grade in the course is "B" (3.00 on a 4.00 scale) or better; the college or university is accredited by one of the following six U.S. regional accrediting agencies: the Southern Association of Colleges and Schools, the Middle States Association of Colleges and Schools, the New England Association of Colleges and Schools, the North Central Association of Colleges and Schools, the Northwest Association of Colleges and Schools, or the Western Association of Colleges and Schools.

Transfer of Graduate Credits Earned while Enrolled in an Undergraduate Program at NC State University. A course that was completed while the student was enrolled as an undergraduate at NC State University may be considered for transfer to a master's program, provided that it is at the 400-level or higher, that the grade is "B" (3.00 on a 4.00 scale) or better, that it was not counted to fulfill undergraduate requirements, and that it is recommended by the Program Director at the time of the student's enrollment in the Graduate School. Students admitted to the Accelerated Bachelor's/Master's program may use up to 12 hours of graduate credit to satisfy requirements for both the bachelor's and the master's degrees. No graduate credit will be allowed for a course completed in an undergraduate classification at another institution.

Transfer of Graduate Credits Earned while Enrolled in a Previous Graduate Degree Program at NC State University. A graduate course that was completed while the student was enrolled in a previous graduate program at NC State University may be considered for transfer to a master's program, provided that it is at the 500-level or higher and that the grade is "B" (3.00 on a 4.00 scale) or better.

Transfer of Post-Baccalaureate Studies (PBS) Graduate Credits Earned at NC State University. A graduate course that was completed while the student was enrolled in PBS status at NC State University may be considered for transfer to a master's program provided that it is at the 500-level or higher and that the grade is "B" (3.00 on a 4.00 scale) or better. All PBS credits (maximum of 12 credit hours) that are used to satisfy requirements of a specific master's degree must be earned *before* the student is admitted to that degree program.

Credit Hour Requirements for PhD Degree and Allowance for Previously Earned Graduate Credits

Doctoral degrees at North Carolina State University require a minimum of 72 graduate credit hours beyond the bachelor's degree. For a student who has a master's degree from a university other than NC State, a maximum of 18 hours of relevant graduate credit from the master's degree may be applied toward this minimum, upon the recommendation of the student's Graduate Advisory Committee. This is not a formal transfer of credit, but simply an allowance to apply previously earned graduate credit toward the required minimum credit hours. If a student completes a master's degree at NC State and continues for a doctoral degree without a break in time, up to 36 credit

hours taken while in master's status may be used to meet minimum requirements for the doctoral degree.

Waivers of Core Courses

Students who have previously taken graduate level courses may request a waiver for similar core requirements in our graduate programs. The process for a waiver is as follows. The student should contact the NC State University course instructor and discuss the content of the previous course with the instructor, preferably using the course syllabus to show the course topics and requirements. If the instructor is satisfied that the previous course is sufficiently similar to the core requirement, the instructor should indicate to the Program Director (either by email or letter; not by telephone) that the required course should be waived. *A waiver is different from transfer credit.*

Students who obtain a waiver must still fulfill the entire credit requirement for their degree program, by substituting additional classes or research credit for the waived classes. The choice of classes or research credit should be made by the Major Advisor and the Graduate Advisory Committee in consultation with the student.

Post-Baccalaureate Studies (PBS) Classification

Those who wish to undertake academic work beyond the bachelor's degree, but are not currently admitted to a graduate degree program, may enroll under the Post-Baccalaureate Studies (PBS) classification. This classification is open only to US citizens, permanent residents, and international students who are sponsored by an agency of the US government or are married to an NC State student. Registration is through [Registration and Records](#).

Rules for Participation in PBS

The following are university minimum requirements. Some departments may have more restrictive requirements.

1. All applicants must have a bachelor's degree from an accredited institution of higher education.
2. All classes taken for credit by PBS students will be graded in the usual manner that applies for the particular course (A+ through F or S,U). All courses taken at NC State will appear on the student's transcript.
3. Registration is limited to a maximum of two courses per semester. Individuals who are employed full-time should limit their PBS registrations to one course per semester.
4. A graduate course that was completed while the student was enrolled in PBS status at NC State University may be considered for transfer to a doctoral program provided that it is a 500- or 700-level course and that the grade is "B" ("B-" and lower not allowed) or better. All PBS credits that are used to satisfy requirements of a specific doctoral degree must be earned before the student is admitted to that degree program. These courses must be evaluated and recommended by the student's advisory committee on the basis of appropriateness and currency of the course material. In such cases, the student's degree clock starts with the first of these courses approved for inclusion in a plan of work (POW). Final approval is given by the Program Director upon submission of the POW to the Graduate School. A maximum of 12 credit hours taken while in PBS status may be transferred into a doctoral degree program.

5. The grade point average (GPA) of a graduate student who has credits in the PBS category will be based on all courses taken at the 400-800 level. The student's degree clock for time-to-completion starts with the first course approved for inclusion in the Plan of Work. This includes PBS courses.
6. If a student's graduate degree program is terminated, he/she cannot use courses taken in PBS status after termination for credit toward the same graduate degree program.
7. The student's advisory committee must approve all course work accepted for degree credit. Requests for degree credit for courses completed in the PBS classification are considered after admission to a graduate degree program when the student's Plan of Graduate Work is filed with the Graduate School.
8. The PBS classification carries with it no implication that the student will be admitted to the Graduate School in any degree classification or that courses taken will be accepted for degree credit.
9. PBS students are required to familiarize themselves with Graduate School and departmental policies and to seek further advice or clarification as needed.

Appendix A

TIPS FOR SELECTING A MAJOR ADVISOR (Compliments of Genetics Graduate Students)

The selection of a Major Graduate Advisor is one of the most important decisions that will be made in your graduate program. Each advisor and student is unique and has their own particular strengths and weaknesses as well as style of operation and interaction. The goal of the laboratory rotations is to identify advisors who will provide the training environment that the student desires and needs to reach their degree goals. These rotations are an excellent opportunity to gain first-hand information on specific programs. Some tips for gaining the information you need to make your decision are listed below:

- Ask questions of current technicians, postdoctoral researchers, and senior graduate students in the laboratory. They are extremely valuable sources of information and often are instrumental in getting a project started. However, do not choose a laboratory based solely on these individuals, since most will move on before you finish your degree.
- Ask to see copies of recent publications and current grant proposals and read them.
- Ask for specific information on current projects in the laboratory and possible projects for new students.
- Find out about the advisor's management style. Some faculty members like to have weekly progress reports and planning sessions, while some meet much less frequently with their students. You should be aware of how much direct contact you can expect.
- Find out about graduate students that have been in the laboratory before you, and what types of positions they are in now. Inquire about current students, when they expect to graduate and how many new students may enter the laboratory.
- Ask about long planned absences such as sabbatical leaves. This may not affect your decision to join the laboratory, but be aware that it will affect the planning of projects and committee meetings.

If you are not satisfied with your three rotations, inquire about doing more. An extra month spent in the beginning is much better than ending up in a research program that you are not interested in.

Appendix B Annual Progress Report Form

NCSU Toxicology Graduate Major Annual Report for _____

Name: _____ Date Enrolled as NCSU Tox Major _____ Degree Objective _____

Faculty Advisory Committee:

(Co)-Chair _____
(Co)-Chair _____
Members _____

Signature:

Fall Semester Courses Taken:

Grade Achieved

Committee Formed (Yes/No)

Date: _____

Plan of Work Submitted (Yes/No)

Date: _____

Summer Semester Courses Taken:

Grade Achieved

Written Exams Passed

Date: _____

Spring Semester Courses Taken:

Grade Achieved

Prelim Orals Passed:

Date: _____

Rotations Completed: _____

Summary of Research Completed: (Use additional page if necessary)

Professional Society Memberships: _____

Number of papers presented (attach abstract) _____

Number of Manuscripts (attach title page and abstract)

- 1. In preparation _____
- 2. Submitted _____
- 3. Accepted _____
- 4. Published _____

Signed _____ (Student)

cc: Committee Members
Director of Graduate Programs
Department Head

Appendix C: Written Qualifying Exam Format for Toxicology Ph.D. Students

WRITTEN QUALIFYING EXAM FORMAT

- 1) The exam is take-home. Students must work independently with no discussion of the material with others. No group efforts. Documented discussions of the exam questions with others will be grounds for exam failure. Questions of clarification can be submitted electronically to the Written Exam Committee Chair.
- 2) Students will have 7 days to respond to 5 questions. Exam will be distributed electronically at 8 am on a Monday and must be returned electronically no later than midnight the following Sunday.
- 3) The exam will consist of five questions.
 - a. Four questions will draw upon topics covered in the core course curriculum with emphasis on TOX 701 Fundamentals of Toxicology and TOX 710 Molecular & Biochemical Toxicology. These questions will be selected by the Written Exam Committee from a pool of questions provided by faculty members.
 - b. In addition, the mentor of each student taking the exam will prepare a question that more closely aligns with the students research focus. Students taking the exam will be provided all of these questions and must answer one question of their choice. These questions will be approved by the Written Exam Committee.
- 4) Students may use any resources available through NCSU (electronic or hard) to research and answer the questions.
- 5) Information derived from the scientific literature must be properly cited with full references provided at the end of the answer. Acceptable sources of information include peer-reviewed literature, text books, review articles. Unacceptable sources of information include Wikipedia, blogs, and magazine articles.
- 6) Answers will be electronically searched for plagiarism. Plagiarism will result in a grade of 1 for that question.
- 7) Exam questions will be graded 1 through 5. 5: outstanding, 4: very good, 3: good, 2: fair, 1: poor. If any question receives a score of 1, the exam will be failed. A cumulative score of 20 or greater will be a passing grade. Cumulative scores of less than 20 will be judged as pass or fail by the Written Exam Committee. Any answer receiving a score of 1 will be reviewed by the Written Exam Committee for a final decision.
- 8) In the event that a student fails the exam, the student may petition the program for a second opportunity to take exam. The petition will be reviewed and subject to vote by the program faculty. A second failure will result in automatic termination from the program.

Example questions follow.

- 1) Cancer can develop through genetic and epigenetic changes. Read the attached review (no review is provided with these examples) on epigenetically induced tumorigenesis. Many unanswered questions are mentioned in the review. You may have additional questions which are not described in this review but should be important to advance our understanding of this field. Pick one question based on this review (either from the review or your own questions) and design a series of experiments to answer the question. The question should

be simple and specific, and outcomes of the series of experiments should provide some advance of our understandings in epigenetics and tumorigenesis.

Note:

- a. An example question: Is hyper methylation of the promoter region of tumor suppressor, Ink4B, causally associated with tumor progression of skin cancers?
- b. The question must not be already answered.
- c. Your response must describe the rationale behind your approaches with references.
- d. The experimental designs must be provided with enough detail including your justifications for numbers of samples or animals.

2) Hydraulic fracturing poses risk of drinking water contamination with many chemicals. Create your hypothesis of how a specific chemical or mixture of chemicals from hydraulic fracturing could cause human diseases associated with either carcinogenesis, or dermal, liver, kidney, neuronal, immune, neural, or reproductive toxicity. Describe a brief background and significance (one paragraph each) of your hypothesis as well as approaches including brief description of methods to test your hypothesis.

Note:

- a) The hypothesis should be original.
- b) If there are similar studies, those studies must be cited and discussed in the background and significance section.
- c) Approaches should consist of a study design including statistical analysis and descriptions of each method.

3) Your company has synthesized a new chemical that has highly effective dispersion properties on petroleum compounds. You intend to market as a solution as a treatment option for spills in freshwater lakes and rivers.

- a) Describe the rationale behind why dispersants are used in petroleum spills and discuss how they may affect the fate and transport of the spilled chemicals.
- b) Preliminary tests indicate that treatment with the compound seem to indicate that certain fish species display a marked sensitivity to the compound with respect to both acute toxicity and also longer term reproductive success. Discuss why this may be, including some experimental studies that could be performed to explain these observations.

4) Nature magazine has just published a new study of a chemotherapeutic drug cocktail that is highly effective at treating primary liver carcinomas. The two components of the combination are a compound that is bioactivated to a very reactive DNA damaging compound and a compound that changes the epigenetic landscape of the DNA to a state that causes excessively cell growth due to inhibition of cell cycle checkpoint activation.

- a) Discuss first the mechanism of how each individual compound is possibly working, including brief descriptions of any relevant cell pathways involved. Second, discuss why this particular combination of drugs might be effective as a chemotherapeutic agent.

b) After Phase III clinical trials, it is found that in patients who become refractory to treatment have significantly increased expression of a CYP450 isoform that processes the DNA damaging agent into a relatively non-reactive metabolite. Additionally, these patients have a greater number of secondary tumors that are also refractory to treatment. Discuss how these observations may be explained and related to each other.

Appendix D: Research Proposal and Oral Preliminary Exam Format for PhD Students

Prior to taking the Preliminary Oral Exam, students are required to prepare a research proposal. This exercise provides training to the student in proposal preparation and provides a document of focus for use during the Preliminary Oral Exam.

Topic selection A toxicological topic for the proposal must be mutually agreed upon by the student and advisor. The student's proposal must be original and not derived directly from a proposal previously prepared by the advisor.

Proposal format The proposal will be prepared according to the general format requirements of a major Federal granting agency (NIH, NSF, EPA, etc). The student will be required to prepare an entire proposal including all of the administrative pages required of the granting agency (i.e. cover page, budget and justification pages, etc.). Students are encouraged to identify a fellowship opportunity prior to preparing the proposal and adopt the format requirements of that funding source.

Oral exam The student will schedule the oral exam following successful completion of the Preliminary Written Exam. Advisory committee members will review the proposal in preparation for the oral exam. The proposal will be used as the point of focus in the oral questions posed. Questions posed during the exam may range from specific issues raised in the proposal to theoretical and conceptual topics of general relevance to the proposal.

Criteria for passing the exam Upon completion of the exam, the committee will briefly discuss the strengths and weaknesses of the proposal and of the student's performance during the questioning. The student then will be apprised of the committee's views on the quality of the proposal and of the oral answers provided by the student. The judgment of pass/fail will be based upon the ability of the students to answer the questions posed during the exam and not on the quality of the proposal.

Appendix E: Scientific Society Membership

SOCIETY MEMBERSHIPS

Students are encouraged to join and to participate in the activities sponsored by professional societies in the areas of their technical interests. The following list of professional organizations was compiled by the faculty and students and includes most of the organizations to which they belong. Where available, web sites are listed -- these can be extremely helpful in learning about the societies, their mission statements, publications, and membership information. Membership application forms for some of the following organizations are generally located on their web sites.

American Association for Cancer Research

Web site: <http://www.aacr.org>

American Association for the Advancement of Science (AAAS)

Web site: <http://www.aaas.org/>

American Chemical Society (ACS)

Web site: <http://www.acs.org/>

American Society for Pharmacology and Experimental Therapeutics (ASPET)

Web site: <http://www.aspet.org/>

Carolinas SETAC

Web site: <https://www.setac.org/group/CRC>

Entomological Society of America

Web site: <http://www.entsoc.org/>

Federation of American Societies for Experimental Biology

Web site: <http://www.faseb.org>

International Society for the Study of Xenobiotics (ISSX)

Web site: <http://www.issx.org/>

International Society of Regulatory Toxicology and Pharmacology

Related web site: <http://www.isrtp.org>

National Academy of Science

Web site: <http://www.nas.edu/>

North Carolina Chapter of Society of Toxicology (NCSOT)

Web site: <http://www.toxicology.org/isot/rc/nc/ncsot.htm>

NC Society for Electron Microscopy and Microbeam Analysis (NCSEMMA)

Related web site: <http://www.microscopy.org/northcarolina/NCSMMAOfficers.cfm>

Sigma Xi- The Scientific Research Society (SRS)

Web site: <http://www.sigmaksi.org/>

Society for Neuroscience

Web site: <http://web.sfn.org/>

Society for Risk Analysis

Web site: <http://www.sra.org/>

Society of Environmental Toxicology and Chemistry (SETAC)

Web site: <http://www.setac.org>

Society of Toxicology (SOT)

Web site: <http://www.toxicology.org>

Appendix F: Summer Session Registration

Summer Registration

To: Departmental Payroll Coordinators
From: University Payroll
Subject: **Student Employee Social Security and Medicare Exemption for Summer School Sessions**

As summer school academic sessions approach, we would like to remind you of the requirements for exemption from social security and Medicare (FICA) tax withholding for student employees for those sessions. IRS regulations require that a student be enrolled at least half time in a session to be exempt from FICA tax withholding. Half time enrollment for a summer session is defined as follows:

1. At least **3 credit hours for undergraduate** students.
Undergraduate students enrolled in 10-week courses will have credit hours applied to both summer sessions. If the course is, at least 3 credit hours, the FICA exemption for both Summer Session I and Summer Session II will be granted.
2. At least **1 credit hour for graduate** students.
In addition, graduate students enrolled in courses numbered XYZ696* or XYZ896* in Summer Session I will also be programmatically exempted from FICA withholding for Summer Session II.

The payroll calendars for student exemption from FICA tax withholding that coincide with the enrollment calendar for the summer sessions are as follows:

1. **Summer Session I** will include biweekly pay periods 20042R26 through 20052R02; the June monthly payroll 20041R12; and 20041S01, special off-cycle payroll for Summer Session I.
2. **Summer Session II** will include biweekly pay periods 20052R03 through 20052R05; the July monthly payroll 20051R01; and 20051S02, special off-cycle payroll for Summer School II.

Reminder: International students on visas with "nonresident tax status" are exempt from social security and Medicare tax withholding during their first five calendar years of student status, provided they have supplied proof of this to the University Payroll Office. Questions concerning whether an international student is exempt from FICA tax withholding should be referred to Michelle Anderson, Nonresident Tax Specialist at 515-4370 or via e-mail, michelle_anderson@ncsu.edu

Please share this information with all student employees within your unit.

*The prefix for thesis research courses shown in the Course Catalog depends upon the department offering the course, but the course numbers will be 696 or 896.

Appendix G: Toxicology Graduate Student E-mail Directory

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