

Suggested plan for Pharm/Tox MS students interested in joining my lab for their thesis research:

A summary and timeline of key milestones for MS thesis students:

Year 1			Year 2	
<p>Fall</p> <ul style="list-style-type: none"> Register for Kemp/Xu Journal Club (PTX7002: Genome Stability and Human Disease) Do rotation in Kemp lab (PTX7012: Intro to Research) Take other required PTX courses (PTX7000, PTX7003, PTX7010) 	<p>Spring</p> <ul style="list-style-type: none"> Register for PTX8020: Pharm/Tox of DNA Damaging Agents (3 credit hr elective) PTX7011: Thesis Development Workshop; Develop specific aims for project PTX9100 7001: Cell Pharm/Tox PTX9100, 3 credit hr 	<p>Summer</p> <ul style="list-style-type: none"> Defend thesis proposal PTX9100, 1 credit hr 	<p>Fall</p> <ul style="list-style-type: none"> PTX9100, 6 credit hr Late Nov: assemble outline of thesis Dec: begin writing thesis 	<p>Spring</p> <ul style="list-style-type: none"> PTX9100, 1 credit hr Mid/late Jan: apply for graduation Early Feb: send 1st draft of thesis to Dr. Kemp Feb: decide on thesis defense date April: defend thesis May: graduate
<ul style="list-style-type: none"> Work on research for thesis project Participate in Kemp lab meeting each week Participate in lab journal club 				

A more detailed description is provided below:

YEAR 1:

Fall Semester:

- Take the journal club PTX 7002: Genome Stability and Human Disease offered by Drs. Xu and Kemp
 - Although there are other journal clubs taught by other faculty members, this journal club will give you better insights into the research going on in my lab. We will discuss recent papers of interest to me, my lab members, and the Xu lab. This specific journal club will start to familiarize you with my area of research and the types of projects that you could possibly work on in my lab. Thus, there are significant advantages to taking this journal club section rather than other journal club sections. Expect that you will encounter challenges reading scientific manuscripts for the first time.
- Carry out rotation in my laboratory
 - Learn a little more about the ongoing research in the lab, and meet the other people working in my lab.
 - We tend to be a molecular/cell biology-focused lab. Lots of cell culture work. Little-to-no animal work. Occasional work with human skin.
 - If you know you want to work in my lab, it may be possible (and even preferable) to decide early on and try to get out of doing all 3 lab rotations. This will save valuable time.

Spring Semester:

- Take PTX 8020: Pharmacology and Toxicology of DNA Damaging Agents
 - This course will provide much greater depth and background about subjects relevant to my area of expertise and research. This will help you better understand your project, which should make working on your research project and writing your thesis much, much easier. Note that this course can very conveniently also count for the 3 credit hour elective course that you need for your program of study.
- Thesis Development Workshop (PTX7010; taught by Drs. Xu and Sahu)
 - I will work with you to develop specific aims for a small project that can be completed within a year or so. We will also decide on two other faculty members to serve on your thesis committee,
- PTX Graduate Research (PTX9100, 3 credit hr)
 - Begin learning techniques in the lab and starting work on a thesis project. Early on, expect there to be lots of learning and trial and error. This time may also involve carrying

out preliminary experiments to narrow down ideas for a specific project for your thesis research topic and specific aims.

4. Other activities

- You will be expected to participate in my lab's weekly lab meeting and in weekly journal club (with the Xu lab)
- Begin reading papers relevant to your project. Learn to love PubMed and its search functions. This will help you in your thesis development workshop and in your project in general. Your goal should be to learn as much as possible about your research topic and the previous work that has been done by others. Ask me if you need help finding relevant publications. Ultimately, the knowledge you gain will be useful for writing the background/introduction section of your thesis.

Summer Semester:

1. Give an oral presentation of your proposed thesis project to your thesis committee
 - The idea here is to outline what you plan to do for your thesis project. It is important that you understand why you will be carrying out these specific aims. Thus, the reading you have been doing will be important for this to go well.
2. Continue work on thesis research project
 - You need to register for 1 credit hour of graduate research over the summer. This is a tremendous bargain; you get to spend up to 5-7 days a week in the lab for the price of 1 credit hour! Summer is a great time to get lots of work done because you will not be distracted by classes.
 - Keep good records, including in a OneNote electronic lab notebook that I will provide you with shared access to so that I can follow your progress. Your primary data (Excel files, image files, etc.) may be needed by others in the future, so you should know where this information can be found. Writing up protocols/methods in the OneNote lab notebook will make it easier for you to write up your Materials & Method section of your thesis. If you hope to get a publication out of your thesis project, I will need access the primary data so that I can analyze/verify data myself and assemble/re-assemble figures depending on specific journal requirements. Thus, it is important to provide primary data files and other information/documents (Excel files, ChemiDoc files, preliminary figures of data with information labeled).
3. Other activities:
 - Continue to read and participate in weekly lab meeting and journal club

YEAR 2:

Fall Semester:

1. Continue work on your thesis project.
 - You will need to register for 6 credit hours of graduate research (PTX9100).
 - Science can be both fun and difficult. Experiments routinely don't work as expected the first time. Spending time in the lab is critical to mastering techniques and successfully completing a good project. Working 5-7 days in the lab (even if only for an hour or so on the weekend) is often necessary to generate enough data for a scientific manuscript in a short amount of time. Even after 20+ years of experience, I still work 6-7 days a week in the lab to maintain a sufficient level of productivity to get papers published and receiving grant funding.
2. Other activities:
 - Participate in weekly journal club and lab meeting
3. **Late November:**
 - Develop an outline of your thesis (and get feedback from me). This will help you when to start to write your thesis over the next few months. The outline will include a summary of the experiments that you have done thus far as well as what you plan to continue to do over the next few months. It is meant to be a flexible, dynamic document to help

organize your thoughts and how you will structure your thesis. A few details are provided below:

- Background/introduction
 - It is important that you understand what was done previously and how this previous data has led to the questions that you will be asking and addressing in your thesis project.
 - Think about how you can draw simple schematics that summarize previous work related to your project and ideas/concepts that you believe are important for your reader to understand the purpose of your thesis project. Be creative...don't just steal published figures!
- Materials and Methods
 - This is usually the easiest section to write, and remember to consider all of the methods you have used. Using the Kemp Lab protocols and the details you have kept in your OneNote lab notebook will make this easier, so be sure to keep track of details (antibodies, reagents, other supplies, kits, etc.) as you carry out experiments.
- Results
 - Think about each specific experiment that you have/will have performed by the end
 - Results should flow logically from figure to figure. This can be a challenge but is part of the process of communicating science to others.
- Discussion/Conclusions
 - Interpret your results. What was learned? What problems were there? What questions remain to be addressed? What should be done next?

5. **December:** Begin writing your thesis

- Check out the OhioLink thesis and dissertation database (https://www.ohiolink.edu/content/ohiolink_electronic_theses_and_dissertations) for examples of how graduate students write their thesis. You can even search for theses written by other Pharm/Tox master's students. Do not start writing your own thesis until you have read through some examples. You may get ideas for writing the thesis that you like and dislike.
- Check out the grad school guidelines on thesis submissions: (<https://www.wright.edu/graduate-school/graduate-thesis-and-dissertation-handbook>). They have lots of information and templates that can be used. This will save time.

Spring Semester:

1. Finish experiments for thesis project (**January-April**, but this may vary with student and project).
 - You will need to register for 1 credit hour of graduate research (PTX9100) during the semester that you intend to graduate.
 - Research can continue until you physically leave WSU. Science never ends. There will always be more exciting questions to ask. But you eventually have to stop. But enjoy the freedom to carry out experiments for as long as possible. Remember: the more data you generate, the more likely you will get a high quality publication (or more than 1 publication). It is possible that you generate data that you don't be able to insert into your thesis until the last moment (and/or put in a publication!)
2. Other activities:
 - Participate in weekly journal club and lab meeting.
3. Finish writing thesis
 - By **early February**, I will want to see a draft. It does not have to be complete, and there can be gaps that you will fill as you complete additional experiments. There will likely be multiple rounds of revisions needed to improve the quality of the thesis. The sooner you get a first draft to me, the better. I am also happy to look at smaller sections at a time as you finish with them. Keep some flexibility in the document; there are usually multiple ways to present your data. Try to write this as a "story" that you are telling your reader, albeit through data and graphs. See previously submitted theses for examples.

4. Thesis defense and graduation information:
 - **January:** apply for graduation
 - **February:** pick date for thesis defense in consultation with committee members
 - **April:** defend thesis
 - Most people defend their thesis sometime during April, so be aware that dates can fill up quickly on people's schedules.
 - The written thesis document should be sent to your committee members 2 weeks before the oral defense date.
 - Expect that additional edits and changes may be needed after your defense date and before you submit the written document to the graduate school.
 - **May:** Graduate!

Other notes:

1. You are encouraged to discuss your career goals and interests with me and to learn about job or additional educational opportunities. I view the purpose of the master's thesis project is for students to gain new/additional technical skills, learn to think more critically about primary data, and to better define the next career goal. Whether your goal is to obtain a laboratory research position or to pursue additional education/training, one of my jobs is to help you achieve that next career step. There is no right/best option career-wise. It is a process that is unique to every individual.
2. If interested in pursuing a PhD, remember to apply early and to multiple programs. Be sure to examine graduate programs that best fit your scientific interests and career goals. Check application deadlines. Find people that willing and able to write strong letters of recommendation for you. Admissions committees will only admit students who have high likelihood of success in the PhD program, and so you must convince them that you have solid academic abilities and understand the process and culture of scientific research. Note that having a PhD doesn't necessarily mean that you will make more money or have a better job/life than someone with only a master's degree (in fact, the opposite is sometimes true!). Pursue a PhD if your goal is to lead research projects/people, become the world's expert in a specific area of science, and/or want to teach at the university level.
3. Time management is key to success not only in graduate school but also in your professional work life. Learn to manage your time efficiently.
4. My priority is to fund myself, postdoctoral researchers, and PhD students. I am therefore unlikely to be able to provide graduate assistantships to master's students working in my lab. Outside employment is a possibility for students to support themselves, and I expect that this can be done well with good time management skills.
5. Vacation/time off is a reasonable expectation. The typical American gets 2-3 weeks off a year, so I expect that you will take some time off while in the master's program. Though you are still a "student", it is important that you realize that you are in the process of becoming an active scientist/researcher who will be judged by potential future employers on your scientific contributions, technical abilities, and level of productivity.