

**Pathology 499: Research Project in Pathology  
Fall/Winter Term 2023/2024 Course Outline**

**Course Weight: 12.0 credits**

**Summary of Course Content:**

There are two components to this course

- a) A research project involving experimental design, data collection and analysis, written report, oral and poster presentations.
- b) "Core" seminars and tutorials on topics related to research.

**1. SCOPE OF THE PATHOLOGY RESEARCH PROJECT**

Research for the thesis should be directed towards answering a specific biological question, applying new methods to a problem or testing a hypothesis relating to the mechanisms underlying human disease processes. In some cases, the thesis research may lead to new data which will eventually result in a scientific publication. However, because of time constraints and, in some instances, the development of new technology, the amount of data you collect may be less than you originally anticipated. It is important to consult regularly with your supervisor, the course teaching assistant and the course co-ordinator who will assist you in keeping your research project focused and manageable within the time available to you. The main objective of the course is to introduce students to scientific research method and to test their application of this method to a defined question.

**2. RESPONSIBILITIES OF THE PROJECT SUPERVISOR**

Research project students should be involved in most phases of the research process from formulation of the hypothesis to be tested through experimental design, data collection and the communication of results. Students should not be simply handed a project with all the details previously worked out. The students should be encouraged to participate in the early stages of the project design.

The pathology research project should normally be completed within six to eight months and therefore should not be considered to be the equivalent of an MSc. research project. It is especially important to design a project that is feasible within the time available to the student. Supervisors of the projects should ensure that the thesis is of reasonable quality with respect to style and organization before submission for review. Many students at this stage of their training will require significant assistance with the style of scientific writing and time allowances should be made with this concern in mind. However, it should be emphasized that the final written thesis must not be extensively re-written by the supervisor prior to marking; the thesis must represent the student's work.

### **THE PATHOLOGY 499 TEACHING ASSISTANT**

A senior graduate student from the Department of Pathology is appointed each year as the Administrative Teaching Assistant for this course. In some instances, this student will themselves have taken PATH 499 during their undergraduate program.

This Administrative Teaching Assistant will be available during the course for questions pertaining to:

- a) Course deadlines
- b) Expectations with regard to progress with projects

The Teaching Assistant will also be available to offer advise with regard to both the oral presentations and the written thesis that comprise the evaluative components of the course. The Teaching Assistant will also participate as one of the three examiners for the two oral presentations during the course.

In addition to the Administrative Teaching Assistant, all Path 499 students will be offered the opportunity of working with a laboratory TA who will normally be a Department of Pathology and Molecular Medicine graduate student. This lab TA will help the Path 499 student with practical laboratory issues and provide advice concerning their oral and written presentations.

### **3. COURSE CONTENT / MARKING SCHEME**

#### **DRAFT LITERATURE REVIEW & MATERIALS AND METHODS SECTION (15% OF FINAL MARK)**

In early December, all students will be expected to hand in a 10-15 pages (double space) Literature Review and Materials and Methods section for their thesis. As well as serving as a minor evaluative component of the course, the organization of the background literature for the thesis serves to begin the process of writing the final thesis report and should provide the student with a clear context for their project work.

#### **Oral Presentation (15% of Marks)**

In the Fall Term (usually in late November), all students participating in this course will be required to present a 10-minute oral presentation to the other students in the course and to an examining committee of two faculty members and the course Administrative Teaching Assistant. The formal presentation will be followed by ~5 minutes of questions. The evaluation will take into account the style and clarity of presentation, its scientific content and the response of the student to questions.

It is not expected that students will have completed the practical work for their project at the time of these initial presentations. The main emphasis for these presentations should be on the background to the project, the study objectives and a brief description of the methods being used.

#### **POSTER PRESENTATION (25% OF FINAL MARKS)**

In late March or early April, students will be expected to produce a poster describing their research project. The information included on the poster should include the following -

1. Background information
2. Study Objective
3. Materials and Methods
4. Study Results
5. Study Conclusions

Posters from all the Life Science Research project courses will be displayed together and evaluated by two faculty members and the course Administrative Teaching Assistant. The students normally present their posters in 5 min, followed by 5 min questions. In addition to the 25% mark assigned for the quality of the work, there will also be at least one monetary award for the best poster presented. The cost of producing the posters will be covered by the supervisor; however, the student and supervisor should discuss the cost and site for printing beforehand.

### **LABORATORY WORK EVALUATION (20% OF FINAL MARKS)**

Each supervisor will provide a formal evaluation of the laboratory work performed by the Path student. Since this is a 12-credit course, the student normally works in the lab for 10 hours per week. This component of the course mark will take into account the student's initiative, work habits and general understanding of the protocols used in their thesis work. The mark will not be based upon the success or failure of the techniques being used.

### **FINAL WRITTEN THESIS (25% OF FINAL MARK)**

This part of the project will likely prove to be the most difficult for students to complete. In light of the fact that written scientific communication forms the basis for the dissemination of most important research advances, training in the skills of scientific writing is an essential component of any biomedical researcher's education. For many students at this stage of their careers, it will be their first attempt at original scientific writing.

It is anticipated that several drafts of the thesis will need to be revised prior to its submission for formal evaluation although the final version of the document must clearly be the student's not the supervisor's work. The early drafts should be discussed with the Project Supervisor who should receive these drafts in adequate time to provide comments concerning revisions.

**Students should note that all background thesis text should represent their own version of previously reported observations with appropriate references provided. Plagiarism of scientific text is not acceptable academic behaviour and, if identified, will result in serious consequences.**

As stated above, the draft Introduction and Materials and Methods sections for the thesis is due at the end of November and the submission date for the final document is at the end of the Winter term (~last week of March).

### **DETAILS FOR ORGANIZATION OF THE RESEARCH THESIS**

#### ***Format***

The Thesis should be **20-25 pages** (8.5 x 11") in length, double spaced, no smaller than 12 pitch font, and 1 inch margins. The 25-page limit is exclusive of the Title page,

Abstract, References and Figures may be submitted. The 25-page text limit will be strictly enforced (ie. no text beyond 25 pages will be evaluated).

a) ***Title Page***

This should be typed on a separate sheet. The Title page should include the title of the thesis, student's name and a statement about the thesis being submitted in partial fulfilment of the requirements for a B.Sc. (Honours) degree. The date of completion of the thesis should also be noted.

b) ***Abstract***

This should be typed on a single page. The Abstract should contain a succinct account of the objectives of the project, the results and conclusions. The purpose of the Abstract is to provide a very focused overview of the project.

c) ***Acknowledgements***

Typed on a separate page, a concise summary of all those who contributed to this work. This should include the Project Supervisor and other Faculty who provided advice and assistance, colleagues who may have helped in some way and other individuals who have made some other form of contribution. Granting agencies that have provided funds to enable the project to be carried out should also be acknowledged.

d) ***Table of Contents***

e) ***List of Figures and Tables***

f) ***Introduction and Literature Review***

This section should occupy 25-35% of the total length of the thesis. The background literature should be reviewed with a view to its relevance to the objectives of the research project. It is important to keep in mind that the thesis should be centred upon the testing of a specific hypothesis or biological question. The purpose of the project should be very clearly stated somewhere in this introductory section of the thesis.

g) ***Materials and Methods***

The source of all materials used in the project must be stated. The experimental techniques must be described in such a way that they could be duplicated by anyone reading the thesis. Where standard, previously reported methods are used it is sufficient to provide a reference to the technique. Where appropriate, statistical methods should be described and referenced. This section of the thesis should be no longer than five or six pages.

h) ***Results***

This section of the thesis should comprise a description of the results obtained, with appropriate figures, tables and graphs. All figures, tables and graphs should be accompanied by legends that describe in adequate detail the data being displayed.

i) ***Discussion***

This final part of the thesis will demonstrate how well the student can co-ordinate the information presented in the preceding Literature Review, Methods and Results sections of the thesis. The Discussion should comprise approximately 25% of the total length of the thesis. It is important to focus the contents of the Discussion on the objective of the thesis, the results obtained and the pertinence of the results in light of prior studies.

j) **References**

Whichever style of Reference presentation is chosen (from a credible scientific journal) it should include a list of authors, the title of the manuscript, the journal in which the manuscript has been published, the year of publication, volume number and starting page for the manuscript.

**Evaluation of written thesis**

Each thesis will be evaluated by two different faculty members: the student's supervisor and one other. The mark awarded for the thesis will represent the mean of their two evaluations.

**Pathology 499 Timetable**

<b>Mid-September:</b>	Meeting with Course Coordinator and Administrative Teaching Assistant
<b>Fall Term:</b>	To be coordinated with project supervisors:
	X Define project objective
	X Read background literature and organize references
	X Become familiar with methodologies to be used
	X Begin experiments
<b>Early December:</b>	Oral Presentation (10 min + 5 min questions)
<b>Early December:</b>	Hand in draft Literature Review and Materials and Methods
<b>March/April:</b>	Poster Presentation
<b>Beginning of April:</b>	Hand in completed written thesis

**Pathology 499 Mark Breakdown**

Literature Review and M&M	15%
Oral Presentation	15%
Laboratory Work Evaluation	20%

Final Written Thesis	25%
Poster Presentation	25%

Contact Information:

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