CANC499 Research Project in Cancer Biology & Genetics Course Outline
Fall/Winter Term 2017/2018

CANC499 Course Weight: 1.5 credits

Summary of Course Content:
This course represents the practical component of the CANC stream in Life Sciences. CANC499 is a research project involving experimental design, data collection and analysis, written report, oral and poster presentations.

1. SCOPE OF THE 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 cancer. In some cases, the thesis research may lead to new data that 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 and the course coordinator, 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 test their application of this method to a defined question.

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 cancer research project should normally be completed within six to eight months and therefore should not be considered to be the equivalent of a 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.

2. The CANC 499 Coordinator

The Coordinator will be available to offer advise with regard to the elements that comprise the evaluative components of the course, including:

a) Course deadlines
b) Expectations with regard to progress with projects
c) The oral presentations
d) The written thesis

The Coordinator will also participate as one of the examiners for the two oral presentations during the course.

All CANC 499 students will also be offered the opportunity of working with a laboratory TA who will normally be a graduate student within the Cancer Research Institute. This lab TA will help the CANC 499 student with practical laboratory issues and provide advice concerning their oral and written presentations.

3. COURSE CONTENT / MARKING SCHEME

LITERATURE REVIEW & MATERIALS AND METHODS REPORT (10% OF FINAL MARK)

All students will be expected to hand in a Literature Review & Materials and Methods section that serves as an initial draft of their Thesis. As well as serving as a minor evaluative component of the course, the organization of the background literature for the thesis begins the process of writing the final thesis report, and provides the student with a clear context for their project.

TWO ORAL PRESENTATIONS (30% OF FINAL MARKS)

Initial Oral Presentation (10% of Marks)

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. 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 have completed the practical work for their project at the time of these initial presentations. The main emphasis for these presentations is the project background, study objectives and a brief description of the methods being used.

Final Oral Presentation (20% of marks)

All students will be required to present a final oral presentation by the end of the winter semester. The student will have 10 minutes to make a formal presentation to their fellow students and an examining committee. The formal presentation will be followed by ~5 minutes of questions. In contrast to the earlier oral presentations, in these final presentations, the student should focus more on the study results and conclusions.

LABORATORY WORK EVALUATION (20% OF FINAL MARKS)

Each supervisor will provide a formal evaluation of the laboratory work performed by the student. 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 is not based on the success or failure of the techniques being used.

POSTER PRESENTATION (10% OF FINAL MARKS)

Students are 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, with 5% mark assigned for the quality of the work. The Life Science Office will cover the cost of producing the posters if submitted electronically by the student no later than 1 week prior to the poster presentation day. Beyond this deadline, the supervisor will incur the cost. The student and supervisor should discuss the poster before printing.

FINAL WRITTEN THESIS (30% 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 Initial Thesis (Introduction & Materials and Methods sections) is due before the end of the Fall term, and the final Thesis is due at the end of the Winter term.

DETAILS FOR ORGANIZATION OF THE RESEARCH THESIS

Format

The Thesis must be between 16 and 20 pages (8.5 x 11") in length, double spaced, no smaller than 12 pitch font, and 1 inch margins. The 20-page limit excludes the Title page, Abstract, Figures/Tables and References. Up to 5 pages of figures/Tables may be

included. The 20-page text limit will be strictly enforced (ie. no text beyond 20 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 rationale, hypothesis and objectives, methodology, key results and major conclusions/significance of the project. The purpose of the Abstract is to provide a very focused overview of the project. Maximum 200 words.

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% (max. 5 pages) 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 centered 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 ~ 20% (max. 4 pages).

h) ***Results***

This section should comprise 25% (max. 5 pages) a description of the results obtained, with appropriate figures, tables and graphs. All figures, tables and graphs should have legends that describe in adequate detail the data being displayed.

i) *Discussion*

This final part of the thesis will demonstrate how well the student co-ordinates the information presented in the preceding Literature Review, Methods and Results sections of the thesis. The Discussion should comprise ~30% (max. 6 pages) 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***

Use of a reference manager software is encouraged, but it is recommended you verify that references are being formatted correctly and consistently. Use the "*Cancer Research*" journal reference style. References should be numbered in the order in which

they first appear in the text; cite only the number assigned to the reference. For references with more than 6 authors, the names of the first 6 authors must be listed, followed by "*et al.*" For manuscripts with 6 or fewer authors, all authors should be listed. Examples for the reference list are provided below:

Reference List examples:

1. Warrell RP Jr, Frankel SR, Miller WH Jr, Scheinberg DA, Itri LM, Hittelman WN, *et al.* Differentiation therapy of acute promyelocytic 584 leukemia with tretinoin (all-trans-retinoic acid). *N Engl J Med***1991**;324:1385–93.

2. Yuspa SH, Hennings H, Roop D, Strickland J, Greenhalgh DA. Genes and mechanisms involved in malignant conversion. In: Harris CC, Liotta LA, editors. Genetic mechanisms in carcinogenesis and tumor progression. New York: Wiley-Liss; 1990. p.115–26.

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.

CORE RESEARCH SEMINARS AND TUTORIALS

A series of ~10 "core" research seminars and tutorials will be given in a common time slot during the Fall and Winter terms.

The organization of those sessions is coordinated centrally by the Life Sciences Office and questions concerning these tutorials should be directed there.

These sessions should be of interest to all students enrolled in the Cancer Research Project course and will be held in conjunction with students enrolled in the other Life Sciences Project courses. The topics that will be discussed at these seminars will include the following:

1. Historical aspects of basic scientific discovery

2. Ethics in research

3. Scientific writing

4. Practical examples of biostatistics

5. Animal models of disease

6. Clinical trial design and interpretation

CANC 499 Timetable
15th September 2017: Meeting with Course Co-ordinator
Fall Term: To be co-ordinated with project supervisors:

- Define project objectives
- Read background literature and organize references
- Become familiar with methodologies to be used
- Begin experiments

30th November 2017: Hand in Initial Thesis (Intro & Materials and Methods)
Early December 2017: Initial Oral Presentation (10 min + 5 min questions)
14th March 2018: Deadline to submit poster for printing (at no charge)
21st March 2018: Poster Presentation
3rd & 4th April 2018: Final Oral Presentation (10 min + 5 min questions)
Beginning of April: Hand in completed written thesis
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CANC 499 Mark Breakdown
Initial Literature Review and M&M Report 10%
Initial Oral Presentation 10%
Final Oral Presentation 20%
Laboratory Work Evaluation 20%
Initial Written Literature and Methods Report 10%
Final Written Thesis 30%
Poster Presentation 10%