GUIDELINES FOR *APBI 499 (6)*
UNDERGRADUATE THESIS IN APPLIED BIOLOGY

This course provides a means for individual students to undertake customized projects designed to provide an opportunity for students to develop and strengthen their research skills and to accommodate special research interests that cannot be met through other APBI courses. Admission to APBI 499 is arranged through the **undergraduate program advisor** for the relevant major, and must be recommended by the faculty member who will be supervising the work that the student is to undertake. Students interested in APBI 499 should contact the undergraduate advisor for their major and the individual faculty member(s) with whom they are interested in conducting a project well in advance of the beginning of the academic term; for example, students should approach potential supervisors in summer regarding thesis projects to start in September. Opportunities for conducting projects are limited.

The work plan is arranged and agreed to by the student and the faculty member and should be set out in writing with a copy to the undergraduate advisor, as described in the " **APBI 499 Thesis Proposal**". The work will consist of a definable project requiring literature search, laboratory or field research, and a written thesis. A thesis proposal is due two weeks after the start of the term, a thorough literature review and detailed experimental plan before lab work begins, and a brief progress report (1-2 pages) is expected from the student when approximately half of the experimental work has been completed. Further details on the deadlines and requirements of the course are given below.

Students will be expected to spend approximately 40 hours of work per credit, or approximately 240 hours to this course. This includes time spent on literature search, design of experiments, experimental work and the write-up. A regular schedule of consultations should be pre-arranged between the supervisor and the student in order to monitor and discuss progress and time spent by the student on the project. The meeting time should form a regular entry on the timetables of both the student and the supervisor.

If the project is to be conducted totally, or in part, at a location other than UBC, the supervising faculty member will make appropriate arrangements for regular monitoring of progress and time. This may entail appointment of an on-site co-supervisor.

If the project is associated with a summer or part-time, paid or volunteer position held by the student, care must be taken to ensure that any hours of work on the directed studies project are over and above those required of the related position. The supervisor must be satisfied that this requirement has been met. Normally, a minimum of 50% of the work required for the course must be conducted during the session in which the student is enrolled in the course. Exception to this requirement may be requested in advance where its application would result in a course overload, unnecessary delay in time to graduation, or the imposition of extra fees.

Deadlines for the course

The following deadlines are suggested for students enrolled in APBI 499. The student and their supervisor must discuss and come to an agreement on deadlines at the start of the project.

Milestones	May – Aug Schedule	Sept – April Schedule
Submission of project title and name of supervisor to undergraduate advisor	May 1	September 15
Thesis proposal to supervisor	May 15	October 1
Literature search/ Experimental Plan Draft	May 30	October 31
Literature search/ Experimental Plan Final	June 1	November 15
Thesis progress report to supervisor	June 30	January 15
Experimental/research work completed	August 1	February 15
Submission of thesis draft to supervisor	August 14	March 15
Submission of final thesis copy to supervisor	August 21	April 7
Oral presentation of thesis work	Arranged with supervisor	

It is expected that APBI 499 Undergraduate Thesis courses will be completed within **no more than two consecutive terms**, unless otherwise agreed to at time of registration. If a grade has not been reported by the deadline, a "T" standing will be recorded. The "T" standing may be changed once the thesis Academic Supervisor submits a written record of the grade to the APBI Program Coordinator

Responsibilities of the supervisor

- Selection of appropriate research project in conjunction with the student
- Provision of suitable laboratory supplies and equipment to perform the work, including ethics approval if required for experimentation involving animals
- Providing guidance on experimental design, data analysis, and presentation of results
- Scheduling of regular meetings with the student (e.g. weekly or biweekly)
- Giving feedback on the thesis draft in a timely manner
- Arranging for a second thesis evaluator and evaluating the student lab work and thesis write-up
- Note: the role of the supervisor in the written report should be restricted to:
  1. provide general recommendations regarding structure, development, and progression of ideas;
  2. provide advice on the general format of the report, according to the guidelines, and the use of correct grammar, spelling, and sentence structure.
  3. The involvement of the supervisor normally should be limited to the first draft of the report.

Responsibilities of the student

- Make arrangements well in advance to work under the guidance of a faculty member as a thesis supervisor.
- *Strict* adherence to deadlines and guidelines for the course, as stated in this document and arranged with the supervisor
- Submit copies of the project proposal to the project supervisor and the Undergraduate Advisor within two weeks after the start of the term via the course Connect website. The thesis proposal (~2 pages) will consist of the following information:

1. The aim or hypothesis of the project (the idea that are being testing).

2. The significance of the project (why is it interesting or important), supported by relevant background information and literature
3. The experimental approach that will use to test the project (the general procedures to be used).
4. The potential problems or difficulties that might be encountered in the project.
5. The time line for the work (the date when specific steps or milestones will be completed, including the date of submission of the written thesis).

The thesis proposal must be approved by the undergraduate advisor within the agreed upon date or the student will be removed from the course.

- Allocate appropriate time to this course over the two terms.
- Submit a brief (one or two pages) progress report to the project supervisor and the Undergraduate Advisor. This report should state:
  1. Major accomplishments in the work to that time.
  2. Major problems in the project.
  3. Significant changes in the aim or approach for the project.
  4. Remaining experiments that is expect to be completed before writing up the final project report.

- Submission of two bound copies of the final thesis for evaluation.

Course Evaluation

For purposes of determining a grade for the written thesis, evaluation will be conducted by the supervisor and at least one other faculty member selected from the program. Where feasible and necessary, a common standing review committee will be struck. Evaluation of the course will be based on the organization and conduct of the project work and the written report.

One suggestion for an evaluation scheme is given below. This scheme may be modified by the supervisor, and should be distributed to the student at the beginning of the project.

Evaluation Scheme Example

Lab Work *(45% weighting of final mark)*
Initiative (20%)
Technique (20%)
Comprehension (20%)
Organization, work habits, attention to safety/proper protocols (20%)
Dedication and Perseverance (20%)

Oral Presentation (*10% weighting of final mark***)**

Final Report *(45% weighting of final mark)*
Abstract (5%)
A concise summary of the report
No abbreviations should be used

Introduction, Statement of Objectives (5%)
Introduction of the research topic
Clear outline of the hypothesis, rationale, objective and specific aims of the project

Literature Review (15%)

Showing depth and scope of the pertinent literature

Materials and Methods (15%)
- Concise and explicit description of the experimental methods used
- Detailed description of newly developed methods
- Citation of appropriate references for methods not developed by the student themselves
- Source of materials and chemicals used
- Methods used for data analysis, if appropriate

Results (10%)
- Presentation of figures, tables, appendices where applicable, in a manner that is commonly used in research publications for the area.
- Inclusion of statistical significance of data
- Presentation of data solely generated by the student during the project

Discussion (20%)
- Demonstrating critical analysis of results and comprehension of subject area

Conclusions (5%)

References (5%)
- Citation of all literature referred to in the report
- Consistent and appropriate format used

Clarity, grammar (sentence structure, spelling), organization (20%)

Thesis Write-up Guidelines

The following items are suggestions as to the write-up of theses. For specific items, the Research Supervisor should be consulted. Also available for consultation, are copies of theses of previous classes.

Each thesis should contain, in the order given, the following sections:

Title page: This page contains the title, author's name, a statement as follows: "A thesis submitted in partial fulfillment of the requirements for the degree of Bachelor of Science in Agriculture in the Department of Food Science", and the date (see example attached).

Abstract: This is a condensation of the contents of the thesis, usually 200 words or less, giving significant information in the report. It serves as a quick reference to determine if the thesis contains information a person is looking for.

Table of Contents: This should list all major and subheadings accompanied by the page on which they are found (see example attached).

List of Tables: The table number, caption and page on which it is found are listed.

List of Figures: The figure number, legend and page on which it is found are listed.

Acknowledgements: This section expresses thanks and appreciation to individuals, institutions or organizations that were particularly helpful in the carrying out of the thesis work. This section is optional.

Introduction: The introduction outlines to the reader the thesis subject, its importance, presents the specific problem of the thesis and indicates the nature of the investigation carried out.

Literature Review: This section generally outlines or discusses findings reported by others in books and journals, relating to and leading to the proposed investigation as related in the thesis (corrected version submitted for marking in October inserted)

Materials and Methods: This section should describe the experimental procedures employed and the equipment and facilities used, in a manner which would allow others to duplicate the work.

Results and Discussions: This section can be written as a combination of the two or as separate entities. The section relates the information, experimental data or observations resulting from the study and describes the findings and what they mean are described logically, leading up to a set of conclusions. The format of tables and figures should be as in the Journal of Food Science or Journal of Agricultural and Food Chemistry.

Conclusions: This section reports the conclusions reached on the basis of evidence presented in the discussion. This may often be combined with a concise summation of results reported in the previous section.

References: This should be an alphabetical listing of authors of literature cited in the thesis. The format to be used for citing in the thesis body and listing at the end should be that of the Journal of Food Science or Journal of Agricultural and Food Chemistry.

Appendix: Appendices are repositories for details that must be recorded because they may be needed, but would slow the reader down unnecessarily if placed in the body of the thesis. Appendix materials must be referred to in the body of the thesis. Calculations, detailed analyses and test figures are typical material found in this section.

This thesis should be legibly typed or printed on good quality bond paper. It should be in 12 pt font, with 2.54 cm margins, double spaced, and printed single sided. The two copies to be submitted to the thesis advisor may be good quality photocopies. The copies submitted should be bound in suitable binders such as Duo-tang or Acco-press binders, or coil bound.

(Title page example)

TITLE OF THE THESIS

By

Your name

A Thesis Submitted in Partial Fulfillment for the Requirements for the Degree of Bachelor of Science in Food and Land Systems

Applied Biology Program

Faculty of Land and Food Systems

The University of British Columbia

April 20XX

TABLE OF CONTENTS (Example)

APBI 499 Grading Rubric for Thesis Oral Presentation

Category/*Rating*	*Poor (0-3)*	*Acceptable (3.5)*	*Good (4)*	*Excellent (5)*
KNOWLEDGE & CONTENT				
Adequacy of introduction	Introduction and background information was unfocussed; audience did not know what the objectives of the presentation were.	Audience had an idea of the focus and objectives of the presentation, but some of the background was either missing or irrelevant.	Captured audience attention; presented adequate background; objectives were clear by the end of the introduction.	Captured audience attention; presented relevant background, quickly established a focus, and clearly stated objectives of the presentation.
Explanation of experimental approach and methodology	Presented procedures used without demonstrating why those methods were chosen or an understanding of the principles.	Presented overview of experimental approach, and described methods to be used.	Presented details of the chosen experimental approach; accurate description of main principles and key steps of methods.	Gave clear rationale and details for the chosen experimental approach; accurate description of main principles and key steps of methods.
Explanation of results	Data was not presented clearly, and/or incorrect explanations of the results were given.	Presented the data obtained from each of the methods; made a good attempt to explain the results.	Presented the data obtained from each of the methods clearly; explained the meaning of each of these results.	Presented the data obtained from each of the methods clearly; provided meaningful interpretation and inter-connections of results
Clarity & accuracy of discussion; Critical judgment exercised	Did not show any understanding of the significance and limitations of the research findings	Gave a good effort to explain the significance and limitations of the research findings	Demonstrated good understanding of the significance and limitations of the research findings	Articulated critical judgment and good understanding of the significance and limitations of the research findings
Appropriateness of conclusion and take-home message	Ended the presentation abruptly; or a conclusion was presented that did not reflect the main points of the presentation.	Summarized main points of the presentation; audience left with a take-home message.	Summarized main points of the presentation; audience left with a clear take-home message; presentation concluded logically.	Summarized main points in an integrated fashion; audience left with a clear take-home message; presentation concluded logically.
Response to questions	Lacked accurate or relevant answers to most of the questions asked.	Made strong effort to answer questions, and handled most questions knowledgeably, but with some hesitation.	Handled most questions knowledgeably and with confidence.	Handled questions knowledgeably and with confidence; demonstrated greater depth of knowledge than what was presented.

Organization and Delivery

Flow of information	Presentation of information is dis-connected; audience found it difficult to understand the main points and to follow the presentation.	Logical organization of information; some gaps or pauses in the transitions between sub-topics of group members.	Smooth and logical organization of information; transitions between sub-topics and group members were mostly effective.	Smooth and logical organization of information; effective bridging between sub-topics and among group members; easy to follow.
Effectiveness of delivery	Reading extensively from notes or the monitor; no eye contact with audience; low volume &/or speaking in a monotone	Spoke in a clear voice at an acceptable pace; occasionally relying on notes or the monitor; made some eye contact with the audience.	Spoke clearly, with good volume and intonation and at a good pace; established good eye contact with the audience	Spoke clearly and confidently, with good volume and intonation and at a good pace; excellent eye contact with the audience
Enthusiasm, professionalism	Apathetic presentation of information; distracting gestures, inappropriate demeanor and/or frequent use of slang or colloquialism	Demonstrated interest for the topic. Occasional distracting gestures or inappropriate choice of words.	Demonstrated enthusiasm for the topic; conveyed professionalism in language and demeanor.	Demonstrated a passion for the topic and instilled interest in the audience; conveyed professionalism in language and demeanor.
Use of visual aids	Most visual aids were too "busy", &/or had text with too small font size or verbatim to speaker's presentation.	Visual aids were used to convey information to the audience. Some slides may have been difficult to understand or see clearly.	Visual aids were attractive and effectively used to clearly convey information to the audience.	A variety of visual aids was used to capture the attention of the audience and enhance understanding of the presented information.
Adherence to time limit	Presentation was longer than 18 minutes or shorter than 12 minutes.	Kept to within three minutes of the prescribed 15 minute time limit	Kept to within two minutes of the prescribed 15 minute time limit.	Kept to within a minute of the prescribed 15 minute time limit!

University of British Columbia
Faculty of Land and Food Systems

APBI 499 (6) Undergraduate Thesis Registration Form

_____ Date Registered
Initials: _____ APBI Coordinator

Student Name:		**UBC Student #:**	

Select the appropriate term(s)		***Submission deadline***
	Sept - Dec (Winter Session, Term 1)	preceeding May 10
	Jan - Apr (Winter Session, Term 2)	Sep 10
	Sept – Apr (Winter Session, Terms 1 & 2)	May 10
	Jan – Aug (Winter Session Term 2, Summer Session Terms 1 & 2)	Sep 10
	May – Dec (Summer Session Terms 1 & 2, Winter Term 1)	Jan 10
	May – Aug (Summer Session Terms 1 & 2)	Jan 10

Start Date*(yy/mm/dd)*		**Expected End Date*(yy/mm/dd)***	

Thesis Title:	
Thesis Academic Supervisor:	

Thesis Proposal Summary
(Include information on learning objectives, work involved, timeline, and assessment criteria. Attach extra sheet if necessary)

Learning objectives:

Thesis goals:

Work involved & location:

Timeline:

Assessment criteria: Mark for this thesis will be based on (% breakdown)

_____ **Student name**	_____ **Student signature**	_____ **Date**
_____ **Academic supervisor signature**	_____ **Academic supervisor signature**	_____ **Date**
_____ **Site supervisor name (if applicable)**	_____ **Site supervisor signature**	_____ **Date**

Rev. 25/03/2015