PROCEDURES FOR THE BIOLOGY COMPREHENSIVE EXAMINATION

G.7.2. Comprehensive examination

Purpose

a) “In [the comprehensive) examination, the candidate must demonstrate a mastery of those sub-disciplines appropriate to his/her research area ... and must further be able to relate the specialization of his/her research to the larger context of these sub-disciplines“ (General Regulations of School of Graduate Studies, Section 2.2.8.2 [(2011-12 University Calendar)]. In this Department, the purpose of the Comprehensive Examination is to evaluate a student’s breadth and depth of knowledge in subject areas defined by his/her research area (“discipline” or “area of concentration”) and selected sub-disciplines, within the broader context of biology.

b) The Examination will be in the area of concentration and sub-discipline(s) named on the Programme of Study Form and Recommendation for Comprehensive Examination form, following term lists in Appendixes II and III, respectively. Therefore, apart from writing an essay on an assigned topic, PhD students should prepare for the comprehensive examination by studying general concepts and techniques in their area of concentration and sub-discipline(s), so they are prepared to critically discuss these areas in the examination.

Timing of the Comprehensive Examination

c) In keeping with University regulations, the Biology Department requires full-time PhD students to complete the comprehensive examination within 7 semesters of first registration (9 semesters for part-time students). Requests for extensions will be assessed by the BGSC on a case-by-case basis.

Committee Structure

d) University regulations state that there shall be an odd number of voting members on the Comprehensive Examination Committee. The Committee shall consist of the Dean of Graduate Studies (or delegate; non-voting), Department Head (or delegate; voting), the Supervisor (voting), and three other voting members, one of whom may be a co-supervisor or another member of the Supervisory Committee. The Biology Graduate Studies Committee may make exceptions to Committee composition if local expertise in the candidate’s area of concentration and sub-disciplines is not available. Voting Committee members may be Biology faculty, faculty in other academic departments at MUN, or qualified persons outside the University.

Procedures and Timelines

e) The procedure shall be initiated by the Supervisory Committee, who will notify the BGSC of the candidate’s readiness by submitting the “Recommendation for PhD Comprehensive Examination Committee” form (Appendix I, Form D). On this form, the Supervisory Committee shall recommend three suitable examiners. The candidate shall not be involved in choice of or be informed about recommended examiners.
f) The BGSC shall select two of the recommended examiners and submit their names to the Dean of Graduate Studies for appointment to the Comprehensive Examination Committee within one week of receipt of the form (barring any changes requested by the BGSC). The candidate shall not be informed of the selected examiners.

g) Within two weeks of being appointed by the Dean of Graduate Studies, the Examination Committee shall meet and select a comprehensive examination topic within the student's area of concentration and sub-discipline(s). The topic shall be broad in scope and shall differ from the thesis topic.

h) The Examination Committee shall submit the topic to the BGSC (Appendix I, Form E).

i) The Graduate Officer shall notify the student of essay topic and dates for essay submission and examination.

j) After receiving the assigned topic, the candidate shall write an essay in the following format: Title Page; Abstract (< 200 words); Body (< 10,000 words [~20 pages]; Calibri font size 12; 1-inch margins; double-spaced); Literature Cited (no limit); Graphics (no limit); and Tables (no limit). The oral presentation will be based upon this essay. The candidate shall submit five copies (or a PDF if the Examination Committee agrees) of the essay to the Graduate Secretary on the assigned date, who will distribute them to the Examination Committee.

k) Based upon preliminary examination of the essay over one week, the Examination Committee shall recommend to the Graduate Officer whether the Comprehensive Examination should or should not proceed (Appendix I, Form F); this recommendation will be based on a majority vote (i.e. 2/3) by voting members of the Examination Committee. An examination that does not proceed will be considered as a failure (see “Outcome of the Examination” below).

l) Summary of timelines:

- Supervisory Committee recommends examiners to BGSC
- +1 week, BGSC approves examiners and makes recommendation to Dean of Graduate Studies
- Dean of Graduate Studies appoints examiners
- +2 weeks, Examination Committee recommends essay topic and examination date to BGSC
- +1 week, BGSC approves essay topic; Graduate Officer notifies candidate
- +5 weeks, Candidate submits essay to Graduate Secretary
- +1 week, Examination Committee recommends/does not recommend that the Examination proceeds
- +1 week, Comprehensive Examination takes place

Structure of the Examination

m) Two parts of the Comprehensive Examination will be open to the public: oral presentation and the question-and-answer period. The written essay will be available only to the Examination Committee.
n) The candidate will make an oral presentation on the assigned topic. The presentation should be ~30 minutes long, with a brief introduction followed by a more in-depth review of a narrower aspect of the topic. The candidate should conclude with a synthesis of the subject and outline knowledge gaps and research priorities.

o) After the oral presentation, the candidate will be questioned by each voting examiner (and Head or delegate, if they wish) on the seminar topic and more broadly within the candidate’s area of concentration and sub-discipline(s). These questions will take place in two rounds (~10-15 minutes per examiner per round).

p) After the question-and-answer portion of the examination, the Examination Committee will meet *in camera* to discuss their evaluations and arrive at a consensus.

**Evaluation**

q) The Examination Committee will evaluate the candidate based on the 3 components of the examination: essay (40% of mark); oral presentation (20%); and question-and-answer period following the oral presentation (40%). The candidate must obtain a grade of 65% overall and with no mark < 50% on any part of the examination. For Distinction, the candidate must achieve a score of at least 90% in all parts of the examination and the decision to award Distinction must be unanimous. Each voting member of the Examination Committee will complete a rubric (Appendix IV) but may modify his/her scores in discussion with the other voting members. The Chair will compile the final scores.

**Outcome of the Examination**

r) Possible outcomes of the examination are pass or fail:

(i) A pass requires a majority vote (i.e. 2/3) by voting members of the Examination Committee. The Biology Department no longer recognizes the class of Pass with Distinction.

(ii) If the candidate is deemed to have failed, and it is the first examination, the Committee may decide:

-- The student may be re-examined in all or some examination components (e.g. the candidate may be asked to conduct a literature review or write an essay on a new topic). Re-examination must take place 1-6 months following the first examination. The nature of the re-examination will be communicated to the candidate in writing by the Graduate Officer within 14 days of this decision. If the candidate fails the re-examination, his/her program will be terminated.

-- The candidate’s performance does not merit re-examination, by unanimous vote. In this case the candidate’s program will be terminated.

s) The Chair of the Examination Committee will communicate the results and recommended outcome in writing to the Dean of Graduate Studies and Biology Graduate Officer.
BIOLOGY DEPARTMENT
COMPREHENSIVE EXAMINATION

Appendix I
Form D

RECOMMENDATIONS FOR EXAMINERS
BIOLOGY DEPARTMENT

NOTES ON RECOMMENDATIONS FOR EXAMINERS

• Potential examiners for the Ph.D. Comprehensive examination and for M.Sc. and Ph.D. theses shall be discussed and agreed to by the Supervisory Committee.
• The Supervisor shall then contact the potential examiners to determine if they are willing to have their names put forward.
• When the list is finalized, it shall be signed off by the Supervisory Committee and submitted to the Graduate Secretary.
• The Biology Graduate Studies Committee shall select the examiners from the list provided and submit their names to the Dean of Graduate Studies.
• After approval by the Dean, the Graduate Secretary shall contact and send the comprehensive examination or thesis to the approved examiners.
• The candidate shall not be involved in choice of or be informed about recommended examiners.

Biology Graduate Studies Committee

December 2011
The Comprehensive Examination Committee shall consist of the Dean of Graduate Studies (or delegate; non-voting), Department Head (or delegate, as Chairperson; voting), the Supervisor (voting), and three other voting members, one of whom may be a co-supervisor or another member of the Supervisory Committee. The Biology Graduate Studies Committee may make exceptions to Committee composition if local expertise in the candidate's area of concentration and sub-disciplines is not available. Voting Committee members may be Biology faculty, faculty in other academic departments at MUN, or qualified persons from outside the University.

The Supervisory Committee shall recommend three people as voting members.

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>Student Number:</th>
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<tbody>
<tr>
<td>Supervisor/Co-supervisors:</td>
<td></td>
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<tr>
<td>Supervisory Committee: (1)</td>
<td></td>
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<td>(2)</td>
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<td>(3)</td>
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</table>

**Thesis title/topic:**

**Area of concentration:**

**Sub-discipline:**

**Recommendations for Comprehensive Examination Committee Voting Members**

(1) **Name:**

**Address:**

**Phone:** | **Fax:** | **Email:**

**Reasons for recommendation:**

(2) **Name:**

**Address:**

**Phone:** | **Fax:** | **Email:**

**Reasons for recommendation:**
<table>
<thead>
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<th>Signature</th>
<th>Date</th>
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<tbody>
<tr>
<td>Supervisor/co-supervisor:</td>
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<tr>
<td>Co-supervisor:</td>
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<tr>
<td>Committee Member:</td>
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<td>Committee Member:</td>
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<tr>
<td>Committee Member:</td>
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Biology Graduate Studies Committee
August 2012
BIOLOGY DEPARTMENT
COMPREHENSIVE EXAMINATION

Appendix I
Form E
RECOMMENDATION FOR EXAMINATION TOPIC
# BIOLOGY GRADUATE PROGRAMME

Recommendations for Ph.D. Comprehensive Examination Topic

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>Student Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor/Co-supervisors:</td>
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</table>

**Examination Committee**

<table>
<thead>
<tr>
<th>(1) Name:</th>
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<tbody>
<tr>
<td>(2) Name:</td>
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<tr>
<td>(3) Name:</td>
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</table>

**Proposed Examination Topic:**

**Thesis Title/Topic:**

**Sub-discipline:**

**Requested Date and Time of Examination:**

## Signatures of Examination Committee

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor/co-supervisor:</td>
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<tr>
<td>Co-supervisor:</td>
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<tr>
<td>Committee Member:</td>
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<tr>
<td>Committee Member:</td>
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Biology Graduate Studies Committee
August 2012
BIOLOGY DEPARTMENT

COMPREHENSIVE EXAMINATION RUBRIC

FOR GRADING THE EXAMINATION
<table>
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<tr>
<th>ESSAY</th>
<th>40</th>
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</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>Clear statement of topic; background information explains topic's scope &amp; importance; key concepts &amp; theories well explained.</td>
</tr>
<tr>
<td><strong>Body</strong></td>
<td>Research results &amp; trends accurately reported; research results &amp; trends well interpreted; open questions, &amp; future directions identified.</td>
</tr>
<tr>
<td><strong>Presentation</strong></td>
<td>Figures, tables, &amp; statistics necessary &amp; complement text; figures, tables, &amp; statistical summaries well designed</td>
</tr>
<tr>
<td><strong>Literature</strong></td>
<td>Citations necessary; key publications cited; citations current; citations &amp; Literature Cited match &amp; formatted uniformly.</td>
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</table>

<table>
<thead>
<tr>
<th>ORAL PRESENTATION</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td>Clear introduction, explanation of approach, and conceptual &amp; empirical context; accurate content; mastery of material; comfortable with material; applications of theory explained; appropriate level of detail.</td>
</tr>
<tr>
<td><strong>Organization, Delivery &amp; Style</strong></td>
<td>Presentation clear, logical, organized; listeners can hear; well paced; speaks without reading; suitable level for general biological audience; grammar correct; sentences complete &amp; flow well; words precise; body language &amp; speech effective &amp; comfortable.</td>
</tr>
<tr>
<td><strong>Use of Aids</strong></td>
<td>Aids appropriate, necessary, effective &amp; well designed.</td>
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<table>
<thead>
<tr>
<th>QUESTIONS &amp; ANSWERS</th>
<th>40</th>
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</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td>Understands theories/concepts important to topic; understands questions &amp; their contexts; acknowledges limits of knowledge</td>
</tr>
<tr>
<td><strong>Organization, Delivery &amp; Style</strong></td>
<td>Answers questions clearly, fully, &amp; concisely; asks questions &amp; engages in discussion; body language &amp; speech effective &amp; comfortable; makes eye contact.</td>
</tr>
</tbody>
</table>
BIOLOGY DEPARTMENT

COMPREHENSIVE EXAMINATION

LISTS OF RESEARCH AREAS AND SUB-DISCIPLINES
BIOLOGY RESEARCH AREAS (“DISCIPLINES”) (from NSERC)

Select 1-2 of the following 29 disciplines and enter as “Area of Concentration” on the Programme of Study form

GENES, CELLS AND MOLECULES
1. Immunology
2. Microbiology
3. Organelle Function and Intracellular Trafficking
4. Cellular and Molecular Neuroscience
5. Molecular Genetics
6. Evolutionary and Developmental Genetics
7. Cell Signals and Electrical Properties
8. Quantitative Approaches
9. Biochemistry
10. Cell Cycle

BIOLOGICAL SYSTEMS AND FUNCTIONS
11. Plant Biology
12. Food Science
13. Physiology and biomechanics
14. Animal Physiology
15. Animal Production
16. Behavioural Neuroscience
17. Cognitive Science
18. Sensory and Motor Systems
19. Nutritional Sciences

EVOLUTION AND ECOLOGY
20. Populations and Communities
21. Ecological and Evolutionary Applications
22. Evolutionary Patterns
23. Evolutionary Processes
24. Ecosystem Patterns and Processes
25. Spatial Patterns in Ecology and Evolution
26. Ecology and Evolution of Behaviour
27. Ecological Function
28. Mathematical and Statistical Models in Evolution and Ecology
29. Systematics and Taxonomy
BIOLOGY RESEARCH SUBDISCIPLINES (from NSERC)

Select 1-3 of the following 80 sub-disciplines and enter these on the
“Recommendation for PhD Comprehensive Examination Committee” form

ANIMAL BIOLOGY
1. Neurophysiology
2. Kinesiology
3. Endocrinology
4. Animal physiology and metabolism
5. Animal reproduction
6. Animal circulation
7. Animal respiration
8. Parasitology
9. Animal morphology
10. Animal production and breeding
11. Animal nutrition and husbandry
12. Veterinary sciences

ENVIRONMENT
13. Climate and atmosphere
14. Oceans, seas and estuaries
15. Inland waters
16. Land, solid earth, seabeds and ocean floors
17. Modelling/mathematical simulation of natural processes
18. Pollutants and toxic agents (Waste, use 902)
19. Conservation and preservation
20. Wildlife management

EVOLUTION AND ECOLOGY
21. Animal ecology
22. Aquatic ecology and limnology
23. Animal behaviour
24. Biogeography and landscape ecology
25. Ecotoxicology
26. Evolutionary theory
27. Plant ecology
28. Sociobiology and behavioural ecology
29. Taxonomy, systematics and phylogenetics
30. Terrestrial ecology
31. Wildlife management
32. Plant-animal interaction

33. Chemical ecology
34. Microbial ecology

CELL BIOLOGY
35. Absorption and transport
36. Inter-cellular communication
37. Cell membranes
38. Cell division
39. Cell differentiation
40. Extra-cellular matrix
41. Cell secretion
42. Cell movement
43. Intra-cellular targeting
44. Cytoskeleton
45. Signal transduction
46. Electrophysiology
47. Chromosomes

GENETICS
48. Transmissional genetics
49. Molecular genetics
50. Developmental genetics
51. Genome analysis
52. Evolutionary genetics
53. Cytogenetics
54. Biochemical genetics
55. Population genetics
56. Genetic engineering

MICROBIOLOGY
57. Bacteriology
58. Virology
59. Protozoology
60. Immunology
61. Mycology
62. Bioremediation

MOLECULAR BIOLOGY
63. Gene structure
64. Gene expression
65. Gene regulation
66. Molecular evolution
67. Protein manipulation and expression

SOIL SCIENCE
68. Soil physics
69. Biology and microbiology
70. Chemistry and mineralogy
71. Fertility of soils

PLANT AND TREE BIOLOGY
72. Nutrition and metabolism, photosynthesis
73. Stress physiology
74. Plant growth and development
75. Plant reproduction
76. Silviculture
77. Plant pathology
78. Water and minerals in plants
79. Crop and pasture production, breeding
80. Plant morphology