COMPREHENSIVE COURSE REQUIREMENT FORM

Student Information

Name:	Email:
Advisor/Supervisor:	**Degree:**

Five Breadth Courses (Courses taken outside the department must be approved by a faculty in a related area of research.)

COURSE # and/or Name	Level (Grad course / 3rd yr undergrad / 4th yr undergrad)	GRADE	DATE (eg.SEP98)	NAME OF UNIVERSITY	Faculty Approval (for Non UBC CS course)
One course from Theory *(see attached)*					
One course from Computer Systems and Design *(see attached)*					

One course in at least three of the areas: *(see attached)*

AREA	COURSE # and/or Name	Level (Grad course / 3rd yr undergrad / 4th yr undergrad)	GRADE	DATE (eg.SEP98)	NAME OF UNIVERSITY	Faculty Approval (for Non UBC CS course)

When proposing breadth courses taken outside UBC, students must provide a detailed course description (calendar description, course outline, course objectives, topics covered, textbooks used, description of projects and prerequisites).

Additional Courses

(Courses must satisfy the "depth requirement" for PhD students or the "supplemental course requirement" for Breadth Master's. These courses must be chosen in consultation with your advisor or supervisor and can include breadth courses in any area. For courses taken outside UBC, your supervisor or advisor's approval is needed.)

COURSE # &/or Name	Level (Grad course or 3rd yr undergrad or 4th yr undergrad)	GRADE	DATE (eg.SEP98)	NAME OF UNIVERSITY
Breadth MSc only:				

Advisor's/Supervisor's Approval

_____   _____
Signature (Advisor(s) / Supervisor(s))   **Date:**

Approval of Graduate Affairs Committee:

COMPREHENSIVE COURSE REQUIREMENT

All M.Sc. students who have selected the Breadth (essay) option, Ph.D. Track andl Ph.D. students must fulfill the comprehensive course requirement. The objective of the comprehensive course requirement is to ensure that the student obtains a breadth of knowledge of computer science and sufficient depth in the field.

Proposals must adhere to the following guidelines:

To fulfill the comprehensive course requirement, the student must have completed:
- **Breadth Requirement**: 5 graded courses equivalent to 15 credits; and
- **Additional Courses**:
  - ▶ Depth Requirement (PhD students should complete 3 graded courses equivalent to 9 credits) These 3 courses should be chosen by the student in consultation with the student's supervisor(s) to ensure that the student has the appropriate depth in their area to conduct their research.
  - ▶ Supplemental Course Requirement (MSc students taking the Breadth Master's (essay) option should complete 4 graded courses equivalent to 12 credits). Student must obtain approval for the program from their supervisor or advisor if he or she wishes to take courses outside the department.

Students must submit a proposal for how they intend to fulfill their comprehensive course requirement. It must be approved in two ways:

(1) The advisor/supervisor(s) must approve the proposal for submission to the Graduate Affairs Committee.
(2) The Graduate Affairs Committee must approve that the proposal satisfies the breadth requirement.

Breadth Requirement

One course from Theory (Faculty contact: Dr. Will Evans)

420: Advanced Algorithm Design & Analysis
421: Introduction to Theory of Computing
500: Fundamentals of Algorithm Design and Analysis
501: Theory of Automata, Formal Languages and Computability
506: Complexity of Computation

One course from Computer Systems and Design (Faculty contact: Dr. Mike Feeley)

415: Advanced Operating Systems
416: Distributed Systems
417: Computer Networking
418: Advanced Computer Architectures
508: Operating Systems
521: Parallel Algorithms and Architectures
527: Computer Communication Protocols
538: Topics in Computer Systems: Computer Architecture offered by Mark Greenstreet that has "breadth" in the course title may be counted towards breadth for Computer Systems and Design. Students should refer to the course schedule in order to determine whether 538 offered in a particular year can be counted as breadth.

One course in at least three of the following areas:

- **Computational Intelligence (Faculty contact: Dr. Giuseppe Carenini)**
  422: Intelligent Systems
  502: Artificial Intelligence I
  503: Computational Linguistics I
  515: Computational Robotics
  522: Artificial Intelligence II

- **Data Management and Analysis (Faculty contact: Dr. Rachel Pottinger)**
  340: Machine Learning and Data Mining
  504: Data Management
  540: Machine Learning
  564: Data Mining

- **Graphics and Vision (Faculty contact for Graphics: Dr. Michiel van Panne; Faculty of Vision: Dr. Jim Little)**
  314: Computer Graphics (previously numbered as 414)
  424: Geometric Modeling
  425: Computer Vision
  426: Computer Animation
  505: Image Understanding I: Image Analysis
  514: Computer Graphics: Rendering
  524: Computer Graphics: Modeling
  526: Computer Animation

- **HCI (Faculty contact: Dr. Karon Maclean)**
  344: Introduction to Human Computer Interaction Methods
  543: Physical User Interface Design and Evaluation
  544: Human-Computer Interaction
  554M: Topics in HCI (as indicated on the graduate course schedule)
  444: Advanced Methods for Human Computer Interaction (may be counted on an individual case-by-case basis.
       Students should obtain permission from the Faculty Contact Person in HCI.

- **Scientific Computing (Faculty contact: Dr. Ian Mitchell)**
  402: Numerical Linear Algebra
  403: Numerical Solution of Ordinary Differential Equations
  406: Computational Optimization
  517: Sparse Matrix Computation
  520: Numerical Solution of Differential Equations
  546: Numerical Optimization (was numbered CPSC 542B before Sep07 - Nonlinear Optimization offered by Michael
  Friedlander)

- **Software Engineering and Programming Languages (Faculty contact: Dr. Ron Garcia)**
  507: Software Engineering
  509: Programming Language Principles
  511: Implementation of Programming Languages

- **Interdisciplinary**
  405: Modelling and Simulation (Faculty contact: Dr. Dinesh Pai)
  513: Integrated Systems Design (Faculty contact: Dr. Alan Hu)
  532: Topics in AI: Multi-Agent Systems (Faculty contact: Dr. Kevin Leyton-Brown)
  547: Information Visualization (Faculty contact: Dr. Tamara Munzner)
  445: Algorithms in Bioinformatics (Faculty contact for Bioinformatics: Dr. Anne Condon)
  545: Algorithms for Bioinformatics (Faculty contact for Bioinformatics: Dr. Anne Condon)
  Graduate courses from other departments that have relevance to computer science. You need the approval of a
  faculty member in related area in Computer Science.

NOTE: While courses may be added to allow more ways to fulfill the requirements, no course will be listed in more than one area.

GPA requirement: In order to satisfy the comprehensive course requirement, a Ph.D. student must obtain a minimum grade of 72% in any course contributing to the requirement, and an overall average of at least 80% in these courses. A M.Sc. student must obtain a minimum of 60% in any course taken. However, only 6 credits of pass standing may be counted towards a master's program. For all other courses, a minimum of 68% must be obtained.

Failed Course: If a student failed a proposed course, the student must discuss with the supervisor whether to retake the failed course or take an alternative course. If a course is repeated, both marks will appear on the transcript. When repeating a failed **required** course, a minimum mark of 74% must be obtained.

Changing a course: Student can change the course selection provided that the change has been approved by the supervisor(s). Once the supervisor(s) has approved the change, please send email to the Graduate Program Coordinator (Joyce Poon) and cc your supervisor(s).

Undergraduate Courses: At most 2 out of the required courses can be fulfilled with undergraduate level course credits; thus all remaining required courses (6 for PhD & PhD Track, 7 for MSc Breadth) must be fulfilled with graduate course credits. Undergraduate courses from UBC that **cannot** be counted as breadth courses are: CPSC 404, 410, 411. Please refer to the above for the UBC undergraduate course that can be counted as breadth courses. For courses taken outside UBC, permission from the faculty contact person in each area is required.

Courses taken outside UBC and work experience: Courses taken outside UBC must be equivalent to UBC graduate or advanced undergraduate courses in order to be considered. They must be approved by the Graduate Affairs Committee on the advice of the faculty contact person for the research area. Work experience can be counted as long as a faculty member can vouch that it is equivalent to what would be learned in a graduate course.

When proposing these courses/work experiences, students **must provide a detailed course description** (calendar description, course outline, course objectives, topics covered, textbooks used, description of projects and prerequisites). Students can ask the faculty contact person in that research area to evaluate the course. If the faculty agrees that the course is equivalent to UBC graduate or advanced undergraduate course, ask him/her to send you a brief email confirmation and attach it to your breadth proposal. The onus will be on the student to argue that the requirement is indeed fulfilled.

For M.Sc. student who is taking the essay option (only)
Master's student who is in the Breadth (essay) option must complete 27 credits of courses work outside the essay, of which:
a.   at least 21 credits must be Computer Science courses OR the student must obtain approval for the program from the supervisor or advisor; and
b.   a maximum of 6 credits at the undergraduate level in courses numbered 300 to 499 may be counted toward the requirements of an M.Sc. degree.

Definition of a breadth course

Clearly, most breadth courses will not be able to cover at a graduate level an entire field in one semester. For many fields, that task cannot properly be accomplished even with the cursory coverage of a third year undergraduate course. Instead breadth courses should strive to have some of the following properties:

1)   Broad coverage of some subfield within the discipline, at a level appropriate for beginning graduates.

2)   No graduate level prerequisites, although because they should contain graduate level material, it is fully appropriate for these courses to require undergraduate prerequisites.

3)   Student grades are not exclusively based on research projects; homework and/or exams encourage students to absorb lecture material. However, one of the goals of graduate coursework is to teach research skills, and projects provide a well motivated opportunity to practice these skills.

Many but not all existing graduate courses will be appropriate for breadth under these guidelines. It is expected that faculty will consider these guidelines when intending that their course(s) count for breadth.