S.05-12

SIMON FRASER UNIVERSITY

Senate Committee on University Priorities
Memorandum

TO: Senate

FROM: John Waterhouse
Chair, SCUP
Vice-President, Academic

RE: MA, MSc and PhD Programs
SIAT

DATE: December 16, 2004

Attached is a proposal from the Senate Graduate Studies Committee for new MA, MSc and PhD programs in the School for Interactive Arts and Technology.

The Senate Committee on University Priorities reviewed the proposal at its December 15, 2004 meeting. The proposal was unanimously approved.

MOTION

"That Senate approve and recommend to the Board of Governors the proposal for a MA program in the School for Interactive Arts and Technology."

MOTION

"That Senate approve and recommend to the Board of Governors the proposal for a MSc program in the School for Interactive Arts and Technology."

MOTION

"That Senate approve and recommend to the Board of Governors the proposal for a PhD program in the School for Interactive Arts and Technology"

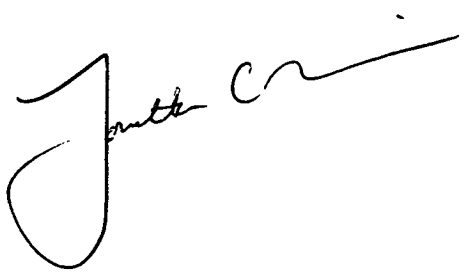
Attach.

c: J. Driver
R. Woodbury
G. Nicholls

SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES
MEMORANDUM

TO:	SCUP
FROM:	Jonathan Driver, Dean of Graduate Studies
SUBJECT:	SIAT Graduate Programs
DATE:	7th December 2004
cc:	R. Woodbury, SIAT

At its 6th December 2004 meeting Senate Graduate Studies Committee unanimously approved the enclosed proposal for MA, MSc and PhD programs in the School for Interactive Arts and Technology. I am therefore forwarding this to SCUP, with the recommendation that it be approved. In addition to the full proposal and course outlines, I also enclose copies of relevant correspondence and external reviews of the program.



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PROPOSAL FOR GRADUATE PROGRAMS IN INTERACTIVE ARTS & TECHNOLOGY

9	April	2003	Approved "in-principle" by Senate Committee on University Priorities
9	December	2003	Approved by Faculty of Applied Sciences
23	January	2004	Received by Dean of Graduate Studies
10	March	2004	Reviewed by Assessment Committee for New Graduate Programs
27	April	2004	Received revised program proposal from School of Interactive Arts & Technology
7	July	2004	Sent proposal to four external reviewers by Dean of Graduate Studies
3	August	2004	Received external reviewers' reports by Dean of Graduate Studies
10	September	2004	Sent external reviewers' reports to School of Interactive Arts & Technology by Dean of Graduate Studies
4	October	2004	Received School of Interactive Arts & Technology's response to external reviewers' reports
14	October	2004	Reviewed and approved by Assessment Committee for New Graduate Programs, pending acceptable course proposals
22	November	2004	Received revised program and course proposals, and submitted to Senate Graduate Studies Committee
06	December	2004	Reviewed and approved by SGSC

SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES
MEMORANDUM

TO:	Jon Driver, SGSC	**FROM:**	Trude Heift, ACNGP
SUBJECT:	Graduate Programs (MA, MSc, PhD) in Interactive Arts and Technology	**DATE:**	November 22, 2004

At the ACNGP meeting of 14th October 2004 the committee unanimously recommended that the proposed graduate programs in Interactive Arts & Technology (MA, MSc, PhD) be forwarded to SGSC, with the recommendation that they be approved, pending the following revisions:

1) Explanation of the number of required courses for the Masters degrees
2) Revised course proposals for IAT 800 and IAT 813 and elimination of the elective courses, IAT 841 and IAT 843

These changes have now been made and the concerns raised by ACNGP have been addressed.

Trude Heift

SIMON FRASER UNIVERSITY

GRADUATE PROGRAM
IN
COMPUTING ARTS
AND
DESIGN SCIENCES

2400 CENTRAL CITY
10153 KING GEORGE HIGHWAY
SURREY, BC V3T 2W1
TEL. (604) 268 7501
FAX. (604) 268 7488

22 November 2004

Dr Trude Heift
Associate Dean of Graduate Studies
SFU

Dear Dr Heift

Re: Graduate Program in Interactive Arts and Technology

I am pleased to respond to the issues raised by the ACNGP and communicated in your note of 15 October 2004 regarding our proposed graduate program.

The issues raised by Dr. Murray have been addressed in our response letter to the external reviews. An amended version is attached.

We have amended the course outlines for IAT 800 and IAT 813 in response to concerns expressed at the ACNGP and by Dr Norm Badler. The program proposal itself has been accordingly amended.

The two courses IAT 841 and IAT 843 have been removed from the proposal. We understand that the sole grounds for this deletion is the uncertainty involved in our faculty hiring process – it is unclear that we would have appropriate faculty to teach these particular courses in the future. They do, however, occupy an important structural place in our curriculum as MSc electives. Once the process of faculty hiring has concluded we will prepare new course proposals to replace these two courses in our curriculum. These new proposals will be brought forward separate from the current program approval process, likely in the fall of 2005.

Yours sincerely

Rob Woodbury
Professor
Graduate Program Chair

T: (604) 268 7501 E: rw@sfu.ca

EXTERNAL REVIEW FOR GRADUATE PROGRAMS IN INTERACTIVE ARTS & TECHNOLOGY

Response of the School of Interactive Arts & Technology

SIMON FRASER UNIVERSITY

GRADUATE PROGRAM
IN
COMPUTING ARTS
AND
DESIGN SCIENCES

2400 CENTRAL CITY
10153 KING GEORGE HIGHWAY
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TEL. (604) 268 7501
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14 October 2004

Dr Trude Heift
Associate Dean of Graduate Studies
SFU

Dear Dr Heift

Re: Graduate Program in Interactive Arts and Technology

I am pleased to respond to the issues raised by the external reviewers for our proposed graduate program.

First of all we were delighted to have reviews by four such well-known and respected colleagues. Kellogg Booth (UBC), Norm Badler (UPenn), Janet Murray (Georgia Tech) and Henry Jenkins (MIT) collectively cover our program's scope with authority. We were also delighted with the reviews themselves. We read them all as highly positive, and welcome the specific questions and criticisms they proffer.

I will address the issues reviewer-by-reviewer, in the order in which they are raised.

Badler. Articulation between MA and MSc. Students will be admitted to one program. Those choosing to articulate must fulfil the requirements of the program into which they will move. The MSc requirements include a specific subset of the program requirements, and a record of substantial prior university coursework in scientific and/or technological areas. Students wishing to articulate in either direction (MA to MSc or MSc to MA) will do so with the approval of the program's Graduate Studies Committee. The proposal has been amended (Curriculum.Program Requirements, page 6) to provide a structure for articulation.

Badler. Foundations of Computation in Computing Arts and Design Sciences course. Professor Badler raises substantial concerns about the structure and content of this course. We share many of his concerns. This semester (Fall 2004) Professors Vive Kumar and Rob Woodbury are offering this course for the first time under our current Cohort Special Arrangements Program and have revised the syllabus on several points that align with Professor Badler's concerns. We have updated the course outline and proposal accordingly.

Badler. Lab scheduling. The proposed program has adequate lab facilities for its present needs. Students are not experiencing the problems that Professor Badler anticipates. The upcoming (Sept 2005) move to new lab space will only improve the situation. With good management (and development) we do not expect lab scheduling to be a significant issue.

Badler. Students' ability to cope with accelerated exposure to computational technology. This issue pertains to the MA and PhD programs. It is partly addressed by student self-selection and by our admission of students likely to succeed in our program. In our admissions process we are increasingly seeing applicants with high levels of prior interest, education and skill in computation. If our Fall 2004 admissions cohort is any indication, our tasks will be two. First we must place students' considerable prior (and largely practical) knowledge on the firm footings of basic computational theory and programming practice, embedded within our research areas. Our primary course here is IAT 800 Foundations of Computation in Computing Arts and Design Sciences. Second, we must assist students in using technology appropriately in their thesis work. Other program coursework and the thesis work per se are the devices here. Our faculty and student population has too much diversity to prescribe a single course of study leading to technological competence. Instead we rely on the quality of faculty advice to students

on coursework and thesis study. There is an analogy to research methods work here. We have a single course introducing research methods, but place on students the expectation of further research methods study, both through coursework and thesis work. With respect to technological competence, we have a single foundations course, requirements in all core courses for use of technological systems (including programming in several courses) and a faculty group whose research requires technological sophistication. Our experience to date is that the large majority of graduate students in the program are developing the requisite technological competence as they progress through the program.

Badler. Demand for graduates. Professor Badler is concerned that the program may only weakly enhance graduate employment opportunities. He is right, this is a matter of program perception in the larger community. Such takes time to develop and the program itself has only the indirect device of the quality of student work to influence community opinion. We have put forward what we argue is a program that provides students with access to coursework and faculty of high quality. Our degrees, whether MA, MSc or PhD, aim at both the breadth necessary to be effective in the complex world of people and technology and ample opportunity and requirement for the depth needed to do state-of-the-art work. We note Professor Badler's endorsement of the co-op program and hope to use that in building links within the industrial community.

Badler. Academic hiring prospects. Again, Professor Badler is right. Some faculty are skittish about people from 'impure' backgrounds. Such is life. We note that, through the evidence of its recent hiring processes, SFU's School of Computing Science appears to be immune to this particular disease. We can only hope that other schools are moving in the same direction. We do note that there is considerable worldwide growth in academic programs in the areas that our program will serve.

Booth. Renewal of lab equipment. Professor Booth is completely correct. It will take sustained faculty effort to keep our lab infrastructure at the leading edge. This is a continuing item that is and will be a strategic focus for our faculty. We note that we have had some success in the last year in bringing in additional infrastructure funds.

Booth. Dedicated research space. We have barely sufficient space now. The plans for new facilities at SFU Surrey include adequate space for our research and graduate programs. All faculty have been involved in this planning process. Our administrative structure includes directors for each of our four labs. Every faculty member has developed an association with one or more labs. Lab directors are responsible for accommodation within their laboratories.

Booth. Curricula Vitae. We acknowledge the omission of previous employment in the curricula vitae submitted with this proposal. Our remedy demands some background explanation. SIAT presently has seven tenurable faculty and one Professor Emeritus. This academic year we are conducting a search for nine additional tenurable faculty. This will be followed by another search for a similar number. We have updated the curricula vitae of the present tenurable and emeritus faculty only.

Booth. Academically refereed works. We agree that we need a better collegial understanding of this important category. As SIAT develops so will this important item.

Booth. Balance of funding for student support. SIAT stable of active research is growing. Faculty both want to increase their research effort and are encouraged to do so. At the same time it has a large demand for teaching assistants. The balance will land where it will, but the trend is towards a greater proportion of research assistantships.

Jenkins. Flexibility. We could not agree more with Professor Jenkins when he advocates to "...maintain a high degree of flexibility to adjust to technological, cultural and economic shifts impacting this area and to respond to the needs of specific students who often come with very distinctive career goals." Such flexibility is one of the main design goals for our program. We believe we have achieved flexibility in our curriculum structure, in which we commit to specific coursework (computation and research methods) for common needs, a small set of core courses that form the signature of our program and a larger set of electives. It is our hope that our program will provide a minimal robust structure in which many intellectual directions can be pursued. Our special topics and directed readings courses we envision partly as devices with which to maintain healthy change within our program.

Murray. Revision to curriculum. Professor Murray points to the likelihood of future revision of our program. We completely agree and, again, point to our minimal curriculum structure as a device to enable such revision. We note that the five specific courses proposed as the 'core' courses in our program were

collegially designed explicitly as a reflection of the research agenda of the program. Each has aspects of the "unusual" which Professor Murray ascribes to the proposed AI course. This is intentional – the courses fit what we do. That said, we expect to revise our courses as the program develops. The rapid change in the field and the relative youth of our faculty both argue for the need to sustain change. We note that we have developed for each of the core courses a set of central readings – the anthologies to which Professor Murray refers.

Murray. Credit comparison with MIT and Georgia Tech programs. The Georgia Tech MS in Information Design and Technology requires 10 three-credit courses and a six-credit project or thesis. Five of the courses are electives and may be taken across a range of disciplines. The MIT Media Arts and Sciences program[1] requires eight courses, taken two a semester, plus a concurrent thesis. Both of these programs are consistent with what might be called a *project-based Master's,* in which coursework predominates over a relatively small project. This is one of two generally accepted designs for a research-based Master's degree. Ours is simply based on the other design. Our proposal is for a single foundation course, five courses and a major thesis work. We adopted this design deliberately and for three reasons. First, we believe that students are better served in future career prospects, particularly in academia, by having done a major work at the Master's level. Second, both our students and faculty in our cohort program expressed a desire for a larger capstone work in the program. Third, we perceived that a rough balance between coursework and thesis seems to be a significant SFU norm.

Murray. Examples of subject areas and reading lists for PhD program. While we would be happy to provide information from specific PhD students currently in the program (and from our sole graduate to date), we do not believe that such would add materially to the discussion at this point. The data are few, and represent diverse research directions.

Murray. Appointment of new senior faculty. Professor Murray is concerned with the need to acquire many new senior faculty in a short period of time. Her view is not completely accurate. As of 1 September 2004, SIAT has a complement of seven senior faculty, all appointed through a competitive search, and one Professor Emeritus. Our current hiring round may include a small number of senior appointments, but the bulk will be at the Assistant Professor level.

Murray. Non-traditional academics. Simon Fraser University's policy on tenure and promotion requires units to define local criteria for tenure consistent with the university's general criteria. A SIAT committee is presently charged to complete this task by December 2004. Thus it is inevitable that SIAT will soon have the "...clear procedures for advancement of non-traditional academics" called for by Professor Murray - in addition to the general criteria put forth by the university.

Murray. Need for a repository of digital artefacts. We have a repository of approximately 100 digital games and 350 films in the SFU Surrey Library. The Bennett Library has 3500 films. SFU has access to the film collections at all BC universities. Such collections are an active concern for our program and one for which the SFU Library has been supportive. I understand that the SFU Surrey library intends to double its game and film collection over the next year.

Murray. Problems of the pioneer. We have experienced all of the problems (and more!) to which Professor Murray refers. We are happy that Professor Murray sees ample evidence that we are addressing and solving these issues in our own terms.

Murray. Funding of graduate students. We refer to the note sent to the ACNGP outlining our positive funding situation. Also, Professor Murray's question about Canadian students being less pressed that those in the USA can be answered in the affirmative.

Murray. Faculty availability. The proposed graduate program is that of the School of Interactive Arts and Technology. While we welcome appropriate faculty from other to participate, we do not currently have the problem of program faculty with homes in other units to which Professor Murray refers. Our graduate program does enjoy significant provincial funding and this is reflected in the teaching load assignments to the graduate program and in the supervision loads that our faculty undertake.

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[1] This is likely the program to which Dr. Murray refers. We are not aware of an MIT program in Computational Media, nor could we find one on MIT's website. Courses with similar titles do exist in the MIT Media Lab, the home of the Media Arts and Sciences program.

I hope I have addressed the issues raised by the external reviewers. The reviewers certainly addressed our aspirations in their summaries: "...my overall enthusiasm for the program." – Badler; "My overall assessment of the proposed graduate program is very positive." – Booth; "I look forward to having another sibling program in the area." – Jenkins; "I judge it to be well worthy of approval." – Murray.

Yours sincerely

Rob Woodbury
Professor
Graduate Program Chair

T: (604) 268 7501 E: rw@sfu.ca

COPY

SIMON FRASER UNIVERSITY
DEAN OF GRADUATE STUDIES
MEMORANDUM

TO:	Dr. Rob Woodbury	**FROM:**	Trude Heift, ACNGP
SUBJECT:	Program Proposal in Interactive Arts & Technology	**DATE:**	October 15, 2004

Dear Dr. Woodbury:

Thank you for your presentation at the ACNGP meeting on October 14. The committee recommends the following modifications of the graduate program proposal in Interactive Arts & Technology for it to go forward to SGSC:

1) In your response letter to the issues raised by the external reviewers, please address the following comment by Dr. Murray:

"The number of courses required for the Masters degrees is considerably less than for our MS in Information Design and Technology, and is also less than MIT's Computational Media Degree."

2) To address the concerns expressed by Dr. Badler and committee members of ACNGP, please revise the two course outlines, IAT 800 and IAT 813, accordingly and eliminate the two elective courses, IAT 841 and IAT 843.

Please send us a copy of the revised documents and I will forward the recommendation to SGSC.

Best regards,

Trude Heift

10.

SIMON FRASER UNIVERSITY

DEAN OF GRADUATE STUDIES

MEMORANDUM

TO: ROB WOODBURY
SCHOOL OF INTERACTIVE ARTS & TECHNOLOGY

FROM: TRUDE HEIFT, ASSOCIATE DEAN

SUBJECT: GRADUATE PROGRAMS IN INTERACTIVE ARTS & TECHNOLOGY

DATE: SEPTEMBER 10, 2004

CC: ACNGP MEMBERS

You will find enclosed reports of four external reviewers on the proposal for the **Graduate programs in Interactive Arts & Technology**. Prior to meeting with the Assessment Committee for New Graduate Programs, I would appreciate a written response to issues raised by the external reviewers, if possible by **Monday, October 4, 2004**.

For your information, the reviewers were asked to respond to the following points:

- The academic merit and structural integrity of the proposed program
- The adequacy of the faculty and other resources available to the proposed program for achieving its intended goals
- The demand for the proposed program among prospective students
- The demand for graduates of the proposed program

A meeting will be scheduled for further discussion of the Graduate programs in Interactive Arts & Technology proposal. I will ask you or a representative of your School of Interactive Arts & Technology to attend the meeting in order to answer any questions which the committee may have.

TH:vb

Enc.

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EXTERNAL REVIEW FOR GRADUATE PROGRAMS IN INTERACTIVE ARTS & TECHNOLOGY

Dr. Norman I. Badler
School of Engineering & Applied Science
University of Pennsylvania
220 South 33rd Street, Towne 111
Philadelphia, PA 19104-6391 U. S. A.

Penn Engineering

June 28, 2004

Jonathan Driver
Dean of Graduate Studies
Simon Fraser University
Burnaby, Canada V5A 1S6

Dear Dean Driver:

I am herewith pleased to provide you with my review of the proposed Graduate Program in Interactive Arts and Technology. I have organized my response to mirror the evaluation points in your letter of June 17, 2004.

Academic merit and structural integrity:

The program is generally well thought out and covers appropriate material. Splitting the program into two Masters tracks seems wise, since the scope of the faculty and their collective interests appear to serve both an art/communication emphasis and a science/technology emphasis. Had only one Masters degree been proposed, it would probably have the resulted in a dilution of the depth experience for the students. A minor administrative point that will undoubtedly appear soon after you admit students is that some will want to switch tracks (MSc to MA sounds very likely, from my experience). You might as well plan for that.

The program has an appropriate and significant technology requirement in the proposed course IAT-800-3 – Foundations of Computation in Computing in the Arts and Design Sciences. There are some discrepancies in descriptions of the course, however. It is billed as a course in computing, yet the catalogue listing mentions nothing explicitly about programming. In perusing the actual topic list, however, programming does re-appear. The content seems rather more appropriate than the description, as I presume that the intent of the course is to make it possible for students to program *something*, whether it be in modern computer languages or in the frequent macro or scripting languages offered in many multimedia and graphics software tools and systems. My own preference would be to concentrate on object-oriented programming skills and skip the logic programming, discrete math, AI, machine learning, etc., for introduction in later courses on an as-needed basis. I think students should know about these topics, and good readings are available (as well as the subsequent courses), but the contents of IAT-800-3 sound so broad that the exposure must necessarily be extremely shallow, especially given the expressed backgrounds of the applicants. The reading list for this course approaches on the bizarre; where are the computational methods and programming resources? Also, on page 8 is the assertion that "... computational work requires proofs and formal languages." While true in some sense, it is also a "classical" Computer Science view and one no longer necessary for some aspects of computational science. For the particulars of this proposed program, one could probably argue more strongly for an understanding of numerical methods, physically-based models, or web-based interactive software tools and concepts. At the risk of being divisive, this course looks as if the MA faculty wrote the textual description while the MSc faculty developed the

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content. I would suggest a substantial "hands-on" technology course if you want to have both MA and MSc students in it, otherwise the MSc students may be poorly prepared while the MA students may be computationally disadvantaged in their subsequent courses.

Adequacy of the faculty and resources available:

In general, the faculty seems highly qualified and motivated to teach the courses in this program. I have the highest regard for Tom Calvert, having known him for probably about 25 years as we share some common research interests. I believe Tom has sufficient experience and vision to make this program a success. He will have an interesting time hiring new tenure track faculty – certainly there are good people available as many of the larger universities have slowed down hiring rates in computer science, anyway -- but a significant teaching load will have to be balanced against research publication expectations at tenure time.

It is more difficult to judge resources from the material provided. While suitable labs exist, the actual load on them when the program is fully operational can be significant. The weak links (in terms of availability) are often the specialized labs; one has to be careful to schedule them so the students get a fair chance to utilize and debug programs in them, and it seems that some of them may have research use obligations that must be factored in as well.

Demand for the program among prospective students:

I agree with the proposal's assessment that student demand is likely to be significant and sufficient to populate the program. The major question that programs like this face is whether the students can cope with the accelerated exposure to the computational technology (i.e., by actually programming stuff). One must also be cognizant of the likely employment opportunities for these graduates (see below). I obviously believe there is demand since we are starting just this Fall term a one year Masters degree in *Computer Graphics and Game Technology* here at the University of Pennsylvania, but it is heavily weighted toward technological courses and hand-on experiences so applicants are expected to essentially have an undergraduate computer science (major or minor) education, otherwise they are admitted instead to a one year concentrated *Masters in Computer and Information Technology* program first. Suitable applicants have even found us without having advertising or a web presence until this month!

Demand for graduates of the program:

If the program is perceived as an Arts or Communication MA degree, its benefit to the student may be to focus a liberal arts undergraduate degree, but it might not greatly enhance employment options in the major entertainment or communications industries. I am unable to judge the value of that degree relative to the North American economy. On the other hand, if it is a weak MSc degree, it could improve the student's employment options but again, not necessarily in the most technologically demanding fields such as movie special effects or computer game programming. On that basis I would urge as much technical depth in the MSc as time and student skill allows. The optional co-op component may be an attractive mechanism for focusing students on employable trajectories, but it does then tend to limit students to more or less local options.

A PhD is a PhD, but one should be clear that turf lines that are easily crossed at SFU might present issues for a PhD applying to teach in a "classical" department. We encountered just such resistance here in trying to hire an excellent computer graphics faculty candidate last

year with a MIT (Media Lab) PhD in Media Arts and Technology: unfortunately he didn't have a "pure" Computer Science (or Computer Engineering) PhD and some of our faculty were skittish about that. One should carefully consider whether a PhD in "Interactive Arts and Technologies" would be treated with similar prejudice – or whether the post-secondary employment options and patterns in Canada (and the US) would provide rewarding academic positions for these people. (Industry won't care so much about the title.) Justine Cassell just moved to Northwestern University from the MIT Media Lab, and is setting up a roughly similar PhD program to yours, but as it will have a similar "non-standard" name she is having some trouble attracting highly technically-oriented students. That may not be bad; it's just a factor to consider. In this regard the University of Toronto's *Knowledge Media Design* program may have the slight advantage of retaining the admitting department's PhD name. Mind you, I have no objection to the SIAT degree name and I don't feel that insularity is best for the future development of forward-looking (computer science) departments, but one needs to be sure potential hiring departments understand what they are and what they aren't getting from your graduates.

In conclusion, I have tried to be quite forthright, but that should not obscure my overall enthusiasm for the program. It is timely, the faculty is strong, they appear to be solidly behind it, the students will love it, and if all goes well, there will be a strong economy and real industries to employ them all. Good luck!

Sincerely,

Norman I. Badler
Associate Dean, SEAS
Professor, Computer and Information Science
Director, Center for Human Modeling and Simulation
Director, Digital Media Design Program

EXTERNAL REVIEW FOR GRADUATE PROGRAMS IN INTERACTIVE ARTS & TECHNOLOGY

Dr. Kellogg Booth
Department of Computer Science
University of British Columbia
2366 Main Mall
Vancouver, BC V6T 1Z4

THE UNIVERSITY OF BRITISH COLUMBIA

Department of Computer Science
2366 Main Mall
Vancouver, B.C. Canada V6T 1Z4
Tel: (604) 822-3061
Fax: (604) 822-5485

August 30, 2004

Dr. Jonathan C. Driver
Dean of Graduate Studies
Simon Fraser University
Burnaby BC V5A 1S5

Dear Dean Driver,

Attached is my review of the proposed **Graduate program in Interactive Arts & Technology** that you requested.

Please contact me if any additional information is required.

Sincerely,

Kellogg S. Booth
Professor of Computer Science

Biographical information

Dr. Kellogg S. Booth is Professor of Computer Science and was the founding Director of the Media and Graphics Interdisciplinary Centre at the University of British Columbia. He has worked in the fields of computer graphics and human-computer interaction since 1968. Prior to UBC, he was a faculty member in the Department of Computer Science at the University of Waterloo (1977-1990), and a staff member at Lawrence Livermore National Laboratory (1968-1976). He received his B.S. in mathematics in 1968 from Caltech, and his M.A. in 1970 and doctorate in 1975 from U.C. Berkeley, both in computer science under the supervision of Dr. Richard Karp. Research interests include computer graphics, human-computer interaction, visualization, user interface design and analysis of algorithms. He has been involved in a number of interdisciplinary research projects at UBC, Simon Fraser University, and the New Media Innovation Centre of British Columbia, where he was an adjunct scientist while on sabbatical leave from UBC during the 2001-2002 academic year. He is a former chair of ACM SIGGRAPH (1985-89), and served as conference co-chair for SIGGRAPH '83 and past chair of the organization from 1989 to 1993. He has served on numerous conference program and selection committees including ACM CHI 2002 and 2004, ACM I3D 2001, ACM UIST 2000, 2002 and 2003, ACM SIGGRAPH '98 and '99, and various of the Canadian Graphics Interface conferences including Graphics Interface '98 for which he co-chaired the program committee. He is a fellow of the B.C. Advanced Systems Institute.

Review of proposed graduate programs in Interactive Arts & Technology

Submitted to the Dean of Graduate Studies, Simon Fraser University

This review is based on the binder of documents that was sent on July 7, 2004, with the letter requesting a review of the proposed graduate programs. The documents were the following:

- three cover letters dated 26 April 2004, one summarizing the documents and providing a few short notes, one describing the transition process, and one addressing issues related to graduate student support;
- the document "Proposal for a Graduate Program within the School of Interactive Arts and Technology (SIAT)";
- a collection of graduate course outlines;

and

- curricula vitae of the current faculty members.

The copy of the proposal that I received was missing page 29 (of 62). A replacement copy was sent to me by FAX.

I have provided comments in the following sections on the four general issues raised in the letter of July 7, 2004, and on the specific issue of support for graduate students.

My overall assessment of the proposed graduate program is very positive. The proposal consolidates a number of innovative ideas developed at the former Technical University of British Columbia into a framework that complements existing strengths of programs at Simon Fraser's other campuses. It is evident that a lot of thought has gone into the proposal and that a good balance between traditional and alternate approaches to graduate education in art and technology has been achieved. It is also clear that implementation of these programs is already underway.

Academic merit and structural integrity of the proposed program

The stated goals of the program, taken from the first page of the proposal, are two-fold:

- *To explore, understand and critically evaluate the interplay between technology and society in the broadest terms, and in particular, between technology and our social and cultural environments.*
- *To foster the development and design of new technologies to benefit society in existing and future contexts.*

These goals will be achieved by establishing research-based master's and doctoral programs emphasizing an interdisciplinary approach. There is a strong sense of "learning by doing" in the curriculum, and also of experiencing first-hand the interactions between art and technology that forms the intellectual basis for the program. Opportunities to participate in co-op placements enhance the more traditional academic components of the program.

The curriculum has been designed with due concern for pedagogical issues, as described in pages 5-6 of the proposal, which provide a "design rationale" for the program. The admission and program requirements, anticipated completion times, assessment criteria, and the various milestones that students are expected to achieve in their programs including the stages through which master's and doctoral students progress as they complete their theses and dissertations are all in line with well accepted practice and represent realistic expectations for academic programs.

There is a sensible plan in place to retire courses in the legacy programs that were associated with Technical University of BC. Keeping the directed readings courses for the near future will allow students in the CADS program to complete their degrees in a timely manner.

The distinction between the MA and MSc degrees is clearly articulated and in line with my understanding of common practice in most Canadian universities. A broad-ranging program such as SIAT cannot expect all students to meet the combined requirements of both an arts degree and a science/engineering degree. The foundations course is clearly designed to ensure that all graduate students have adequate background to embark on the rest of their coursework. The core courses that follow, which all students take, provide common ground that will unify the program, while the two tracks in the master's program allow enough diversity to attract the types of students who will most benefit from the program. I would not be surprised to find that some students will manage to satisfy both sets of requirements, but this will be the exception rather than the rule. Most will need to gain depth in their chosen focus, which the requirements encourage through a series of electives after completing the core requirements.

The course on Research Methods and Strategies is one of the cornerstones of the proposed program. The importance of instilling research skills early in the program, and also an appreciation for the range of methodologies and standards of assessment within different fields cannot be overestimated. The SIAT proposal addresses this well by providing a core course (IAT 801-3) and then a required second specialized course appropriate to a student's disciplinary focus.

At the doctoral level new students start by taking a program similar to that of the master's students, but those who already have adequate preparation (such as, one assumes, students who have completed a master's degree within SIAT) proceed more rapidly to advanced work. I would expect that there may be some changes to this philosophy after a few years of experience with the system, but it is a sensible approach for now given the need to bootstrap into a steady-state where there is a shared understanding of the objectives, goals, and approaches characteristic of the program.

Adequacy of the faculty and other resources

The faculty team that has been assembled is an interesting mix drawn from a number of disciplines. I understand that a substantial amount of additional entry-level tenure-track hiring is expected to take place during the coming year (or two). This will have an influence on the directions that the program takes, but the current complement of faculty members includes some accomplished senior faculty, some mid-career faculty, and some faculty just beginning their academic careers. Not all of the senior and mid-career faculty have traditional academic backgrounds (see later in this section for comments on the lack of complete employment histories). This is to be expected for a program such as this, where experience as a practitioner either within the artistic community or within industry is both appropriate and necessary in order to have the full range of talents needed for a program like SIAT.

The ratio of 3-to-1 for graduate students to research faculty is a sensible goal. Although some programs have much higher ratios, on average, the nature of the graduate program in SIAT is such that I would expect to see a greater need for contact time between faculty and graduate students. Over time, this ratio might increase as additional resources are acquired, such as administrative and technical support staff well versed in the needs of the program. For now, I would expect that many of the faculty members will be called upon to play these roles.

Library facilities seem adequate based on the information provided by the SFU Library.

Equipment for teaching and research, which is essential for a program like this, appears to be in place. CFI funding has played a major role in establishing the research infrastructure. It will be important to have an on-going plan to renew the infrastructure on a regular basis. The nature of the program requires state-of-the-art equipment (hardware and software), not all of which is computer-oriented. A significant investment in other types of equipment to meet the wide-range of activity characteristic of new media is necessary. Some of the infrastructure will have a very short time to obsolescence due to rapid advances in technology.

It is difficult to comment knowledgeably on whether appropriate space has been made available for the teaching, research, and administrative functions associated with the proposed programs. I draw particular attention to the need for dedicated research space where faculty and graduate students can conduct highly specialized studies that may not be accommodated in the spaces assigned for teaching or for more general research activity. At most institutions this is an issue that is always a hot topic for discussion. It is important that SIAT be aware of this and that there be a well-defined mechanism for assigning research space to the faculty members who require it.

I have addressed the issue of support for graduate students separately below.

I close this section with two comments on the curricula vitae. The first is that none of the faculty list their previous academic or professional employment, only their education

(in some cases dates were not provided for degrees). Normal practice for curricula vitae is to list all previous employment. I believe that all of the Canadian granting agencies require this information on the personal data forms that accompany grant applications. In some cases it is possible to guess where the senior faculty have worked previously given their list of publications and other information contained with the main body of the proposal, but it would have been much easier to assess the strengths of the faculty as a whole had there been more information about previous employment.

There is a lot of variation in the interpretation of "Academically Refereed Works" across the curricula vitae of the faculty in SIAT. Some of this is normal, representing differences between disciplines regarding what constitutes peer review, but I would have expected to see more uniformity in a proposal that has been put forward by a group of faculty members who have spent considerable time addressing the challenges of mounting a multidisciplinary program.

Demand for the proposed program

I am aware of a significant latent demand within the Lower Mainland for a program similar to that proposed for SIAT. No doubt this extends to other parts of British Columbia and beyond. As noted in the proposal, there are no comparable programs in Canada and few in the rest of the world (see below for comparisons to some other programs). I feel confident in stating that there are and will continue to be well qualified students eager to enroll in this program.

I have often been approached by students who have appropriate backgrounds but who have been unable to find suitable programs that will allow them to continue their education by pursuing a combination of interests in art and technology. In many cases they have already examined the alternatives, both within the public colleges and universities in British Columbia and the many private organizations that offer training leading to careers in art and technology. Of these people, I count at least half a dozen who are already listed as students in the existing program inherited from the Technical University of British Columbia. Clearly they have identified with the philosophy espoused by current faculty members in SIAT and are making progress toward their career goals.

The Media Lab at MIT is the universal example cited for programs like SIAT. With almost twenty years of experience and a substantial international reputation, the Media Lab sets the standard by which other programs are measured. Nevertheless, the Media Lab has not managed to successfully resolve all of the issues that arise when combining art and technology. There have been notable shortfalls in some areas, and many agree that there has been a persistent imbalance of too much science and engineering and too little reflective artistic, cultural, and social commentary. The program in SIAT has an opportunity to redress this imbalance, which is one of the strengths of the approach that has been proposed.

More recent examples of successful academic collaborations between art and technology exist in Europe, Japan, and elsewhere. I am mostly familiar with North

America, which I think is the appropriate comparison to make. Georgia Institute of Technology has programs in arts that have a strong technology component and programs in technology that have a strong artistic component, with ties between the two. A more traditional program exists at the Rhode Island School of Design, in art and design, where the focus is on design with a strong technology component. There is a collection of programs at the University of Southern California that focus on specific aspects of art and technology related to the film, television, and game industries. None of these programs are as integrated as the SIAT proposal, although each of them does build on strong interdisciplinary ties. In this sense the program in SIAT represents an ambitious undertaking with its fully integrated approach.

Within Canada, Emily Carr Institute of Art and Design is perhaps one of the closest comparable programs to SIAT, along with the Ontario College of Art and Design, Sheridan College, and NSCAD University (the former Nova Scotia College of Art and Design), but all of these take a more mainstream approach by emphasizing the relationship of technology to art and design while still having a primary focus on art and design. Largely missing is the commitment to critical analysis of the interplay between art and technology within society, perhaps in part because none offer doctoral programs.

Demand for graduates of the program

Forecasting demand within industry is never easy. Right now many sectors of the high technology and entertainment industries within British Columbia have not fully recovered from the effects of the "dot com bust" (for the high technology firms) and the rise of the Canadian dollar (for the entertainment industry, especially the film-related entertainment industry). Despite this, there are positive prospects for students who successfully graduate from the SIAT program. As the economy picks up, and as more and more people with training like what SIAT will provide take positions in industry and in academia, demand will increase.

Classic "chicken and egg" issues are at work here. Twenty years ago, when the computer animation industry in Canada was just starting to take off, similar questions were asked about whether there was any demand for programs in computer graphics and animation. A few Canadian schools rose to the challenge (Sheridan College in Oakville and Emily Carr College of Art and Design in Vancouver being two of them). This meant that there was a supply of talented computer animators when the demand came from industry. Companies such as Electronic Arts Canada (Burnaby) relied heavily on these two schools when they began production of computer games in earnest in the late 1980s and early 1990s, as did a number of animation companies from south of the border including Disney and other mainstream Hollywood production houses.

I have no doubt that a similar phenomenon will play out on a larger scale as we continue to see the economic intertwining of art and technology. Following after the industrial demand we can expect a wave of new academic programs from universities down to colleges and eventually into secondary schools, all of which will need people trained in not only the practical aspects of art and technology but also able to put together the necessary educational programs ranging from basic training to scholarly research on

the social and cultural impact of what is still rightfully referred to as "new media" despite its having been around for more than a few decades already.

Support for graduate students

The issue that was addressed in one of the letters of 26 April 2004, that of support for graduate students, is something that I feel should be commented on because it is an important aspect of any graduate program that aspires to being highly regarded within the academic community.

SIAT is a new program, with some new junior faculty members who do not have high levels of research funding. Some of the senior faculty are quite experienced, but have transferred into the Canadian granting system and thus do not have the levels of funding that colleagues with comparable experience might have in other departments. It will take time to build up full research funding. The short-term plan presented in the letter of 26 April 2004 is a sensible one. Over time I would expect externally funded research to increase to the point where there are at least as many research assistantships as there are teaching assistantships. A roughly equal balance between these two is typical in most universities where research and undergraduate teaching are equally valued. Most strong PhD programs have a higher percentage of their students funded as research assistants, so the final mix depends in part on the balance between the master's and PhD programs.

A potentially difficult issue, which is inherent in this type of program, is the disparity in funding between science and engineering, on the one hand, and the arts, social sciences, and humanities on the other. The latter group historically receives measurably less funding and this is almost always reflected in support for graduate students. SIAT will not be able to change this situation, but will need to deal with it. It appears from the documents that I reviewed that there is a sensible plan in place to pursue a combination of sources for funding and this is to be distributed fairly equitably amongst the students, subject only (I assume) to rules imposed by the granting agencies related to eligibility of students for support. I would expect to see, over the long term, an on-going imbalance between those parts of the program that are more oriented to science and engineering over those that are not, despite the best efforts to the contrary by the faculty members in SIAT. This should not be viewed as a shortcoming, but rather as recognition of the availability of funding. Should funding priorities within Canada shift to a more balanced perspective, SIAT ought to be poised to take advantage of the opportunity, having already put in place a program that brings the various disciplines together.

It is worth noting that the infrastructure funding from CFI is perhaps higher than might be expected for such a program, indicating that the current faculty members have been successful in their applications, which are peer-reviewed. This will have a positive effect on graduate students, to some extent compensating for what may be a modest shortfall in funding for direct support.

EXTERNAL REVIEW FOR GRADUATE PROGRAMS IN INTERACTIVE ARTS & TECHNOLOGY

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August 2, 2004

Aug 3, 2004

Jonathon C. Driver
Dean of Graduate Students
Simon Fraser University
Burnaby, British Columbia
Canada, V5A 1S6

Dear Dean Driver,

I have been asked to write a letter assessing the proposed new graduate program within the school of interactive arts and technology. I am delighted to share my thoughts which are based both on reading the submitted materials and on the basis of having visited the program's faculty and students earlier this summer. I must say that I am very impressed by what this faculty has achieved so far and by the directions they are proposing for future growth and development.

The explosion of new media technologies in the past few decades has required many universities to rethink their coverage of media studies and has led to a significant reconfiguration of the field. I have overseen the development of the Comparative Media Studies program here at MIT, one of the programs cited in this proposal as a potential model for the developments being proposed. Most universities have come to the conclusion that only an interdisciplinary approach can generate research and prepare students for work in these emerging fields. Each university has come up with its own interdisciplinary mix of faculty and subjects, building on their existing strengths and competencies, and relying on students to help forge the most vital links between faculty prepared in more traditional disciplines. Our own experience at MIT suggests that such an approach works best if you are able to maintain a high degree of flexibility to adjust to technological, cultural, and economic shifts impacting this area and to respond to the needs of specific students who often come with very distinctive career goals. This flexibility can sometimes be difficult to negotiate in relation to established university bureaucracies, but it is vital for the success of the kind of program being described here.

My sense is that this proposal gets it right – as far as Simon Frasier is concerned – offering a distinctive mixture of subjects which bring together technical and cultural expertise and should enable students to enter a range of different fields all related to the growth of electronic media. What is being described in this proposal is a rich laboratory environment which allows for intellectual exploration, aesthetic expression, and technological innovation and which will allow for dialogue and collaboration between faculty and students coming from diverse backgrounds. This is very much what I felt

when I visited the program. The faculty were committed and excited at the prospects of what lay ahead; the students were engaged and reflected interesting perspectives and backgrounds. The caliber of my conversation with these students was quite high and the facilities available for their work were impressive. This was a place where good work was and will be done.

My own experience with the Comparative Media Studies Program suggests that there is an enormous untapped demand from students around the world for the mix of courses being described in this proposal. There are more students interested in moving in these directions than can be accommodated by existing programs and the best students want something few existing programs offer – that mix of disciplinary backgrounds, that fusion between theory and practice – which are outlined in this proposal. Some of the students are coming through traditional undergraduate majors but have hit a set of walls in their thinking which can only be shattered by entering a new kind of intellectual environment. Some of them have worked in the private sector and discovered that they want to understand the big picture of media change and want to understand the social and aesthetic possibilities of the new media environment. The proposed program is ideally situated to meet their needs.

The courses as outlined are on the cutting edge of thinking about new media. They map a range of different methodological approaches and theoretical perspectives within the field – diverse yet complimentary, inclusive yet with a strong sense of direction. It is clear to see some of the strengths of this proposed curriculum – the things I wish I could offer my students at MIT – and they include solid work in artificial intelligence, performance, design, cognition, and pedagogy, which can inform the production practices of students working in this area. It is clear as well that the strengths of this innovative and well-structured curriculum are well matched by the qualifications of your accomplished faculty. And perhaps what is most important, there seems to be a spirit of collaboration and mutual respect between the various parties who will need to work together to accomplish what is proposed here.

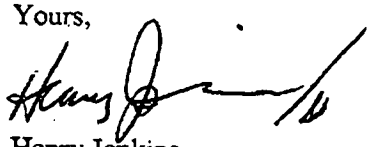
Your questions asked me to consider job prospects for graduates of the proposed program. Again, I would see Simon Frasier as well situated. Vancouver is one of the new digital cities – a center for media production of all kinds and seemingly in a position to grow and expand its influence in the coming decade. One should not be thrown by the dotcom bust into thinking the expansion of digital industries has slowed or stopped. All signs are that there will be continued growth in the future, especially in those spaces where old and new media meet – the games industry, for example.

Having said all of that, I return to my point about flexibility. It would seem that the Simon Frasier faculty have the right approach, the right faculty, and the right location to emerge as a leading new program in this area. I think they will live up to their potential. But, it is very unlikely that they have got it all right the first time or that the right mix today will be the right mix tomorrow. What must be avoided at all cost is rigidification. There must be room for everyone – faculty, students, administrators, and research collaborators – to explore and to grow. Even a center for innovation like the MIT Media

Lab can occasionally run aground when it does not allow younger faculty the chance to help redefine the core vision and mission.

I am looking forward to having another sibling program in this area. I hope we can find opportunities to collaborate. We are already discussing ways of leveraging our mutual interests in games and education.

Yours,



Henry Jenkins
Director, Comparative Media Studies Program
MIT

EXTERNAL REVIEW FOR GRADUATE PROGRAMS IN INTERACTIVE ARTS & TECHNOLOGY

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Georgia Tech Ivan Allen College
School of Literature, Communication, and Culture

July 1, 2004

Prof. Jonathan C. Driver
Dean of Graduate Studies
Simon Fraser University
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Canada V5A 1S6

Dear Professor Driver:

I have reviewed the materials you sent to me on June 17 relating to the Proposal for a Graduate Program within the School of Interactive Arts and Technology, including cover letters, the proposal itself, graduate course outlines, and cvs of the Research Faculty. As the Director of Graduate Studies for Georgia Tech's School of Literature, Communication, and Culture, which offers an MS in Information Design and Technology (since 1993), an MS in Human Computer Interaction (since 1997) and a PhD in Digital Media (starting Fall 2004), I am quite familiar with the area and with the process of proposing new programs. I have therefore read your materials with much interest. I have grouped my responses under headings responding to your own specific requests.

Academic merit and structural integrity of the Program

The program is inherently interdisciplinary and it is in the process of establishing a core of senior faculty. In addition it is one of the first in an emerging field. Given these facts, it is likely that the current curriculum will be revised over the coming years. As it stands this curriculum is as a fine first cut, particularly strong in the computational area. The general research methods course will perhaps prove challenging to teach, but it should be useful in reinforcing the ties among the faculty. The core computation course is a key component, and will provide an advantage for your students over programs that do not require computational proficiency of all their students. The choice of AI as a "core" subject is unusual but promising, and will presumably feed the research agenda of the program. The emphasis on cognition and knowledge representation is a good idea. The titles of the two humanities-oriented core courses are much more general, and the course content very likely varies with individual instructors. The reading lists reflect a sophisticated knowledge of the field. It might be a good idea to establish one or two solid anthologies as the focus of these courses, and then let individual instructors diverge from a common base. The elective courses hit many key areas for applications and research in this growing field. The areas of laboratory research are also very impressive.

The computational and writing entrance requirement should help to keep standards high, and the flexibility of two MS degrees, one in Arts and one in Sciences, should ensure that you get a good mix of students for the team-centered learning that you are encouraging. In our graduate program we find that considerable learning takes place at the peer-to-peer level.

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The number of courses required for the Masters degrees is considerably less than for our MS in Information Design and Technology, and is also less than MIT's Computational Media Degree. However, you may be requiring more research work, and you seem to be expecting the students to take two years to finish, so the amount of study may be the same. The masters thesis requirement is very appropriate and should allow students to pull together the perhaps disparate threads of their coursework. It should also allow Masters students to leave with appropriate portfolio pieces.

The PhD program is already large and is no doubt rooted in the extensive funded research you refer to. It is described somewhat generally: it would be good to see some examples of subject areas and reading lists.

The detailing of administrative structure for the program is very sound, with appropriate explicitness in the procedures for meeting degree requirements. Having visited the TechBC campus before the merger, I am happy to see that promising program absorbed into Simon Fraser's solid and mature structure.

Adequacy of faculty and other resources for achieving program goals

The existence of four funded research lab and a graduate student lab is a very positive sign, as are the references to faculty research projects. The need to acquire many new senior faculty members in a short period of time is somewhat worrisome, but given the growth of this area and core strengths of the University you should be able to attract the right faculty. The current faculty includes many without PhDs, and they may be among the most accomplished and appropriate members of the group. It may be necessary to establish clear procedures for advancement of non-traditional academics. The resources of the university at large, including the library and wider choice of courses, provide important support for the program. It will be important to keep up the labs with regular renewal of equipment and software and to establish an active acquisition program for the library. It would be useful to have a repository of digital artifacts (such as games) as well, and access to a film library.

Demand for the program among prospective students

The program is already larger than established programs at CMU, MIT, and Georgia Tech, and the demand is growing by your own account. I would expect it to continue to grow because of the growth in the games industry, in digital media in general, and the location and growing reputation of the program. We have had steady demand for our MS program, and very heavy demand for our barely-announced PhD. We have just announced a new BS program in Computational Media and we expect that to be very popular as well. Clearly this is a need that will grow and that other institutions are not as well situated to meet.

Demand for graduates of the proposed program

Given the growth in digital media which pervades all fields of communication, commerce, service, production, and research graduates of these programs will continue to be in demand. PhD graduates are particularly needed to staff the growing undergraduate and graduate programs in the field. Our own research indicated that English departments, Film, and Communication departments among others have all been advertising for openings in this field, many of them citing overenrolled new undergraduate programs. Industry is also in need of researchers who can combine knowledge of media traditions with computational sophistication.

Potential Problems

The main problems the program may face are the standard problems of the pioneer: how to establish a stable curriculum; how to attract faculty in a field that almost no one has yet been graduated in; how to integrate the disciplinary strengths of a diverse faculty. In addition there are pitfalls specific to this new field: how to distinguish between applications development and research; how to educate students in the underlying principles while still keeping them up to date on specific technologies; how to achieve gender balance; how to encourage technical, artistic, and analytical excellence without letting one develop at the expense of the others; how to integrate theory and practice within particular courses and across the curriculum. These are the challenges of a new field, which also brings with it the promise and excitement of bringing new technological power to bear on human aspirations and human needs. The proposal gives ample evidence that your faculty are already grappling with these issues and finding their own solutions.

The proposal does not explicitly address the funding of graduate students. Does the research program generate enough stipends? Are students expected to teach? Perhaps Canadian students are less pressed for support than those in the U.S.

The proposal also does not address the question of faculty availability. Will it be a problem to get enough teaching and supervision time from faculty who have their home in other units? Interdisciplinary programs can be difficult to administer because of the overburdening of faculty. Is this not addressed because it is not an issue at Simon Fraser?

Other Comments

In general I find this to be a promising proposal in a crucial area of education and research. I judge it to be well worthy of approval, I wish you the best of luck with it, and I look forward to working together to advance the emerging field of interactive digital media.

Sincerely,

Janet Murray
Professor and Director of Graduate Studies

Proposal for a Graduate Program within the School of Interactive Arts and Technology

Proposed to Simon Fraser University

by the graduate program faculty of the
School of Interactive Arts and Technology

Approved Internally by SFU/Surrey faculty on 13 December 2002
Edited in response to comments from SCUP (Feb 2002)
Reconfirmed by SIAT graduate program faculty on 1 October 2003
Edited in response to comments from SCUP (Oct 2003)
Reconfirmed by the Graduate Program Committee of SIAT on 21 November 2003
Approved by the FAS Graduate Chairs Committee on 9 December 2003
Reconfirmed by the Graduate Program Committee of SIAT on 9 January 2004
Edited to add optional Co-operative Education component in response to student needs on 26 April 2004.
Edited in response to the ACNGP External Review on 29 September 2004.
Reconfirmed by the Graduate Program Committee of SIAT on 1 October 2004
Approved by the ACNGP on 14 October 2004
Edited in response to the ACNGP on 27 October 2004.
Reconfirmed by the Graduate Program Committee of SIAT on 28 October 2004

Executive Summary

This document follows from the approvals granted the preliminary proposal for a permanent graduate program in the School of Interactive Arts and Technology at Simon Fraser University. We describe here the strength of human and material resources necessary to sustain high quality Master's and doctoral programs in the School of Interactive Arts and Technology, the advantages of this addition to Simon Fraser University and the regional need for its graduates.

Presently, the school operates a graduate Master's program and has a limited group of PhD students, a structure that has carried over from our institution's former life as The Technical University of British Columbia. The program's size currently stands at 65 Master's students and 15 PhD students. In our design below, we have substantially revised this model to fit the opportunities, needs and facilities of a comprehensive university.

The proposed program has two goals. The first is to explore, understand and critically evaluate the interplay between technology and society in the broadest terms, and in

particular, between technology and our social and cultural environments. The second is to foster the development and design of new technologies to benefit society in existing and future contexts.

The program is explicitly interdisciplinary; it brings together faculty and students from a variety of disciplines to the study of technology. In so doing, we have several objectives: first, research in technology and its contexts of use, particularly the computational technologies that drive much current innovation; second, development and use of research methodologies for interdisciplinary collaboration and the development of new technologies; third, research into the acts of inventing, designing, making, managing and learning about technology; and fourth, application of new technologies in society and industry.

The program is research-based with a dominant thesis or dissertation component. Students' theses research will be supported by four new CFI funded labs with a total capital funding of about 4 million dollars and a graduate student lab funded internally to the program. The labs' research includes information and networking, computer graphics and animation, computational design, immersive collaborative environments (CAVE), interactivity, human computer interaction, visualization, learning and technology evaluation. All labs are supported by interdisciplinary groups of faculty ready to provide students with cross-disciplinary perspectives. Many faculty bring considerable research funding, signal of their expertise and national recognition. Ties with regional high technology industries, and existing SFU units offer additional synergies for graduate-level development.

The proposed program develops both Master's and doctoral level work as these were anticipated in the structure and staffing of TechBC and are essential to retain the quality of faculty and research the new school has attained to date. Available resources such as specialized labs, faculty skill and experience, key collateral programs at SFU-Burnaby and SFU-Harbour Centre, library holdings and high societal demand for graduates argue in favour of this proposal.

A hallmark of the program is its emphasis on interdisciplinarity, team endeavour, combining of concept and practice, and use of technologies as a vital instructional base. All graduate students take a mandatory course in Research Methods and Strategies, which critically evaluates research philosophies and techniques for collaboration among disciplinary experts. Students learn in an environment that employs traditional coursework, one-on-one mentoring, teamwork, and technology-enhanced learning. In short, students are immersed in an environment that is both technology rich and structured for interdisciplinary cooperation.

The graduate course offerings outlined provide a core of five courses spanning the school's disciplinary facets (information technology, the arts, social science, design and pedagogy). An initial offering of ten electives gives greater depth in specialties such as the sociology of networked communities, spatial computing and games. A hallmark of each is that a traditional disciplinary specialty is eschewed in favour of productive synergies from related disciplines, such as technologies for enhancing theatrical performance. Special topics courses and directed readings provide for introduction of new material and constructive pressure to "retire" offerings that are no longer serving the program's needs. We believe many of these courses – particularly the elective offerings – will be of considerable interest to other programs and departments at SFU.

Of the approximately 40 faculty members total in the School of Interactive Arts and Technology, seven hold tenurable positions, one is an Emeritus Professor and some 16 hold positions as limited-term faculty at the rank of Assistant Professor and above and are thus eligible to supervise graduate students. The School is currently in the process of hiring a comparable number of tenurable faculty members, through open competition. By Fall 2005, plans are that, in addition to the eight senior faculty members, an additional 10 members holding tenurable positions (Associate Professors and Professors) will be in place. Additional hiring will occur after this group has been appointed.

All current faculty have been carefully chosen for their interdisciplinary strengths, the inventiveness of their research interests, their skills and the experience they bring to our collective work. Eighteen hold earned doctorates in their specialties from internationally recognized institutions. Two are advanced candidates in doctoral programs. All but newly granted doctorates have accumulated strong research records based in peer-reviewed publication, international fora and judged exhibitions. Several have distinguished international and national academic leadership profiles. They have as a common denominator interdisciplinary work in technology, design and computer-based media.

The program is unique in Canadian higher education. While most universities have depth in computer science, social science, communication, education and the arts, very few host the mix being built in the new school. At the same time, such combinations are widely sought by students and regional employers. TechBC's original design was to provide cross disciplinary scholarship built on regional development needs. This design has been redefined here to reflect the significant advantages afforded by SFU. Parallels might be found in elements of the MIT Media Lab and the broad interests of New York University's program in Communication Arts or the comprehensive communications programs at the University of Southern California's Annenberg School. There are few parallels north of the US boundary and none in Western Canada.

The union with Simon Fraser provided solutions to many of the problems faced by the nascent TechBC: an adequate research library; supporting and distinguished complementary programs in the liberal arts and applied sciences; and an adequate physical plant. SFU allows our expansion as a program to remain fully based in its specialization – without having to provide all the antecedent and support courses that would have been needed with solo operation as TechBC.

We are confident that this plan provides a program of strength and excellence that builds upon the solid institutional base afforded by Simon Fraser University. We believe it fits well as a partner with many standing programs on campus, offering a synergy and interdisciplinarity that has few, if any, equals in Canada.

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* Details available for review by calling Bobbie Grant, Senate Assistant 604 291-3168 or email bgrant@sfu.ca

CURRICULUM

Learning Outcomes

The program will offer Master of Arts, Master of Science and PhD degrees and is structured so that graduates will have the research knowledge and skill required to be effective creators of new knowledge.

The curriculum has six components: (1) *Foundations of Computational Art and Design* (1 required course), (2) *Research Methods and Strategies* (1 required course), (3) *core courses* (2-3 courses of 5 required), (4) *elective courses* (2-3 courses to be taken), (5) *MA Thesis, MSc Thesis or PhD Dissertation* (the PhD also has a *comprehensive examination and dissertation proposal*) and (6) *Research Colloquium.*

In completing a degree, graduates will have developed depth in their chosen research area, breadth in understanding technology in context, ability to work in interdisciplinary teams and scholarly skills for sustained intellectual productivity. These are general qualities of a research degree and each has special significance in the context of the proposed program. Table 1 (below) summarizes the curriculum structure and identifies components corresponding to each of these four main objectives.

Depth of study. The proposed curriculum is dominated by its thesis/dissertation component, which is the primary vehicle for developing depth in a particular topic. To assist students in achieving depth the curriculum has both core and elective courses. The core courses cover areas of broad concern in the program. The elective courses provide in-depth and specialized study. They may be selected from within the program, from other SFU graduate programs or elsewhere. The elective courses particularly are intended to assist students in progressing towards their thesis or dissertation.

Breadth of knowledge. The Foundations of Computational Art and Design course is intended to assure that all students have knowledge of and skill in applying computation appropriate for an advanced degree holder in our disciplinary areas. The Research Methods and Strategies course introduces students not only to the intellectual structure of research but also to the methods available for conducting research across the broad areas with which the program is concerned. The core courses (of which Master's students take two and PhD students take either two or three) aim to expose students to research issues and results beyond any single topic area.

Interdisciplinarity. The Foundations of Computational Art and Design course will draw its examples from a wide range of specialties within the program. The Research Methods and Strategies course has components on interdisciplinary work. In the core courses students will work in groups whose members have differing disciplinary foci.

Scholarly skills. The Research Methods and Strategies course has required components on writing scholarly articles, on library research techniques and on scholarly presentation. The core courses require that students meet standards of scholarly production in assessable work. One elective course is required to be a research methods course appropriate to a student's course of study (the particular course will be approved by the student's supervisory committee and the graduate program committee).

The PhD comprehensive examination has components that test for achievement of scholarly skill sufficient for producing a successful dissertation.

Program Requirements

The degree requirements minimally are five (5) courses of at least three (3) credits each (nominally 15 credit hours) of coursework for the Master of Arts and Master of Science and six (6) courses of at least three (3) credits each (nominally 18 credit hours) of coursework for the PhD. In addition there is a single course, Foundations of Computational Art and Design, that offers necessary basic concepts and skills for further study in the program and will not count towards the above coursework requirements. All students will be required to take Foundations of Computational Art and Design or demonstrate sufficient knowledge for it to be waived. We anticipate that students with strong technical backgrounds will not need to take this course.

PhD students who have completed a Master's degree within the program will have an option to apply to the program's Graduate Program Committee for a reduction in coursework aimed at breadth and scholarly skill. Such reduction shall not reduce course requirements below those specified in the PhD (from MA or MSc within the program) option in the table below.

Master's students will be admitted to study for either the MA or MSc degree. Students may articulate between the MA and MSc degrees by meeting the admission and program requirements of the degree to which they articulate and with the approval of the Graduate Program Committee. A student may make one application for articulation.

The degrees to be awarded

Students who complete the Master's program will be awarded a Master of Arts or Master of Science. The distinction between the two degrees will be based on the coursework taken towards the degree (see the table on page 14). The decision as to degree designation will be taken at the time of admission: Master's students will be admitted to either the Master of Arts or Master of Science. Admission to a program will depend upon prior academic preparation and intended focus of study (see admission requirements on page 24).

Students who complete the doctoral program will be awarded a PhD.

Time required for the degree

Under normal circumstances, degree requirements for the MA or MSc should be completed within six semesters and should not require longer than eight semesters.

Under normal circumstances, degree requirements for the PhD should be completed within 12 semesters and should not require longer than 15 semesters.

Students, both Master's and PhD, will be encouraged to complete their thesis work in a timely manner.

		MA and MSc	PhD#	PhD (from MA or MSc with the program)
Foundation	IAT 803-3 Foundations of Computational Art and Design ‡ †	*3 credits (possibly waived)*	*3 credits (possibly waived)*	
Coursework	IAT 801-3 Research Methods and Strategies ‡ † *	*3 credits*	*3 credits*	
	Core ‡ † *	2 courses *6 credits*	2 or 3 courses* *6 or 9 credits*	1 course *3 credits*
	Electives § *	2 courses *6 credits*	2 or 3 courses* *6 or 9 credits*	3 courses *9 credits*
	Special Topics			
	Directed Readings			
	Total Coursework	**5 courses *15 credits***	**6 courses *18 credits***	**4 courses *12 credits***
Research	Co-operative Education	Optional	Optional	
	Research Seminar	Attendance requirement + 1 presentation	Attendance requirement + 2 presentations	
	Master's Thesis §	required		
	PhD Comprehensive Examination *		required	required
	PhD Proposal		required	required
	PhD Dissertation §		required	required

Table 1: Curriculum Structure. Both courses and credits are listed. For determining degree requirements in core, elective, special topics and directed readings categories the number of courses of at least three credits each shall be used. #PhD students are required to take at least two (2) core courses and at least two (2) courses from electives, special topics or directed readings. PhD students must complete six (6) courses (18 credits) of coursework in addition to Foundations of Computational Art and Design.

§ **Depth of study** – primarily through the thesis/dissertation and electives.
‡ **Breadth of knowledge** – Foundations of Computational Art and Design course, Research Methods course and core courses.
† **Interdisciplinarity** – Mandatory parts of the program provide a range of perspectives, tools for working with other areas, and practice in communicating in an interdisciplinary cohort.
* **Scholarly skills** are developed and assessed in the Research Methods course, and core courses. One elective must be an appropriate research methods course. The PhD comprehensive examination tests for scholarly skill.

IAT 800-3 **Foundations of Computational Art and Design** is an introduction to computing as a research and professional tool in art and design. Its intended audience includes those who have not had substantial experience in the computational aspects of art and design. This is a mandatory course for all students in the program, but may be waived for those students having had sufficient formal educational background in art and design computation.

IAT 801-3 **Research Methods and Strategies** is an introduction to the research enterprise. It covers structures of research that are prevalent across fields, introduces research methodologies and tools, teaches methods for interdisciplinary work and fosters a critical discourse around the fundamental differences among research in different areas. This is a mandatory course for all students in the program.

There will be five **core courses**, each offering the bases for research in an area in which a large group of faculty is involved. These courses will be team-designed and taught by the faculty in the particular areas. MA and MSc students will be required to take two core courses. PhD students will be required to take either two or three core courses.

MA and MSc students will be required to take two courses from the pool of **electives**, **special topics** and **directed readings**. PhD students will be required to take either two or three courses from this pool. Subject to Supervisory Committee approval and Graduate Program Committee approval, students in the program may fulfill part of these requirements through other appropriate graduate courses at SFU or elsewhere (the latter subject to SFU rules on external courses). Normally, all students must take at least one course towards these requirements as either an elective or special topics offered within the program. One elective is required to have a focus on research methods appropriate to the student's thesis/dissertation topic. In this interdisciplinary program appropriate research methodologies will vary widely. For example, quantitative empirical work requires a background in statistics; process-based social research requires qualitative methods; and computational work may require proofs and formal languages.

There will be ten **electives**, with five offered alternately each year. These courses will provide in-depth coverage of areas or concepts particularly relevant to the program and based on faculty expertise. Courses have been selected and developed based upon four criteria: the contribution to the program internally; for some courses, their focus on research methods; their appeal to other programs at SFU; and their provision of a unique offering at SFU.

The **special topics** courses serve several agendas. They provide the needed flexibility to quickly adapt to new contexts and to serve the curiosity-driven inquiry that is essential to our research and graduate program. They will be an incubator for new electives and are the normal way that new elective courses are proposed and refined before they are formally considered for addition to the program. They also provide the program with a means to take best instructional advantage of visiting faculty with skills new to our program.

Directed readings will play the normal function of such courses at SFU. They will be seminar or tutorial experiences that develop special research interests in depth and with faculty supervision. Students should not expect to take a directed readings course where there is a substantively comparable course offered at SFU. Directed readings should be distinct from the work to be undertaken towards the MA Thesis, MSc Thesis or PhD Dissertation. Normally, directed readings should not be taken under the supervision of a

student's Senior Supervisor. We anticipate that we will use directed readings sparingly but strategically in the program. Normally MA and MSc students may take at most one directed readings course for credit towards the degree. Normally PhD students may take at most two directed readings courses for credit towards the degree. Students may take at most one directed readings course with a given professor.

On an optional basis and with approval of the Graduate Program Committee, MA, MSc and PhD students may participate in **co-operative education** by placement in a government or private research agency to gain practical experience in their thesis or dissertation area. The co-operative education option is separate from coursework in the program and serves as an adjunct to the thesis/dissertation process.

The PhD degree will require a **comprehensive examination** aimed at testing for achievement in interdisciplinarity, breadth of knowledge, depth of knowledge, topic focus and scholarly skill.

The PhD degree will require a **dissertation proposal** aimed at collegial review of the proposed work, development of research formulation and presentation skills and approval of the dissertation work by the Supervisory Committee and the Graduate Program Chair. The approval of the Graduate Program Chair is largely for oversight issues, for example, required ethics clearances. The dissertation proposal has two components: a research prospectus and a public event with timely notification given to the campus community.

The **MA Thesis, MSc Thesis** and **PhD Dissertation** will be the formal vehicles by which students make the contribution to knowledge that is the hallmark of a research degree.

The **Research Colloquium** is an important part of the scholarly life of the program. During their studies PhD students are required to present their research work in at least two seminars as part of this series. MA and MSc students are required to present in one seminar. There is an expectation of continuous participation. All students are expected to attend two-thirds of the seminars in the series while they are taking coursework in the program.

Course proposals

The program structure has been described in Table 1 above. This section provides brief details of the courses to be offered.

Course descriptions and outlines are included in **Appendix B**.

Foundation

IAT 800-3 Foundations of Computational Art and Design (3 credits)

This course aims at a robust understanding of models for art and design and representations of these models as symbol systems. It meets these aims through a set of case studies that demonstrate how computational thinking can affect professional and research outcomes. Its outcomes are preparedness for further relevant study and skill development in using computers to support research and professional work in art and design.

Research Methods

IAT 801-3 Research Methods and Strategies (3 credits)

This course maps key methods and strategies of building reliable knowledge across diverse specializations within the graduate program. It is meant not so much to build specific expertise in a given set of techniques as to recognize issues underlying most all research and to appraise critically methods of observation, test and organization of findings.

The course provides a common basis for discussion and criticism of research. The goal is a broad reading literacy across a spectrum of research, an essential step to knit collaboration and scholarly community.

Core Courses

IAT 810-3 New Media (3 credits)

This course examines theory, history and current research in the field of new media. Its methods are the interweaving of design, social/cultural, learning and aesthetic theories. Historical views of the field are provided through an analysis of the histories of technology, moments of media emergence, social and cultural movements, design and aesthetics. The outcomes for the course are exploration, analysis and development of applied methods in order to better understand, design, create and assess new media and future "newer media" developments.

IAT 811-3 Computational Poetics (3 credits)

This course provides students the opportunity to engage in critical, creative thinking and practice in the discovery of the emergent overlying principles and concepts that enable one to describe, analyze, evaluate and design interactive multi-mediated experience. The structure of the course will centre on art in the age of information, virtuality, compositional design and practice.

IAT 812-3 Cognition, Learning and Collaboration (3 credits)

The aim of this course is to address what it means to know something, how people gain and use knowledge and complex skills, how to determine what an individual knows, how humans learn, how humans solve complex problems, how knowledge is created within a social and group context, and how to model human capabilities and performance. We will select and study theoretical perspectives that inform the design of computer-based mediated environments, products and experiences.

IAT 813-3 Artificial Intelligence in Computational Art and Design (3 credits)

Working through a set of motivating examples from domains such as generative design, dance simulation, social interaction, adaptive user interface design and knowledge sharing in e-learning the course provides insights on how AI techniques can be used to address important problems in art and design. The topics are presented in a comparative manner to clearly highlight advantages and disadvantages of each method providing students with ability to weight benefits of a particular approach when facing a concrete problem in their research area.

IAT 814-3 Knowledge Visualization and Communication (3 credits)
The course provides a cognitive and computational framework for understanding and designing graphical and visual representations. We investigate several psychological and computational models of diagram processing, and explore diverse interactive graphical systems.

Elective Courses

IAT 830-3 Learning Design and Media (3 credits)
Students will gain an understanding of instructional design as an evolving set of theories and practices based on learning research. They will develop detailed knowledge of design strategies for interactive learning media and will be able to explain how they relate to cognitive theories of learning. As an overarching goal, students will develop the knowledge and skills to conduct basic research projects relating to the design of learning media.

IAT 831-3 Encoding Media Practice (3 credits)
This course undertakes a study of conceptual, aesthetic, and computational issues and techniques involved in the encoding of interactive media objects. It includes study of theoretical and poetical backgrounds in computer-human interaction (Bush, Dinkla, De Landa, Grosz, Deleuze, Manovich, Murray, Laske, Hamman, Ascott, Penny, Kahn), basic tenets of programming for the arts (media representations, practical machine perception, algorithmic processes, database strategies, display techniques), and practical exercises in programming interactive computer art that may include interactive cinema, audio and narrative.

IAT 832-3 Exploring Interactivity (3 credits)
Over the past few years technological innovation has created a host of exciting new opportunities in the field of interaction design. As the outgrowths of smaller faster wireless computing reshape our human experience, new questions need to be asked about how we analyse, design and prototype more effective and more appropriate products and systems to support interactivity. The socio-cultural and technical considerations that stem from the research questions are complicated by the fact that we have few precedents. In particular, the socio-cultural implications are not well understood. This course will examine these issues through an iterative modeling process.

IAT 833-3 Embodiment and Electronic Performance (3 credits)
This course is a combination of theoretical and practical explorations of physicality and live performance in technologically mediated environments. It offers an introduction to phenomenology as a methodology for analyzing and elaborating new physical and technological hybrids. Students are asked to devise a performance experiment, while simultaneously exploring critical discourses around embodiment, virtuality, gender, and communication. This course is designated as a research methods course.

IAT 840-3 Models of Networked Practice (3 credits)
The course examines several social frameworks for describing mutual activity in work and learning particularly in computer supported networked environments. The frameworks are used to describe, analyse and design the tools and approaches for

new communities of practice. This course is designated as a research methods course.

IAT 842-3 Theory and Design of Games (3 credits)
Thanks to the success of computer games, games have become a major part of our culture, rivalling the popularity of movies. Drawing on a wide variety of examples and disciplines, this course examines theories and techniques for the analysis of existing games and the design of new ones. It studies game design, and will provide students with the conceptual and technical tools necessary to critique and design games of all kinds.

IAT 844-3 Spatial Computing (3 credits)
This course covers the concepts, algorithms and design principles underlying modern 3D computer animation and visualization from a user interface perspective. Research topics include 3D user interface constructs; information, data and knowledge visualization; 3D graphics and animation; spatial perception; and virtual and immersive environments.

IAT 845-3 Methods for Research into Technological Systems (3 credits)
Key models of research into technological systems are analysed and compared. Together, they frame diverse methodologies for art, social science, business, engineering and information technology. Focus will vary by instructor and disciplinary combination being examined. In contrast to the Research Methods and Strategies Course, this offering considers specialized, discipline specific research tools taken in combination. These may be qualitative, quantitative, laboratory-based, field based (as in survey research), actively experimental or based on secondary analysis of archival data. This course is designated as a research methods course.

Special Topics

By its very nature the content of a special topics course will vary. Eight such courses are proposed, so that course numbers will recur only every two years. Thus students are unlikely to register for a single special topics course more than once. Special topics courses offered in the program will be approved by the Graduate Program Committee to essentially the same criteria required for approval of a new elective. At the time of approval, each special topics course will be evaluated for suitability for study towards the MSc degree and the results of such evaluation will be noted in the course approval and course outline. At the time of approval, each special topics course will be evaluated for suitability for fulfilling the program's research methods requirement and the results of such evaluation will be noted in the course approval and course outline.

IAT 881-3 Special Topics I (3 credits)

IAT 882-3 Special Topics II (3 credits)

IAT 883-3 Special Topics III (3 credits)

IAT 884-3 Special Topics IV (3 credits)

IAT 885-3 Special Topics V (3 credits)

IAT 886-3 Special Topics VI (3 credits)

IAT 887-3 Special Topics VII (3 credits)

IAT 888-3 Special Topics VIII (3 credits)

Directed Readings

Normally a student would take at most one (MA or MSc) or two (PhD) directed readings course during their degree. We have included three such courses: this should accommodate almost all registrarial circumstances. Directed readings offered within the program will be approved by the Graduate Program Committee to essentially the same criteria required for approval of a new elective. As the time of approval, a directed readings course may be approved for study towards the MSc degree. At the time of approval, a directed readings course may be approved as fulfilling the program's research methods requirement.

IAT 871-3 Directed Reading I (3 credits)

IAT 872-3 Directed Reading II (3 credits)

IAT 873-3 Directed Reading III (3 credits)

Co-operative Education

Co-operative education is intended to provide opportunities for MA, MSc and PhD students to gain practical research experience in settings external to the program. Enrolment in co-operative education requires successful completion of at least two courses within the program, good academic standing, no deferred grades and approval of the Graduate Program Committee.

The co-operative education option is separate from coursework in the program and serves as an adjunct to the thesis/dissertation process. Students wishing to participate in this program are responsible for making all arrangements external to the program. Students participating in co-operative education will be eligible for the *co-op registration fee* as listed in the Graduate Fee Schedule of the Graduate Regulations.

IAT 861-0 Practicum I (0 credits)

IAT 862-0 Practicum II (0 credits)

MA Thesis, MSc Thesis and PhD Dissertation

IAT 897-6 MA Thesis

Students who are working on their Master of Arts thesis register in this course. This course will not count towards the coursework requirements.

IAT 898-6 MSc Thesis

Students who are working on their Master of Science thesis register in this course. This course will not count towards the coursework requirements.

IAT 899-6 PhD Dissertation

Students who are working on their PhD dissertation register in this course. This course will not count towards the coursework requirements. PhD candidate status is neither required for nor implied by registration in this course.

MSc Requirements

The MSc is distinguished from the MA by additional constraints on coursework requirements. In addition to the program requirements in Table 1 above, MSc students must fulfill coursework by taking courses from those specified in Table 2 below.

Core Courses	Electives, Special Topics and Directed Readings
The two required Core Courses shall be selected from the following pool. *IAT 814-3 Knowledge Visualization and Communication* *IAT 812-3 Cognition, Learning and Collaboration* *IAT 813-3 Artificial Intelligence in* Computational Art and Design	At least one course shall be taken from the following pool. *IAT 840-3 Models of Networked Practice* *IAT 842-3 Theory and Design of Games* *IAT 844-3 Spatial Computing* *IAT 845-3 Methods for Research into Technological Systems* A *special topics* course approved by the Graduate Program Committee for study towards the MSc degree. A *directed readings* course approved by the Graduate Program Committee for study towards the MSc degree. A graduate course in a Faculty of Applied Sciences graduate program approved by the Graduate Program Committee for study towards the MSc degree. Such course approval will be on a case-by-case basis.

Table 2: MSc coursework requirements

Supervision

Student supervision will comply with *Section 1.6 Supervision* of the Graduate General Regulations. Students entering the program will be assigned an interim advisor. In some cases a senior supervisor may be decided upon admission. The interim advisor has two main tasks: advising the student on issues related to study within the program and assisting the student in identifying and approaching potential senior supervisors. There is no requirement that the interim advisor has a role in supervision once the senior supervisor is approved.

The normal size of MA and MSc supervisory committees is two. The normal size of a PhD supervisory committee is two or three.

Comprehensive Examination

We attach as **Appendix B** our policy document governing the PhD Comprehensive Examination, of which the following is a summary.

The PhD degree will require a comprehensive examination aimed at testing for achievement in four areas: breadth of knowledge, depth of knowledge, topic focus and scholarly skill. We must ensure that our doctoral graduates will be prepared for careers of university teaching and research, in addition to a range of other work available in industry, government and NGOs. Part of this qualification is a mastery of disciplinary work to a high professional calibre. The comprehensive examination in the interdisciplinary milieu of the School of Interactive Arts and Technology must of necessity adapt in form to students' skills and topics, but have a common evaluative baseline in terms of sufficient mastery shown.

With the consent of their supervisory committees and the Graduate Program Chair, doctoral students may elect to take the comprehensive examination following completion of course work, but normally within 18 months of starting the program and no later than the beginning of the third semester of the second year of full-time study (or equivalent). Upon passing, the student will be admitted to full degree candidacy. The comprehensive examination may be retaken once and a second failure will require that that student withdraw from the program.

The Graduate Program Committee is responsible for oversight and administration of the comprehensive examination. It will ensure that the examination tests for each of the four criteria; that the examinations in a given year are fair in comparison; and that each examination is appropriate for the student being tested. The committee thus seeks a balance between examination content that is common across students and that which is specific to a student's course of study. With the wide disciplinary range found among our program's students and faculty, it will be normal for each student's Supervisory Committee to have a significant role in designing the examination for a given individual. The Graduate Program Chair is charged with assuring that the test meets high institutional standards for comprehensiveness and of evaluation. The test will have written or recorded qualities that allow its prompt review in case of contested outcomes.

The MA Thesis, MSc Thesis and PhD Dissertation

The **MA thesis**, **MSc thesis** and **PhD dissertation** are the key means through which students make their contribution to knowledge, the hallmark of an advanced research degree.

Doctoral candidates complete and defend a dissertation by showing an original contribution to their field. The standard of work expected is that of peer-reviewed work by accomplished scholars in their specialization. Candidates are encouraged to consider the professional and career implications of this major scholarly work.

The standards of scholarship – quality of work – set for the MA and MSc are no less than those for the doctorate, except the scale, scope and originality of the thesis may be less. Commonly, the Master's thesis shows refinement of a developed scholarly specialization, a useful replication of established note and in some cases a pre-testing or prototype of supporting ideas for eventual PhD research.

Research Expectations and Implications

All degrees (MA, MSc and PhD) are research degrees. As part of degree requirements students will write a thesis or dissertation that presents a contribution to the field of study.

All degrees, MA, MSc and PhD, shall entail work the program is able to support through its faculty. The program will be supported by its laboratories, funded faculty research, the SFU library system and other research resources at SFU or related institutions.

LEARNING METHODOLOGIES

The pedagogy of the School of Interactive Arts and Technology reflects the goals of the program. We blend the innovative with the traditional, trusting that appropriate use of technology for learning in advanced degree work can work effectively and serve as a valuable extension of SIAT's instructional expertise in undergraduate curricula. We combine some of the former TechBC's methods of instructional delivery in balance with teaching methods of several established SFU schools, providing a vigorous hybrid of convention and innovation. The program's instructional methods show several distinguishing characteristics:

Experiential learning. The involvement of students swiftly into the activity of on-going research teams and purpose-built labs makes for a distinct combination of the conceptual and applied.

Distributed learning. The foundation work in the graduate program is – where appropriate – taught by computer mediation. A hallmark of the program though is its residential character – the major portion of advanced degree work will normally be taken on campus, both for the vitality of our academic culture and the immediacy and inspiration of face-to-face interaction. Use of other electronic means of connection between instructor and student, for example, through teleconferencing, team discussion and email, expand our ability to teach, advise and mentor, both locally and at distance.

Interdisciplinary structure. As mentioned previously, the program finds its strengths in the synergies among established disciplines in the arts, social, sciences and applied sciences. This intention pervades our selection of students, the research facilities we control and our core courses.

Practical focus. Our graduate courses demand considerable conceptual and theoretical skills, but we also seek practical, workable outcomes to research. We have a practical focus directed towards social, computational, pedagogical and aesthetic issues. We believe that a tight linkage of concept to practice better equips our graduates for employment and future distinction.

FACULTY

A crucial feature of our program is that every faculty member is accomplished in a discipline "external" to the school. For example, our current faculty comprises computer scientists, design scientists, learning scientists, engineers, social scientists, cognitive psychologists, educational psychologists, a philosopher, business theorists, cultural theorists, dancers, academic artists, and designers. What unites faculty is their focus on technology in its diverse contexts. In this way, the program inverts the usual pattern of small groups of technologically-oriented faculty each housed in a "home" department. The record shows that such small, isolated groups often cannot address the wider concerns that technology implies. The program presents Simon Fraser University with a novel way to address the issues raised by technology and its rapid change.

Following is a list of the current tenurable and emeritus faculty in the program. Listed with each faculty member are the areas in which he or she conducts research. **Appendix F** contains a list of all members of the SIAT graduate program faculty at the

time the proposal was written. For the record, this is the group that originated the program proposal.

SIAT is presently in the process of hiring its tenurable faculty. The planned hiring pattern is consistent with the proposed program.

John Bowes (Professor & SIAT Director) AB (Hamilton College), MSc (Syr), PhD (Mich State) –

- Digital media and telecommunications policy
- Computer mediated communication and online commerce
- Technology transfer
- Minorities and media
- History of technology

Jim Budd MVA (Alta) (Associate Professor) –

- Collaborative product development
- Interface design & navigation
- Interactive products
- Visualization: virtual & physical
- Digital literacy
- Electronic conferencing

Tom Calvert (Emeritus Professor) BSc(Eng) (Lond), MSEE (Wayne), PhD (Carnegie Tech), PEng –

- Computer systems for the animation and choreography of human figures
- Networked multimedia systems for learning
- The design and evaluation of human-computer interfaces for complex systems
- Computer graphics

Brian Fisher (Associate Professor)

- Cognitive science
- Interactive systems design
- Entrepreneurship and innovation

Susan Kozel (Associate Professor) BComm (McG), MA, PhD (Essex) –

- Live performance in mediated environments
- Philosophies of embodiment
- Motion capture and motion tracking systems
- Artificial life: discourses and practices
- Wearables: performance and design
- Interactive installation

Thecla Schiphorst (Associate Professor) BGS, MA (S Fraser) –

- Authoring methodologies
- Human computer interaction
- Wearable technology
- Multi-modal interaction

Ron Wakkary (Associate Professor) BFA (Nova Scotia Art & Des), MFA (NY State) –

- Interaction design - multi-user interaction

- Design methods in interaction and games
- Collaborative authorship
- Digital culture & online content
- Online learning

Rob Woodbury (Professor & Graduate Chair) BArch (Car), MS, PhD (Carnegie Mellon) –

- Design space exploration
- Ontological systems
- Online interpretations: repositories and galleries
- Parametric design
- Play in learning and practice

PROGRAM CONSULTATIONS AND EVALUATION

External

The programs at the former TechBC underwent formal approval by the Degree Program Review Committee of the Ministry of Advanced Education. As part of that approval several forms of consultation and evaluation occurred.

- Program Advisory Committees comprising a majority of external members met monthly during the early stages of the TechBC graduate programs.
- The TechBC Academic Programs Working Committee collected and evaluated considerable information on external programs as part of the program development process.
- During the Fall of 1998, a number of individuals from other institutions were invited to visit TechBC to review and to provide input to the program development process.
- During TechBC's existence, course evaluations were conducted on a regular basis for all graduate courses.

The program has held discussions with related non-university institutions such as the BC Advanced Systems Institute and the New Media Innovation Centre.

Internal to SFU

The proposed program has a number of natural links to existing SFU departments and programs. Our course offerings have affinities with Contemporary Arts, Computing Science, Engineering Science, Communication, Education and Business Administration. Current graduate students enrolled in the cohort program are taking electives in Contemporary Arts, Communication, Engineering Science and Computing Science. Co-supervision and supervisory committee membership arrangements are growing and currently include Contemporary Arts, Molecular Biology and Biochemistry, Education, Communication, English, Computing Science and Engineering Science.

Faculty members have established research collaborations with research centres including the GRUVI Lab, the MBB program, the Centre for Experimental and Constructive Mathematics, and service units such as the eLearning Innovation Centre.

Given the particular research interests of our faculty, we foresee research collaborations possible with computing science, engineering science, communication, education, business, mathematics, cognitive science, biology, sociology and philosophy.

Cognate Programs Elsewhere

There are several organizational patterns that have some parallels to our proposal. The first is comprehensive and interdisciplinary, marked by a merging of technical or engineering interests with those in art, education and the social sciences. The MIT Media Lab (www.media.mit.edu) established the first major related program with its Master's and Doctoral programs in Media Arts and Sciences (MSc, MSc in Media Arts and Sciences, MSc in Media Technology, PhD). It perhaps is closest in concept to our proposal and past practice as TechBC but has historically had a more relentless focus on digital media itself. A close second is the recently established CMU Center for Entertainment Technology (http://www.etc.cmu.edu/curriculum.html) (Master of Entertainment Technology) with applied interests in the art and engineering of new technology from games to film. Similarly, work of the National Film Board of Canada (www.nfb.ca) has for decades merged art and information science in pursuit of inventive media expression. It remains an icon of interdisciplinary work in film and video technology, but it is not a degree program or school as such.

The Comparative Media Studies program at MIT (http://mit.edu/cms/) (MSc) examines media technologies for their cultural, social, aesthetic, political, ethical, legal, and economic implications. The CMS Program is situated in the Faculty of Humanities, and leads to a Master of Science degree. While this program involves a broad range of the humanities and social sciences, it does not host hands-on development and testing of technologies *per se*. Taken together, the MIT Media Lab *and* Comparative Media Studies nearly duplicate the range of the School of Interactive Arts and Technology, though it does not do so as a comprehensive degree program. Nevertheless, this duality is our closest cognate.

Second, Toronto offers a collaborative graduate program through the Knowledge Media Design Institute. The program offers *"...a specialization for graduate students from a variety of academic backgrounds to engage in the design, prototyping, evaluation, and use of media intended to support and enhance the ability of individuals and groups to think, communicate, learn, and create knowledge."* (www.kmdi.org). Students are admitted to graduate study in a home department (Architecture, Landscape, and Design; Computer Science; Information Studies; Mechanical and Industrial Engineering; and Sociology – degree designations vary by home department). Students must meet all the requirements of their home department plus those of the KMDI program. The program undertakes to work with supervisory committees to tailor individual student courses of study. Overall the Toronto program seems to combine elements of our proposed program with an organizational structure that is a hybrid between regular and special arrangement studies. The program accepted its first students in the Fall of 2002 and currently has 21 students (Master's and PhD) and 7 informally associated students. Over 50% of the current students are enrolled in Information Studies.

Third, there are existing programs in art or communications with newly expanded mandates. Most currently, The Rhode Island School of Design (RISD) has announced formation of a graduate Department of Digital Media to offer a Master's degree (MFA) (http://www.risd.edu/digital_media.cfm). It is unclear whether this is a research or

professional program, or of its involvement of related interests from business, media and modern culture, literature and the humanities either from RISD or adjacent Brown University. RISD has traditionally focused on specializations within art, not on broad interdisciplinary ventures.

Fourth, there are schools of library science who have enlarged their scope from training librarians to more interdisciplinary work at the graduate level. The University of Michigan's School of Information (http://www.si.umich.edu) offers Master's and PhD degrees (MSc in Information, PhD) in information systems and human-computer interaction. While broadly inclusive of human considerations in information systems it lacks the cultural focus of the proposed program. A similar focus exists at Syracuse University and is also an outgrowth of the library sciences (http://istweb.syr.edu) (MSc in Library and Information Sciences, MSc in Telcommunications and Network Management, MSc in Information Management, PhD in Information Transfer).

Similarly, the University of Washington rechristened its library school 7 years ago as The Information School (http://www.ischool.washington.edu) (Master of Library and Information Science (MLIS), MLIS in Law Librarianship, Distance MLIS, MSc in Information Management, PhD in Information Science). Despite the name change and an enlarged concern with the social and legal consequences of an information economy, the program lacks strong participation by the arts and social sciences. These broad concerns are presently spread among 6 other programs as diverse as technology and management (the business school) to medical informatics and telemedicine. Each of these specializations is located in a separate department, often in a different college and campus.

Fifth, communications programs, such as Simon Fraser's own justly well-regarded program, offers some parallel interest to ours, as do those in other major Canadian schools such as Concordia (http://artsandscience.concordia.ca/comm/masters.html) (MA in Media Studies). Much of their curriculum centres upon traditional media and its industrial, cultural and training needs. Some other regional universities offer training in journalism. The University of British Columbia and University of Victoria both offer this training to undergraduates, but do not offer much crossover to technology, design and art, particularly at the graduate level.

New York University's program in Cinema Studies (http://www.nyu.edu/tisch/cinema/) (MA in Cinema Studies, MA in Moving Image Archiving and Preservation, PhD in Cinema Studies) offers both distinction in certain specialties like film and a breadth of programs in other media, media policy and criticism. It, with the Annenberg Schools at USC and the University of Pennsylvania (http://ascweb.usc.edu/home.php) (MA in Communication, MA in Communication Management, MA in Global Communication, PhD in Communication); (http://www.asc.upenn.edu/asc/) (PhD), is considered among the top such schools, continentally. The Annenberg Schools each have strong media criticism, policy and social science emphases, both at the graduate and undergraduate levels. Other programs are small and exclusive: journalism training at University of California - Berkeley, Stanford, Columbia and Northwestern provides prestigious post-baccalaureate training in media and journalism, but do not tie strongly to engineering or information technologies, *per se*. Michigan State University, University of Georgia, University of Texas, Universities of Minnesota, Wisconsin, Oregon and others offer a breadth of instruction in Colleges of Communications Arts, with specialized departments

spanning undergraduate training in journalism, broadcast, film, commercial art and the social effects of media, but again have scant direct focus on technologies.

Finally, we know of notable programs more distant from these shores with characteristics at some variance from North American offerings. In Sweden, new programs have begun at the University of Malmo and the Chalmers University of Technology (http://www.design.chalmers.se/arttech/) (Master in Art and Technology). In Australia, Sydney University's Faculty of Architecture offers a Master's degree in Design Science and a PhD (http://www.arch.su.edu.au/nwfa/research/index.html). Its ambitions are broad but its scope is necessarily limited by its home in an architecture faculty (the disciplinary walls between units are generally high in Australia). The Spatial Information Architecture Laboratory at RMIT University in Melbourne Australia offers Master's and PhD degrees (http://www.sial.rmit.edu.au) (Master of Architecture by Research, PhD by Research) through its hosting department (Architecture and Design). In comparison to SFU, RMIT is a much more practically focused institution with fewer graduate-level offerings. England's Open University's Design and Innovation Department (http://technology.open.ac.uk/design/index.html) affords some parallels as well, though its graduate offerings are slim. Sheffield Polytechnic Institution offers strength in political economy and critical studies of media as do many other U.K. institutions. Ireland's Dublin City University has an extensive communications program (http://www.comms.dcu.ie/), with multiple graduate degrees (MA in Political Communication, MS in Communication and Cultural Studies, MA in Film and Television Studies, MA in Journalism, MSc in Multimedia, MSc in Science Communication). The Interaction Design Institute in Ivrea Italy offers a two year thesis-based Master's degree in interaction design (Master in Interaction Design) (http://www.interaction-ivrea.it/en/).

The National Chiao Tung University in Taiwan has aggressively expanded its digital design and media offerings through its graduate school of architecture (http://www.arch.nctu.edu.tw/) offering both Master's and PhD degrees. The program there offers a blend of applied design, computational design and human-computer interaction research. It is only one of several noteworthy rapidly growing programs in Asia.

In this brief review, there are several clear distinctions between possible parallel programs and what we propose. First, few place equal weight on technology in distinction to social sciences and the arts. Most communication programs centre in the applied social sciences or vocational training for media work. Second, programs we reviewed exist largely at the undergraduate level. There are several prestigious journalism programs at the graduate level, but most are designed to prepare talented post-BA students for media careers. There are many programs – including SFU's own communication program – with well-regarded Master's and doctoral degrees, but whose focus is with the social, legal and aesthetic consequences of established media industries. Third, very few competing programs consider centrally new or developing media forms from the more established internet to dawning forms of wireless, wearable or immersive media. Finally, few programs have as their common denominator computation and design, a balance of art, technology and application to everyday life. Together, these characteristics frame a unique and synergistic program that invites participation from a wide spectrum of related programs within SFU. In comparison to programs outside of SFU, our proposal has no direct regional competition and there is very little internationally that approaches our unique configuration.

We have included a comprehensive and inclusive list of related Canadian programs in **Appendix A.**

ADMISSION

There will be annual admission into the program with the possibility of early or out-of-cycle admissions in special cases. The annual deadline for applications is 15 January with the possibility of late applications. By the end of April, the Graduate Studies Committee will announce its decisions to applicants who have met the above deadline.

The minimum standards will be those of SFU, as described in the graduate general regulations. The following guidelines will be applied to new admissions.

It is our aim to admit groups of students with diverse backgrounds, across the broad areas in which our faculty have disciplinary expertise. The following admission requirements are designed to encourage such diversity while setting minimum standards for acceptance into the program.

Minimum Standard Entrance Requirements for MA and MSc Programs

1. An undergraduate degree in a field related to the proposed program of study. For example:

- BSc Computer Science, BASc Engineering (Electrical, Communications, Computer Engineering) BA or BSc in Education, Management, Economics or Communications, BFA in Art, Design or Performing Arts, BA in Art, Art History, Architecture, Linguistics, Psychology or Philosophy, BArch, BLArch, BID).

Or

- An undergraduate degree in another, related discipline. Applicants under this category are required to make the case for (1) the relationship between the discipline in which they hold their previous degree or degrees and this program; and (2) how they would benefit from this program.

2. For applicants to the MSc, a record of substantial university coursework in scientific and/or technological areas.

3. Demonstrated ability in computing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of a foundational course in computing (this course **will not** count towards graduation requirements).

4. Demonstrated ability in academic writing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of selected writing intensive courses within the program (such courses **will** count towards graduation requirements). Applicants are to submit one sample of written work done as part of their undergraduate studies.

5. A minimum cumulative GPA of 3.0 or better at a Canadian university, or equivalent, for the undergraduate degree.

6. A suitable letter of intent explaining the applicant's motivation for selecting this degree program; summarizing relevant skills, training and experience; describing proposed research directions within the program and indicating how the course of study would contribute to future intellectual or professional growth. All of the above four points should be explicitly addressed in the letter of intent.

7. Three reference letters each from a suitably qualified person.

Minimum Standard Entrance Requirements for the Doctor of Philosophy Program:

1, A graduate degree in a field related to the proposed program of study. For example:

- MSc Computer Science, MASc Engineering (Electrical, Communications, Computer Engineering) MA or MSc in Education, Management, or Economics, Communications, MFA in Art, Design or Performing Arts, MA in Art, Art History, Architecture, Linguistics, Psychology or Philosophy, MArch, MLArch).

Or

- A graduate degree in another, related discipline. Applicants under this category are required to make the case for (1) the relationship between the discipline in which they hold their previous degree or degrees and this program; and (2) how they would benefit from this program.

Or

- An undergraduate degree in one of the two categories above. Applicants under this category are required to demonstrate both high academic standing (GPA of 3.5 or better at a Canadian university, or equivalent), for the undergraduate degree, and evidence of research aptitude and accomplishment.

2. A record of accomplishment in computing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of a foundational course in computing (this course **will not** count towards graduation requirements).

3. A record of accomplishment in academic writing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of selected writing intensive courses within the program (such courses **will** count towards graduation requirements). Applicants should submit two samples of their scholarly written work.

4. A minimum cumulative GPA of 3.0 or better at a Canadian university, or equivalent, for the Master's degree.

5. A suitable letter of intent explaining the applicant's motivation for selecting this degree program; summarizing relevant skills, training and experience; describing and critically supporting proposed research directions within the program and indicating how the course of study would contribute to future intellectual or professional growth. All of the above four points should be explicitly addressed in the letter of intent.

6. Three reference letters each from a suitably qualified person.

Additional Requirements for both Programs:

1. Demonstrated proficiency in the English language through one of the following means:

- A previous undergraduate or graduate degree completed at a university where English is the applicant's primary language of instruction
- A minimum score of 570 on the paper-based TOEFL test with a minimum TWE score of 5
- A minimum score of 230 on the computer-based TOEFL test with a minimum TWE score of 5

2. Portfolio/Interview:

Candidates who are being considered for admission may be required to submit a portfolio of their work and/or be required to attend a personal or telephone interview during the latter stages of the admissions process.

OTHER PROGRAM INFORMATION

Tuition

Students will pay tuition fees based on SFU's standard fees for students in "per-semester" research-oriented graduate programs.

All SFU regulations concerning tuition fees will apply. Refer to the SFU Calendar for details of these regulations.

Administrative structure

The program will be housed in the School of Interactive Arts and Technology (SIAT) in the Faculty of Applied Sciences. A Graduate Program Committee will be created, consisting of faculty members from SIAT, and reporting to the Director of SIAT. The committee members will undertake the normal tasks of a graduate program committee, as outlined in SFU graduate general regulations.

The program committee, which will be known as the Graduate Program Committee, will be chaired by one of its members, who will fulfill all the normal duties of a graduate program chair, and will sit on the Faculty of Applied Sciences Graduate Studies Committee.

Presently SIAT has seven tenurable and one emeritus faculty members at the Assistant Professor level or above. SIAT is currently in a staged process of hiring its tenure-track faculty, starting with a cohort of nine positions being filled in Fall 2004. Additional hiring will occur after this group has been appointed. All newly-appointed faculty would be expected to participate in the proposed program.

Equipment resources include our four CFI-funded labs (these are devoted respectively to computing technology, interaction, virtual environments and usability), a computer suite devoted solely to the graduate program, specialized media editing facilities, and availability of the undergraduate labs in the program. The faculty currently have

significant funded research that would support research assistantships in the program. The SFU library system has considerable relevant literature through its collections relevant to Computer Science, Engineering Science, Contemporary Arts, Business, Communication, Education, Mathematics and the Arts. During its brief existence the former TechBC developed a small but significant collection of material relevant to the program.

Linked to its Double the Opportunity Program, the Provincial Government has made a substantial commitment to increasing graduate student numbers in the program that develops from the former TechBC (40 FTE in 2003/4, 50 FTE in 2004/5 and 60 FTE in 2005/6).

Students from the current Cohort Special Arrangements Program in Computing Arts and Design Sciences would, at their option and by meeting program requirements, transfer to the new program and no new admissions would be made to the Cohort Program. We expect that most, if not all, Cohort PhD students will choose to transfer and that Cohort MASc students will make a choice between completion by project within the Cohort Program or completion by thesis in the new program. Some may wish to complete under the existing project option while other may wish to do the extra work required to complete a degree by thesis.

Attached are the names and curricula vitae of the members of the SIAT faculty eligible to supervise graduate students.

Once students are enrolled in the program, all program regulations will apply. However, there will be no retroactive application of the new program regulations to those students who remain in the Cohort Special Arrangements Program in Computing Arts and Design Sciences except by written election by the student involved.

RATIONALE AND DEMAND

The program will be housed in SIAT and thus its administering faculty is the Faculty of Applied Sciences.

The first priority of the Faculty of Applied Sciences in its current Strategic Plan is *"to expand its existing programs and to design and develop new programs in areas of high demand."* We argue that the events of SFU's expansion into Surrey and its choice to retain and redevelop the programs of the former TechBC is a de facto realization of this first priority. Demand for the proposed graduate program we demonstrate in the form of our recent admissions process into the Cohort Special Arrangements Program in Computing Arts and Design Sciences, and in the large number of potential applicant inquiries that we currently receive with neither advertisement nor marketing. We argue appropriateness to the strategic goals of the Faculty of Applied Science by noting that the work of our research faculty would open new and needed areas for this Faculty and, more broadly, in society. We are simultaneously concerned with how technologies are used, designed and implemented. The technological areas we currently work within include systems for interactive performance, authoring systems, industrial design, computer-aided design, visualization, learning systems, software, computer games, buildings and policy. All of these are important areas that are currently being transformed by technology. There are many examples among the Schools and faculty of

FAS that share these goals, but no group that synthesizes and articulates these goals into a locus of study and research.

The Three-Year Plan of the Vice President, Academic notes that the societal context in which universities operate is changing in several ways. Among these is the transition to a knowledge-based society. The proposed program represents one approach to enabling people to achieve the aim of life *long learning, innovation and discovery* implied by a knowledge-based society. It does this by making inquiry to the process of learning, innovation and discovery an integral part of its educational offerings.

The VPA plan notes an important force in society that we argue is partly a consequence of being knowledge-based.

> *...within the larger society there is an increasing demand for applied and professional programs. By responding to this demand some are concerned that the integrity and support for the arts and sciences will be compromised. Comprehensive universities have always sought to secure balance among potentially competing areas. We are committed to preserving the fundamental foundation of the arts and sciences while simultaneously building on our excellence and strength in applied and professional programming. We view our programming breadth as an opportunity for partnership to draw together interdisciplinary programming, greater breadth in the educational experience for our students, and enrichment for the community in which the university operates.*

The proposed program provides a novel structure with which to address interdisciplinarity, programming breadth and the technology in its societal contexts.

Potential applicants for program

Based on four rounds of admission to TechBC and the current Computing Arts and Design Sciences program, applicants for the proposed program will likely come from three populations.

The first contains people holding an undergraduate degree in a discipline unrelated to computing and who have pursued aspects of computing either as part of their degree or informally. Such people realize that computation has become an essential, increasingly important tool for their discipline, and are frustrated by the difficulty of developing discipline-based computational knowledge within conventional departmental structures. They are attracted to the new program by the prospect of working with like-minded people from their discipline and others and by the promise of hybrid vigour that such interdisciplinary work can provide. The current program has a large representation of people from the art, design and management areas. We expect that these areas will continue to be well-represented and note that our most recent admissions round saw a considerable broadening of the applicant field (we were very encouraged to see several applicants with online learning backgrounds and aspirations, but were constrained by current degree offerings from accepting some of these people into the present program). Graduates of the new program originating in this pool will enrich their former disciplinary knowledge by understanding how computation informs and is informed by other disciplines.

People in the second group have a strong technical foundation in computer science, engineering or mathematics. They wish to apply their knowledge to one or more of the domains represented in the program. Their motivation is both practical and curiosity-driven. They wish to apply their knowledge, but also see that application provides new

opportunities for learning about computation and technology. Graduates originating in this pool will know their technical discipline and how to translate it into application in the field.

The third group of applicants is a special case of the first, is small, but important. Such people want to develop deep expertise in computing and technology, but continue to develop in their former fields of study. Their aspirations are high – they wish to do the difficult work of becoming expert in more than one area. The evidence from other programs known to us (CMU, MIT) is that successful graduates from this pool are spectacular performers in their subsequent careers. It takes both a program such as the one proposed located in a university with a good computer science or engineering school to foster such people.

Demand for the proposed program appears to be strong. We received over 100 applications this spring with almost no advertising and an extremely limited application period. Presently we continue to receive a large number of unsolicited yet informed application inquiries. We propose to set enrolment limits at the reasonable limit of the ability of faculty to supervise students in a research-based program: a ratio of three students per eligible faculty member. With growth to 30 research faculty members in the new school, we would anticipate having about 90 students in the program at any one time.

Achieving a balance across genders is important to us. Our current gender balance is that of 80 grad students, we have 29 female and 51 male, which is better balanced than other technical programs at SFU. It needs to be improved. We anticipate a large complement of women in our applicant pool (and past admissions support this claim). Emphasizing recruitment of women graduate students will be important to our overall development strategy. Our program includes a significant contextual, artistic and critical-analytical approach to technology, which women applicants tend to favour over more narrowly focused technological approaches.

The proposed program is unique in British Columbia. There are other programs and parts of other programs that share some of its elements, but none can claim the degree of focus on computing and technology in its contexts or the explicit inquiry into interdisciplinarity that are the hallmarks of what we propose here.

Potential job market

Nationally and provincially, there has been demand for Canadians with advanced skills and research ability in computing, communications and their intersect with arts and entertainment as key components of a "smart" economy. Further, it is important that these individuals are equipped to work in cross-disciplinary ways, finding invention and new applications of technology with non-traditional instruction. Through team projects our students are prepared to work with others who may have different perspectives. Many government efforts from the Canada Foundation for Innovation to BC's "Double the Opportunity" signal this kind of new economy and advanced skill set.

Our graduates are equipped do the important tasks in industry and government of making computing and technology work for people and organizations. Graduates from the program must have knowledge of two key areas (computing/technology and another area such as the arts), with an emphasis on one of these. For example, a student may combine the micro technology of positional sensors with dance. Another may better

conceptualise the aesthetic contribution or audience impacts of high resolution television imaging. The portability and video capabilities of cellular telephones may form the basis of novel text "conversation" software implemented through the mobile telephone network. In all these cases, our students span from art and design to technology in important ways. They are both agents of discovery and of creating useful applications for everyday use.

We expect that many of our graduates will progress to either further graduate study, to academic careers or positions of influence in governments and NGOs. Every field is feeling the effects of computation and technology and most universities and governments have realized that their faculty must reflect this important and continuing trend. Our graduates will be specially prepared for such positions. Additionally, the growing symbiosis of the university with "smart" industries suggest the importance of graduates able to energise such relationships, moving with ease between the commercial and academic worlds of research and invention. As the Canadian economy moves from its traditional resource base dependent on powerful neighbours to a position of invention and high value-added information industries, our program and its advanced students should play an important part.

APPENDIX A – INCLUSIVE LIST OF RELATED PROGRAMS IN CANADA

Alberta, University of

Similar research themes are spread across four different schools:

- Art and Design – MA, MFA: History of Art, Design and Visual Culture
- Communications and Technology - MA: electronic and social networks, organizational communications, electronic commerce
- Computer Science: AI, Computer graphics, Database and Multimedia Systems, etc.
- Educational Psychology: Instructional Technology

British Columbia, University of

A similar program of study could be created by a student enrolled in Interdisciplinary studies. For example, such a student could take courses in Fine Arts and Computer Science, or Communications and Computer Science.

Two programs with related themes are:

- Master of Educational Technology program – MET: a joint, online program with Tec de Monterrey (Mexico).
- Master of Advanced Studies in Architecture – some research links with engineering and fine arts.

Calgary, University of

Similar themes are found in the following programs:

- Fine Arts – MFA: Offers a minor in Intermedia Arts and Technology (boundaries between digital and traditional media). (The MFA is generally a terminal Master's degree.)
- Computer Science – MSc, PhD: some courses in Computer Graphics, Computer Vision, and Human-Computer Interaction.

Carleton University

Four programs at Carleton feature similar though more narrow research:

- Computer Science: Intelligent Systems: Expert systems, knowledge acquisition tools, knowledge based assistants, connectionism and neural networks, natural language understanding, learning and adaptability, robotics, pattern recognition.
- Computer Science: Object-Oriented Systems: Visual programming, filing systems, databases, user interfaces, simulation, animation, software engineering, office automation.
- Institute for Comparative Studies in Literature, Art and Culture: Offers a PhD in Literary Studies, Visual Culture, Musical Culture, New Technologies
- School of Industrial Design: does not offer a graduate program, but does have some courses available for graduate students enrolled in Engineering or Architecture.

Concordia University

Three programs with some relationships to ours exist.

- Media Studies – MA: Cultural and social aspects of media and communication
- Educational Technology – MA, PhD: Focus of the program is on communication, management theory and systems analysis.
- Open Media – MFA: This program includes art forms such as performance, installation, and electronic art.

Guelph, University of

Computing and Information Science and Fine Arts have some cognate topics, however, there are no specific programs listed with similar themes.

Manitoba, University of

Computer Science has some cognate topics, however, there are no specific programs listed with similar themes.

McGill University

Art History and Communication Studies – MA, PhD: Focus is on interdisciplinary study of art, culture and communications, and the technologies of information, image, and sound. The program involves cultural and social aspects.

McMaster University

Computing and Software has some cognate topics, such as computational geometry. However, there are no specific programs listed with similar themes.

Memorial University of Newfoundland

Computer Science has some similar themes and Sociology has one course focusing on science and technology. There are no specific programs listed with similar themes.

Ryerson University

Communications and Culture – MA, PhD: Ryerson offers this joint program with York. It focuses on contemporary issues and practices in communication and culture

Toronto, University of

Toronto offers a collaborative graduate program through the Knowledge Media Design Institute. The program offers *"...a specialization for graduate students from a variety of academic backgrounds to engage in the design, prototyping, evaluation, and use of media intended to support and enhance the ability of individuals and groups to think, communicate, learn, and create knowledge."* (www.kmdi.org). Students are admitted to graduate study in a home department (Architecture, Landscape, and Design; Computer Science; Information Studies; Mechanical and Industrial Engineering; and Sociology).

Students must meet all the requirements of their home department plus those of the KMDI program.

Toronto offers a program in the History and Philosophy of Science and Technology and the McLuhan Program in Culture and Technology. Topics include Communications in History, Theory, Technology and Perspective and Design in the Twentieth Century. The programs do not have an applied technology component.

Waterloo, University of

Somewhat surprisingly, Waterloo's offerings in this area remain spotty and dispersed.

- Fine Arts – MFA: Offers a concentration in computer imaging.
- School of Computer Science – MMath, PhD: This department offers similar research areas such as User Interfaces and Computer graphics.

Canadian Film Centre - Habitat Programme

Habitat (http://www.cdnfilmcentre.com/training/newmedia.html) is centred on the exploration, development and production of the interactive experience. Its goal is to provide educational programming that combines the intellectual rigour of post-graduate university environment with the results-driven orientation of a production studio environment. Though not a degree granting program, Habitat plays an important national role in the development of highly qualified new media personnel.

The Banff Centre - New Media Institute (BNMI)

BNMI (http://www.banffcentre.ab.ca/bnmi/) offers a series of summits, workshops, co-productions, co-developed programs and production. Through these vehicles, BNMI supports collaborative research, dialogue and networking, a laboratory for the prototyping and co-production and research of new media works, and a place for career development and training. Though not a degree granting program, BNMI plays an important national role in the development of highly qualified new media personnel.

APPENDIX B: PHD COMPREHENSIVE EXAMINATIONS

This document states the guidelines PhD Comprehensive Examinations in the graduate program in the School of Interactive Arts and Technology. It embodies five aims:

- To demonstrate breadth and depth of knowledge appropriate for the holder of a PhD
- To test for preparedness to conduct PhD thesis research
- To test for preparedness to produce the PhD thesis
- To test for comparable standards of preparedness across candidates taking the exam, to the extent possible in a diverse, interdisciplinary program.
- To align with SFU policies and practices

The Comprehensive Examination

With the consent of their Supervisory Committee, students may sit the Comprehensive Examination following completion of required course work. Upon passing, the student will be admitted to full degree candidacy. The examination may be retaken once.

As part of preparation to undertake the Comprehensive Examination, the student shall submit, to his or her Supervisory Committee, a comprehensive annotated bibliography of readings used throughout course work and readings related to their proposed thesis topic. The student's Senior Supervisor will inform the Graduate Program Committee of the Supervisory Committee's consent for the student to sit the examination and will provide a copy of the annotated bibliography.

Upon receipt of the consent and annotated bibliography from the Senior Supervisor, the Graduate Program Committee will strike an Examination Committee as described below.

The examination shall have three sections. The first will test for breadth of knowledge within the student's course of study. The second will test for knowledge of the proposed thesis topic. The third will test for knowledge of and skill with pertinent research methodology. At least two of the sections shall have a required archival component. The examination shall have an oral component that shall test for all three sections.

The examining committee shall refer to the bibliography in preparing the examination.

The examination process should not exceed one term in duration from the date of notification to the Graduate Program Committee of the consent to sit for the examination. This time may be longer should a student be required to retake the examination.

Specific guidelines for these examinations are available from the graduate program assistant.

Examination Committee

The examination committee shall consist of the student's Supervisory Committee, the Graduate Program Chair or designate, and one other member of faculty in the School eligible to act as a Senior Supervisor. This last selection may be nominated by the student's Supervisory Committee and shall be approved by the Graduate Program Committee. More than one individual may be nominated by the Supervisory Committee, from which the Graduate Program Committee shall make the final choice or require

additional nominations. The Graduate Program Chair or designate shall chair the Examination Committee.

Examination

a) Program Responsibilities
The Graduate Program Committee has responsibility to ensure that the comprehensive examinations for a given cohort test for comparable standards of preparedness across candidates taking the exam, to the extent possible in a diverse, interdisciplinary program. Comparability, not equivalence, is the goal—a general test of preparedness, difficulty and fairness should be met by comparison to other like instances, both within the program and to other SFU PhD programs.

b) Bibliography
As part of the applying to site the examination, the student shall prepare a comprehensive annotated bibliography designed to demonstrate the topic areas that they have covered in their course of study.

The purpose of the bibliography is to inform the process of the focus and substance of the student's work to date and to facilitate the faculty's task of preparing the Comprehensive Examination. As such, it may well include substantial interpretive material, but should be concise, clear and complete.

c) Preparation and Approval of the Examination
The Examination Committee shall use the bibliography to assist in preparing the exam questions. The questions shall be approved by the Graduate Program Committee. The Graduate Program Committee may require common questions across a cohort taking the comprehensive examination or may otherwise advise on the proposed examination.

d) Form of Examination
The examination shall have three components, of which at least two must be submitted in an archival form consonant with SFU policies and practices on submission of the thesis to the library.

Section 1 – Breadth: This section shall test for breadth of knowledge within the student's course of study and across the general area in which study has been focused. The student will be expected to demonstrate interdisciplinary aspects of his or her study.

Section 2 – Thesis Topic. This section shall test the student's understanding of the research issues around the proposed thesis topic. It shall test *inter alia* for social justification, conceptual justification, and current research problems and issues.

Section 3 – Methodology: This section shall test for knowledge of methodologies appropriate to the research area, for ability to choose and design methodologies for particular research tasks and for ability to apply methodology to the proposed thesis topic.

e) Supplemental Material
If a section of the exam contains supplemental examples of the student's work, the student must explain the example in the respective section. Supplemental examples must be submitted in an archival form.

Supplemental material may describe, for example:
- video taped performance
- programming or design artifacts

- visual or written works

Decision of the Examination Committee

The Examination Committee shall make a recommendation of its findings to the Graduate Program Committee. The Graduate Program Committee shall confirm the recommendation upon satisfying itself that the examination has been conducted in accordance with these guidelines.

On the first sitting of the examination the recommendation shall be one of the following:

- The student passes the examination.
- The student is required to retake the examination.

Should a second sitting of the examination be required due to the student not passing the examination on the first sitting, the recommendation shall be one of the following:

The student passes the examination.

The student fails the examination and is required to withdraw from the program.

If a student is required to retake the examination, the Examining Committee may include in its recommendation a set of required tasks for the student that may include additional formal coursework.

A student may retake the comprehensive examination once. A second failure requires withdrawal from the program.

The decision of the Examination Committee shall be by simple majority vote. The Examination Committee Chair shall vote only in the case of a tied vote, and his or her abstention from voting in this instance shall be taken as a vote to retake (first sitting) or fail (second sitting) the examination.

APPENDIX C: COURSE PROPOSALS AND OUTLINES

In the interests of saving trees, course proposals are not included here. Copies have been provided to the Dean of Graduate Studies and these are available to all involved in the review process.

No instructors are listed on the course proposals. Given that SIAT is in the midst of the process of hiring its tenurable faculty (with seven tenurable and one emeritus currently appointed), listing the faculty members who will normally teach is not practical at this stage.

Each of the course proposals was prepared by a sub-group of the SIAT graduate program faculty and approved by the entire SIAT graduate program faculty.

Detailed course proposal and outlines are available for review by calling Bobbie Grant, Senate Assistant, 604 291-3168 or email bgrant@sfu.ca

APPENDIX D: CALENDAR ENTRY

SCHOOL OF INTERACTIVE ARTS AND TECHNOLOGY GRADUATE PROGRAM

Surrey Campus, 2400 Central City, 10153 King George Highway. (604) 586-5225, Fax (604) 586-5237, .http://www.iat.sfu.ca/grad

Director

J. Bowes
AB (Hamilton College), MSc (Syr), PhD (Mich State)

Graduate Program Chair

R. Woodbury
BArch (Carleton), MS (Carnegie Mellon), PhD (Carnegie Mellon)

Faculty and Areas of Research

John Bowes AB (Hamilton College), MSc (Syr), PhD (Mich State) – digital media and telecommunications policy; computer mediated communication and online commerce; technology transfer; minorities and media; history of technology

Jim Budd MVA (Alta) – collaborative product development; interface design & navigation; interactive products; visualization: virtual & physical; digital literacy; electronic conferencing

Tom Calvert (Emeritus) BSc(Eng) (Lond), MSEE (Wayne), PhD (Carnegie Tech), PEng – computer systems for the animation and choreography of human figures; networked multimedia systems for learning; the design and evaluation of human-computer interfaces for complex systems; computer graphics

Brian Fisher BA (Hiram College), PhD (UC Santa Cruz) – human perceptual, enactive, and distributed cognition; individual differences; development of expertise; perceptually rich interfaces; visual analytics; collaboration systems; media arts; technology commercialization; open-source distribution models

Susan Kozel BComm (McG), MA, PhD (Essex) – Live performance in mediated environments; philosophies of embodiment; motion capture and motion tracking systems; artificial life: discourses and practices; wearables: performance and design; interactive installation

Thecla Schiphorst BA (Hampshire), MFA (Calif Inst Arts) – authoring methodologies; human computer interaction; wearable technology; multi-modal interaction

Ron Wakkary BFA (Nova Scotia Art & Des), MFA (NY State) – interaction design - multi-user interaction; design methods in interaction and games; collaborative authorship; digital culture & online content; online learning

Rob Woodbury (Chair) BArch (Car), MS, PhD (Carnegie Mellon) – design space exploration; ontological systems; online interpretations: repositories and galleries; parametric design; play in learning and practice

Program Goals

The program has two goals. The first is to explore, understand and critically evaluate the interplay between technology and society in the broadest terms, and in particular, between technology and our social and cultural environments. The second is to foster the development and design of new technologies to benefit us in existing contexts and to elaborate, expand and create contexts for beneficial technological application.

The program brings together faculty and students from a variety of disciplines to the study of technology both in and across the participating disciplines. The program has the quadruple objectives of, first, research in technology in its contexts, particularly the computation that drives much current technological development; second, inquiry into and use of research methodologies that enable interdisciplinary collaboration and the development of new technologies; third, research into the acts of designing, making, managing and learning about technology; and fourth, demonstration of new technologies in their contexts.

A hallmark of the program is its emphasis on interdisciplinarity, team endeavour, combining of concept and practice, and use of technologies as a vital instructional base. All graduate students take a mandatory course in Research Methods and Strategies, which critically evaluates research philosophies and techniques for collaboration among disciplinary experts. Students learn in an environment that employs traditional coursework, one-on-one mentoring, teamwork, and technology-enhanced learning. In short, students are immersed in an environment that is both technology rich and structured for interdisciplinary cooperation.

Degrees Offered

The program offers courses of study leading to the MA, MSc and PhD. It provides graduate study in diverse areas related to people, technology and society, especially the areas of art, design, games and knowledge management.

Research Facilities

The school operates five research labs, supporting work in the broad areas of information technology, virtual environments, interactivity and usability. One lab comprising computers, display and output devices is for general graduate program use. The other four labs provide specialized research facilities.

Shared Virtual Environment Lab

The particular focus of the lab is shared virtual environments where technology is used to provide sensory cues of physical presence. The lab supports research into shared spaces, developed to provide an immersive virtual reality environment in which users

can interact with others in similar spaces in Canada and around the world. Its facilities include a two-walled cave, graphics servers, software and desktop computers.

InfoNet Media Lab
The InfoNet Media Lab houses a computer-based environment that allows for the creation, usage, and sharing of multi-modal information to support such areas as: signal Processing for multimedia applications, image and video processing, computer graphics and animation, multi-modal muman-computer interaction, bioinformatics. The goal of utilizing the InfoNet Media Lab is to define, investigate, and integrate advanced multimedia and creative technologies, in order to dramatically transform the way an individual communicates, works, teaches, learns, and plays. Its facilities include visualization displays, instrumentation and prototyping equipment, software, and desktop and laptop computers.

Interactivity Lab
The Interactivity Lab aims to extend our current range of digital interfaces and interactivity solutions. The research in the Interactivity Lab supports existing and in-development tools and solutions and develops new forms of interactivity and authoring tool methods, from small numeric-pad driven interfaces to full body, multi-sensory interaction. It facilities include a range of input, sensing and display and output devices, rapid prototyping equipment, servers, software, and desktop and laptop computers.

Electronic Commerce, Educational Technology and Community Informatics Usability Lab
The Electronic Commerce, Educational Technology and Community Informatics Usability Lab (EC3 Usability Lab) examines the areas where the virtual world interfaces with the physical world. It supports research in the human and user component of technology development. The lab develops and evaluates applications that merge the virtual and physical world and provide a platform for research in user interface, user response, and user requirements in areas such as electronic eommerce, educational technology, computational design and community informatics. Its facilities include head and eye tracking equipment, usability evaluation hardware and software, collaboration systems, servers, terabyte storage arrays, software, and desktop and laptop computers.

Admissions
There will be annual admission into the program with the possibility of early or out-of-cycle admissions in special cases.

The minimum standards will be those of SFU, as described in the graduate general regulations, augmented bythe following specific requirements.

It is our aim to admit groups of students with diverse backgrounds, across the broad areas in which our faculty have disciplinary expertise. The following admission requirements are designed to encourage such diversity while setting minimum standards for acceptance into the program.

Master's students will be admitted to study for either the MA or MSc degree. Students may articulate between the MA and MSc degrees by meeting the admission and program requirements of the degree to which they articulate and with the approval of the Graduate Program Committee. A student may make one application for articulation.

Minimum Standard Entrance Requirements for MA and MSc Programs

1. An undergraduate degree in a field related to the proposed program of study. For example:

- BSc Computer Science, BASc Engineering (Electrical, Communications, Computer Engineering) BA or BSc in Education, Management, Economics or Communications, BFA in Art, Design or Performing Arts, BA in Art, Art History, Architecture, Linguistics, Psychology or Philosophy, BArch, BLArch, BID).

Or

- An undergraduate degree in another, related discipline. Applicants under this category are required to make the case for (1) the relationship between the discipline in which they hold their previous degree or degrees and this program; and (2) how they would benefit from this program.

2. For applicants to the MSc, a record of substantial university coursework in scientific and/or technological areas.

3. Demonstrated ability in computing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of a foundational course in computing (this course **will not** count towards graduation requirements).

4. Demonstrated ability in academic writing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of selected writing intensive courses within the program (such courses **will** count towards graduation requirements). Applicants are to submit one sample of written work done as part of their undergraduate studies.

5. A minimum cumulative GPA of 3.0 or better at a Canadian university, or equivalent, for the undergraduate degree.

6. A suitable letter of intent explaining the applicant's motivation for selecting this degree program; summarizing relevant skills, training and experience; describing proposed research directions within the program and indicating how the course of study would contribute to future intellectual or professional growth. All of the above four points should be explicitly addressed in the letter of intent.

7. Three reference letters each from a suitably qualified person.

Minimum Standard Entrance Requirements for the Doctor of Philosophy Program:

1, A graduate degree in a field related to the proposed program of study. For example:

- MSc Computer Science, MASc Engineering (Electrical, Communications, Computer Engineering) MA or MSc in Education, Management, or Economics, Communications, MFA in Art, Design or Performing Arts, MA in Art, Art History, Architecture, Linguistics, Psychology or Philosophy, MArch, MLArch).

Or

- A graduate degree in another, related discipline. Applicants under this category are required to make the case for (1) the relationship between the discipline in which

they hold their previous degree or degrees and this program; and (2) how they would benefit from this program.

Or

- An undergraduate degree in one of the two categories above. Applicants under this category are required to demonstrate both high academic standing (GPA of 3.5 or better at a Canadian university, or equivalent), for the undergraduate degree, and evidence of research aptitude and accomplishment.

2. A record of accomplishment in computing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of a foundational course in computing (this course **will not** count towards graduation requirements).

3. A record of accomplishment in academic writing. Students not meeting this criterion may be admitted conditionally subject to SFU regulations and successful completion of selected writing intensive courses within the program (such courses **will** count towards graduation requirements). Applicants should submit two samples of their scholarly written work.

4. A minimum cumulative GPA of 3.0 or better at a Canadian university, or equivalent, for the Master's degree.

5. A suitable letter of intent explaining the applicant's motivation for selecting this degree program; summarizing relevant skills, training and experience; describing and critically supporting proposed research directions within the program and indicating how the course of study would contribute to future intellectual or professional growth. All of the above four points should be explicitly addressed in the letter of intent.

6. Three reference letters each from a suitably qualified person.

Additional Admission Requirements for both Programs:

1. Demonstrated proficiency in the English language through one of the following means:

- A previous undergraduate or graduate degree completed at a university where English is the applicant's primary language of instruction
- A minimum score of 570 on the paper-based TOEFL test with a minimum TWE score of 5
- A minimum score of 230 on the computer-based TOEFL test with a minimum TWE score of 5

2. Portfolio/Interview:

Candidates who are being considered for admission may be required to submit a portfolio of their work and/or be required to attend a personal or telephone interview during the latter stages of the admissions process.

Advising and Supervision

Student supervision will comply with *Section 1.6 Supervision* of the Graduate General Regulations. Students entering the program will be assigned an interim advisor. The interim advisor has two main tasks: advising the student on issues related to study within the program and assisting the student in identifying and approaching potential senior supervisors. There is no requirement that the interim advisor has a role in supervision once the Senior Supervisor is approved.

The normal size of MA and MSc Supervisory Committees is two. The normal size of a PhD Supervisory Committee is two or three.

Degree Requirements

Students fulfill the following requirements to complete their degree.

		MA and MSc	PhD*	PhD (from MA or MSc with the program)
Foundation	IAT 800-3 Foundations of Computational Art and Design	*3 credits (possibly waived)*	*3 credits (possibly waived)*	
Coursework	IAT 801-3 Research Methods and Strategies	*3 credits*	*3 credits*	
	Core	2 courses *6 credits*	2 or 3 courses* *6 or 9 credits*	1 course *3 credits*
	Electives§	2 courses *6 credits*	2 or 3 courses* *6 or 9 credits*	3 courses *9 credits*
	Special Topics			
	Directed Readings			
	Total Coursework	5 courses *15 credits*	6 courses *18 credits*.	4 courses *12 credits*
Research	Co-operative Education	Optional	Optional	
	Research Seminar	Attendance requirement + 1 presentation	Attendance requirement + 2 presentations	
	Master's Thesis	required		
	PhD Comprehensive Examination		required	required
	PhD Proposal		required	required
	PhD Dissertation		required	required

Table 1: Curriculum Structure. Both courses and credits are listed. For determining degree requirements in core, elective, special topics and directed readings categories the number of courses of at least three credits each shall be used. *PhD students are required to take at least two (2) core courses and at least two (2) courses from electives, special topics or directed readings. PhD students must complete six (6) courses (18 credits) of coursework in addition to Foundations of Computational Art and Design..

§ At least one elective is required to be a research methods course appropriate to the student's course of study.

Coursework Requirements for all students

IAT 800-3 **Foundations of Computational Art and Design** is an introduction to computing as a research and professional tool in art and design. Its intended audience includes those who have not had substantial experience in the computational aspects of art and design. This is a mandatory course for all students in the program, but may be waived for those students having had sufficient formal educational background in art and design computation.

IAT 801-3 **Research Methods and Strategies** is an introduction to the research enterprise. It covers structures of research that are prevalent across fields, introduces research methodologies and tools, teaches methods for interdisciplinary work and fosters a critical discourse around the fundamental differences among research in different areas. This is a mandatory course for all students in the program.

There are five core courses, each offering the bases for research in an area in which a large group of faculty is involved. These courses are team-designed and taught by the faculty in the particular areas. MA and MSc students will be required to take two core courses. PhD students will be required to take either two or three core courses.

MA and MSc students are required to take two courses from the pool of electives, special topics and directed readings. PhD students will be required to take either two or three courses from this pool. Subject to Supervisory Committee approval and Graduate Program Committee approval, students in the program may fulfill part of these requirements through other appropriate graduate courses at SFU or elsewhere (the latter subject to SFU rules on external courses). Normally, all students must take at least one course towards these requirements as either an elective or special topics offered within the program.

The **Research Colloquium** is an important part of the scholarly life of the program. During their studies PhD students are required to present their research work in at least two seminars as part of this series. MA and MSc students are required to present in one seminar. All students are expected to attend a large majority of the seminars in the series.

Co-operative Education

On an optional basis and with approval of the Graduate Program Committee, MA, MSc and PhD students may participate in **co-operative education** by placement in a government or private research agency to gain practical experience in their thesis or dissertation area. The co-operative education option is separate from coursework in the program and serves as an adjunct to the thesis/dissertation process.

Master's requirements

MA and MSc produce and defend a thesis as part of degree requirements. All SFU regulations on thesis form and examination process apply. The standards of scholarship – quality of work - set for the MSc are no less than those for the doctorate, except the scale, scope and originality of the thesis may be less. Commonly, the Master's thesis shows refinement of a developed scholarly specialization, a useful replication of established note and in some cases a pretesting or prototype of supporting ideas for eventual Ph.D research.

MSc requirements

The MSc is distinguished from the MA by additional constraints on coursework requirements. In addition to the program requirements in Table 1 above, MSc students must fulfill coursework by taking courses from those specified in Table 2 below.

Core Courses	**Electives, Special Topics and Directed Readings**
The two required Core Courses shall be selected from the following pool. IAT 814-3 *Knowledge Visualization and Communication* IAT 812-3 *Cognition, Learning and Collaboration* IAT 813-3 *Artificial Intelligence in* Computational Art and Design	At least one course shall be taken from the following pool. IAT 840-3 *Models of Networked Practice* IAT 842-3 *Theory and Design of Games* IAT 844-3 *Spatial Computing* IAT 845-3 *Methods for Research into Technological Systems* A *special topics* course approved by the Graduate Program Committee for study towards the MSc degree. A *directed readings* course approved by the Graduate Program Committee for study towards the MSc degree.

Table 2: MSc coursework requirements

PhD requirements

The PhD degree requires a comprehensive examination aimed at testing for achievement in interdisciplinarity, breadth of knowledge, depth of knowledge, topic focus and scholarly skill.

The PhD degree requires a dissertation proposal aimed at collegial review of the proposed work, development of research formulation and presentation skills and approval of the dissertation work by the Supervisory Committee and the Graduate Program Chair. The approval of the Graduate Program Chair is largely for oversight issues, for example, required ethics clearances. The dissertation proposal has two components: a research prospectus and a public event with timely notification given to the campus community.

PhD students produce and defend a thesis as part of degree requirements. All SFU regulations on thesis form and examination process apply.

Ph D Comprehensive Examination

With the consent of their Supervisory Committee, students may sit the comprehensive examination following completion of required course work. Upon passing, the student will be admitted to full degree candidacy. The examination may be retaken once.

As part of preparation to undertake the comprehensive examination, the student shall submit, to his or her supervisory committee, a comprehensive annotated bibliography of

readings used throughout course work and readings related to their proposed thesis topic. The student's senior supervisor will inform the Graduate Program Committee of the supervisory committee's consent for the student to sit the examination and will provide a copy of the annotated bibliography.

Upon receipt of the consent and annotated bibliography from the senior supervisor, the Graduate Program Committee will strike an examination committee comprising the student's Supervisory Committee, the Graduate Program Chair or designate, and one other member of faculty in the School eligible to act as a Senior Supervisor. The Graduate Program Chair or designate shall chair the Examination Committee.

The examination shall have three sections. The first will test for breadth of knowledge within the student's course of study. The second will test for knowledge of the proposed thesis topic. The third will test for knowledge of and skill with pertinent research methodology. At least two of the sections shall have a required archival component. The examination shall have an oral component that shall test for all three sections.

The examining committee shall refer to the bibliography in preparing the examination.

The examination process should not exceed one term in duration from the date of notification to the Graduate Program Committee of the consent to sit for the examination. This time may be longer should a student be required to retake the examination.

Specific guidelines for these examinations are available from the graduate program assistant.

Graduate Courses

IAT 800-3 Foundations of Computational Art and Design (3 credits)

Aims at a robust understanding of models for art and design and representations of these models as symbol systems. It meets these aims through a set of case studies that demonstrate how computational thinking can affect professional and research outcomes. Its outcomes are preparedness for further relevant study and skill development in using computers to support research and professional work in art and design.

IAT 801-3 Research Methods and Strategies (3 credits)

Maps key methods and strategies of building reliable knowledge across diverse specializations within the graduate program. It is meant not so much to build specific expertise in a given set of techniques as to recognize issues underlying most all research and to appraise critically methods of observation, test and organization of findings. The course provides a common basis for discussion and criticism of research. The goal is a broad reading literacy across a spectrum of research, an essential step to knit collaboration and scholarly community.

Core Courses

IAT 810-3 New Media (3 credits)
Theory, history and current research in the field of new media. Its methods are the interweaving of design, social/cultural, learning and aesthetic theories. Historical views of the field are provided through an analysis of the histories of technology, moments of media emergence, social and cultural movements, design and aesthetics. Outcomes are exploration, analysis and development of applied methods in order to better understand, design, create and assess new media and future "newer media" developments.

IAT 811-3 Computational Poetics (3 credits)
Provides students the opportunity to engage in critical, creative thinking and practice in the discovery of the emergent overlying principles and concepts that enable one to describe, analyze, evaluate and design interactive multi-mediated experience. The structure of the course will centre on art in the age of information, virtuality, compositional design and practice.

IAT 812-3 Cognition, Learning and Collaboration (3 credits)
Addresses what it means to know something, how people gain and use knowledge and complex skills, how to determine what an individual knows, how humans learn, how humans solve complex problems, how knowledge is created within a social and group context, and how to model human capabilities and performance. It selects and studies theoretical perspectives that inform the design of computer-based mediated environments, products and experiences.

IAT 813-3 Artificial Intelligence in Computational Art and Design (3 credits)
Working through a set of motivating examples from domains such as generative design, dance simulation, social interaction, adaptive user interface design and knowledge sharing in e-learning the course provides insights on how AI techniques can be used to address important problems in art and design. The topics are presented in a comparative manner to clearly highlight advantages and disadvantages of each method providing students with ability to weight benefits of a particular approach when facing a concrete problem in their research area.

IAT 814-3 Knowledge Visualization and Communication (3 credits)
Provides a cognitive and computational framework for understanding and designing graphical and visual representations. Investigates several psychological and computational models of diagram processing, and explore diverse interactive graphical systems.

Elective Courses

IAT 830-3 Learning Design and Media (3 credits)
Students will gain an understanding of instructional design as an evolving set of theories and practices based on learning research. They will develop detailed knowledge of design strategies for interactive learning media and will be able to explain how they relate to cognitive theories of learning. As an overarching goal, students will develop the knowledge and skills to conduct basic research projects relating to the design of learning media.

IAT 831-3 Encoding Media Practice (3 credits)
Studies conceptual, aesthetic, and computational issues and techniques involved in the encoding of interactive media objects. It includes study of theoretical and poetical backgrounds in computer-human interaction (Bush, Dinkla, De Landa, Grosz, Deleuze, Manovich, Murray, Laske, Hamman, Ascott, Penny, Kahn), basic tenets of programming for the arts (media representations, practical machine perception, algorithmic processes, database strategies, display techniques), and practical exercises in programming interactive computer art that may include interactive cinema, audio and narrative.

IAT 832-3 Exploring Interactivity (3 credits)
Analyses, designs and prototypes more effective and more appropriate products and systems to support interactivity. This course will examine these issues through an iterative modeling process.

IAT 833-3 Embodiment and Electronic Performance (3 credits)
Combines theoretical and practical explorations of physicality and live performance in technologically mediated environments. It offers an introduction to phenomenology as a methodology for analyzing and elaborating new physical and technological hybrids. Students devise a performance experiment, while simultaneously exploring critical discourses around embodiment, virtuality, gender, and communication. This course is designated as a research methods course.

IAT 840-3 Models of Networked Practice (3 credits)
Examines several social frameworks for describing mutual activity in work and learning particularly in computer supported networked environments. The frameworks are used to describe, analyse and design the tools and approaches for new communities of practice. This course is designated as a research methods course.

IAT 842-3 Theory and Design of Games (3 credits)
Games have become a major part of our culture, rivalling the popularity of movies. Drawing on a wide variety of examples and disciplines, this course examines theories and techniques for the analysis of existing games and the design of new ones. It studies game design, and will provide students with the conceptual and technical tools necessary to critique and design games of all kinds.

IAT 844-3 Spatial Computing (3 credits)
Covers the concepts, algorithms and design principles underlying modern 3D computer animation and visualization from a user interface perspective. Research topics include 3D user interface constructs; information, data and knowledge visualization; 3D graphics and animation; spatial perception; and virtual and immersive environments.

IAT 845-3 Methods for Research into Technological Systems (3 credits)
Key models of research into technological systems are analysed and compared. Together, they frame diverse methodologies for art, social science, business, engineering and information technology. Focus will vary by instructor and disciplinary combination being examined. In contrast to the Research Methods and Strategies Course, this offering considers specialized, discipline specific research tools taken in combination. These may be qualitative, quantitative, laboratory-based, field based (as

in survey research), actively experimental or based on secondary analysis of archival data. This course is designated as a research methods course.

Special Topics

By its very nature the content of a special topics course will vary. Eight such courses are proposed, so that course numbers will recur only every two years. Thus students are unlikely to register for a single special topics course more than once. Special topics courses offered in the program will be approved by the Graduate Program Committee to essentially the same criteria required for approval of a new elective. At the time of approval, each special topics course will be evaluated for suitability for study towards the MSc degree and the results of such evaluation will be noted in the course approval and course outline. At the time of approval, each special topics course will be evaluated for suitability for fulfilling the program's research methods requirement and the results of such evaluation will be noted in the course approval and course outline.

IAT 881-3 Special Topics I (3 credits)

IAT 882-3 Special Topics II (3 credits)

IAT 883-3 Special Topics III (3 credits)

IAT 884-3 Special Topics IV (3 credits)

IAT 885-3 Special Topics V (3 credits)

IAT 886-3 Special Topics VI (3 credits)

IAT 887-3 Special Topics VII (3 credits)

IAT 888-3 Special Topics VIII (3 credits)

Directed Readings

Normally a student would take at most one (MA or MSc) or two (PhD) directed readings course during their degree. Directed readings offered within the program will be approved by the Graduate Program Committee to essentially the same criteria required for approval of a new elective. At the time of approval, a directed readings course may be approved for study towards the MSc degree. At the time of approval, a directed readings course may be approved as fulfilling the program's research methods requirement.

IAT 871-3 Directed Reading I (3 credits)

IAT 872-3 Directed Reading II (3 credits)

IAT 873-3 Directed Reading III (3 credits)

Co-operative Education

Co-operative education is intended to provide opportunities for MA, MSc and PhD students to gain practical research experience in settings external to the program. Enrolment in co-operative education requires successful completion of at least two courses within the program, good academic standing, no deferred grades and approval of the Graduate Program Committee.

The co-operative education option is separate from coursework in the program and serves as an adjunct to the thesis/dissertation process. Students wishing to participate in this program are responsible for making all arrangements external to the program. Students participating in co-operative education will be eligible for the *co-op registration fee* as listed in the Graduate Fee Schedule of the Graduate Regulations.

IAT 861-0 Practicum I (0 credits)

IAT 862-0 Practicum II (0 credits)

MA Thesis, MSc Thesis and PhD Dissertation

IAT 897-6 MA Thesis

Students who are working on their Master of Arts thesis register in this course. This course will not count towards the coursework requirements.

IAT 898-6 MSc Thesis

Students who are working on their Master of Science thesis register in this course. This course will not count towards the coursework requirements.

IAT 899-6 PhD Dissertation

Students who are working on their PhD dissertation register in this course. This course will not count towards the coursework requirements. PhD candidate status is neither required for nor implied by registration in this course.

APPENDIX E: LIBRARY ASSESSMENT

URL: http://www.lib.sfu.ca/about/collections/courseassessments/siatgrad.htm

Library Course and Program Assessment for
Proposal for a Graduate Program in the School of Interactive Arts and Technology

Updated: November 28, 2003

Introduction | Required courses | Core courses | Elective courses | Other courses | Total library costs

Introduction

This is the Library's assessment of collection needs to support the proposed graduate programs within the School of Interactive Arts and Technology at the Surrey campus. The programs are being planned for a steady state of 90 graduate students in the School at any given time.

The SFU Library collection now includes over 9000 electronic journals and the Library is committed to moving more of its journal collection to electronic format in the coming years, in part to address the multi-campus reality of the university. A core collection of journal titles relevant to the subject focus of the proposed program already exists at SFU Surrey, in either print and/or electronic form. The journal collection of Tech BC was pared down and de-duplicated from SFU holdings at the time of the transfer to SFU, but when taken together with the overall electronic holdings of the SFU Library, is suitable as a core collection to support the proposed courses. The adequacy of the collection is substantiated by the fact that the vast majority of journal articles on course reading lists are available at the SFU Library, and most online. With only a few exceptions, noted below, additional needs can be met by delivering articles from the Bennett Library print journal collection as required.

Therefore, the primary focus of this assessment is the monograph collection at the Surrey campus. Where substantial reading lists were included in the proposed course outline, the assessment focuses on ensuring that these titles are held at Surrey. In some cases there are multiple copies in the Bennett Library collection and one copy can be permanently transferred to Surrey without cost. Newer titles, and titles not held at the SFU Library have been prioritized for purchase. Not all titles on each reading list have been listed for purchase; where the reading lists were exhaustive, a core collection at Surrey can be adequately supplemented by delivery from the Bennett Library.

For courses without substantial reading lists in the course outlines, the assessment is based on an evaluation of the Surrey and SFU holdings on the relevant subjects, as well as any changes to our present collection development activities required to continue building appropriate holdings at Surrey. The book approval profile with our principal book wholesaler, Blackwell Books, is used as an indicator of current collecting activities for Surrey. However, the Surrey collections budget is not adequate to allow the Library to order all core new publications in the subject areas of this program. Therefore, a general assessment at the end of the report addresses the need for deeper book collections. Few modifications to the profile will be needed, but more funding to order the material identified by the profile is required.

Required Courses

Foundations of Computational Art and Design

This is a graduate level introduction to concepts of and skills in computing. It was successfully offered as a Special Topics course in September 2002, and covers discrete mathematics, computability, and applications such as artificial intelligence and symbolic computation such as Lindenmayer systems.

There are two books listed on the course outline for this course, both of which are held at SFU Surrey.

LC Subject heading	Surrey holdings	SFU holdings
Algorithms	1	301
Artificial intelligence	17	729
Combinatorial analysis	1	143
Computer algorithms	9	176
Computer programming	15	657
Computer science-Mathematics	10	98
Data structures-computer science	4	210
Functional programming-computer science	0	19
Graph theory	2	239
L systems	0	6
Logic programming	1	76
Logic-Symbolic and mathematical	3	519
Machine learning	1	112
Mathematics	13	669
Object oriented programming-computer science	23	416
Set theory	1	199
System analysis	14	670
TOTAL	**115**	**5239**

Headings covering the topics of this course are included on the Blackwell forms profile for Surrey.

Research Methods and Strategies

A graduate level course in research methodology. There are 17 books on the reading list for this course. All but one are held in the SFU Library, but only 9 of them are at the Surrey campus. Those that are still in print should be added to the Surrey collection.

Researching culture : qualitative method and cultural studies / P. Alasuutari, 1995. Sage 0803978308 **$93**

Who owns history? : rethinking the past in a changing world / E. Foner, 2002. Hill & Wang. 0809097044 **$32**

Design and analysis : a researchers handbook / G. Keppel, 1991. Prentice Hall. 0132007754 **$162** (also on the list for Methods for Research into Technological Systems)

Reliable knowledge / H. Larrabee, 1991. Houghton Mifflin. 0521406706 **$32**

The ideological octopus / J. Lewis, 1991. Routledge. 0415902878. **$62**

One of the four Bennett Libray copies of *Kreps investigating communication* should be moved to the Surrey collection. Two titles on the list are not in print.

One-time cost: $381
As evidenced by the lack of Surrey holdings, this subject is not covered in Surreys current collection development activity. The Blackwell subject heading Social Science Research should be added to profile and set to forms so that a small selection of new material on this topic can be added to the Surrey collection each year. This heading will also bring in useful current material for one of the elective courses in the program, Methods for Research into Technological Systems.

Core Courses

New Media

Of the 36 books on the reading list for this course, 21 are held at Surrey and an additional 14 are in the Bennett Library. One title is forthcoming and will fall under Surreys current collecting activities. Copies of the following recent books should be added to the Surrey collection.

Handbook of new media : social shaping and consequences of ICTs / Lievrouw & Livingstone, eds., 2002. Sage. 0761965106. **$187**

The new media book / D.Harries, ed., 2002 British Film Institute. 0851709249. **$110**

One-time cost: $297

Knowledge Visualization & Communication

Headings covering the topics of this course are included on the Blackwell forms profile for Surrey. In addition, three books from the reading list should be added to the collection.

Diagrammatic reasoning : cognitive and computational perspectives / B.Chandrasekaran, ed., 1995.. AAAI Pr/M I T Pr. 0262571129. **$89**

The Ecological Approach to Visual Perception / J.Gibson,1979. Lawrence Erlbaum.
0-89859-959-8 **$60**
Vision / D.Marr, 1983. W. H. Freeman 0-7167-1567-8 **$56**

One-time cost: $205

Cognition, Learning and Collaboration

Of the 18 books on the course reading list, twelve are held at SFU, but only five at Surrey. Many are now out of print and will be difficult to acquire, but the following should be added to the Surrey collection.

Adaptive learning environments: foundations and frontiers / ed. by M. Jones, ed. (NATO ASI Series. Series F, v.85), 1992. NATO Scientific Aff. Div. 0387554599 **$164**

Computers as cognitive tools / S. Lajoie, ed., 1993. Lawrence Erlbaum 0-8058-1082-X **$48**

Computers as cognitive tools, v.2: No more walls : theory change, paradigm shifts, and their influence on the use of computers for instructional purposes / S. Lajoie, ed., 2000. Lawrence Erlbaum. 080582930X **$153**

Constructivism and the technology of instruction : a conversation / T. Duffy, ed., 1992. Lawrence Erlbaum. 0805812725. **$44**

Learning and awareness / Marton & Booth, 1997. (Educational psychology series) Lawrence Erlbaum. 0805824545 **$66**

Mental models / D. Gentner, Dedre et al., 1983. Lawrence Erlbaum. 0-89859-242-9 **$72**

Mental models / P. Johnson-Laird, 1983. Harvard Univ. Press. 0-674-56881-8 **$51**

Self-regulated learning and academic achievement : theoretical perspectives / edited by Zimmerman & Schunk, eds., 2nd ed. 2001. Lawrence Erlbaum. 0805835601 **$106**

One-time cost: $704

Artificial Intelligence in Computational Art and Design

The Blackwell subject heading Artificial Intelligence is in the Surrey profile. The Surrey collection includes 17 books with the corresponding LC subject heading. The text for this course is in the Surrey collection. In addition, the Library provides access to several online collections that will be useful for this course: *Lecture Notes in Computer Science*; *IEEE/IEE Electronic Library*, including not only journals but conference proceedings; and the *ACM Digital Library*.

Computational Poetics

Of the 24 books on the course reading list, only seven are held at Surrey, with an additional twelve titles in the Bennett Library collection. The following titles should be added to the Surrey collection.

Art and technics / L.Mumford, 2000. (Bampton lectures in America) Columbia Univ. Press. 0231121059. **$20**

Basic writings / M. Heidegger, 1993. Harpercollins. 0060637633. **$24**

Before and after the I-Bomb: An Artist in the Information Environment / T.Sherman et al., 2002. Banff Centre Press. 0-920159-94-X **$30** (also on list for Encoding Media Practice)

The Cambridge companion to John Cage / edited by D.Nicholls, ed., 2002. (Cambridge companions to music) Cambridge Univ. Press. 0521783488. **$103**

Fluid concepts and creative analogies / D. Hofstadter, 1995. Basic Books 0465024750. **$32**

The poetics of space / G. Bachelard, Gaston, 1994. Beacon Press. 0807064734 **$20**

The logic of practice / P.Bourdieu, 1990. Stanford Univ, Press 0804720118 **$29**

Metamagical themas : questing for the essence of mind and pattern / D.Hofstadter, 1985. 0465045669 **$42**

Multiple meaning : techno : an artistic and political laboratory of the present / M.Gaillot, 1998. (Plastic arts) Editions Dis Voir, FR/Dist Art Pub Consortium. 2906571768 **$31**

Olafur Eliasson : surroundings surrounded : essays on space and science / P. Weibel, ed., 2001. Neue Galerie/Z K M Ctr Art & Media/M I T Pr. 0262731487. **$50**

Otto Laske : navigating new musical horizons / J.Tabor, ed., 1999 (Contributions to the study of music & dance, no.53) Greenwood Pr/Greenwood Publ Grp Inc. 031330632X. **$86**

A shock to thought : expression after Deleuze and Guattari / B.Massumi, ed., 2002. Routledge/ ITP Services. 041523803X. **$121** (also on list for Encoding Media Practice)

Snap to grid : a user's guide to digital arts, media, and cultures / P.Lunenfeld. M I T Press. 026212226X. **$66** (also on list for Encoding Media Practice)

The Spell of the Sensuous: Perception and Language in a More-Than-Human World / D. Abram, 1997. Random House Canada. 0-679-77639-7 **$23** (also on list for Embodiment and Electronic Performance)

One-time cost: $677

The reading list for this course also indicates that an SFU Surrey faculty member has an article in press in *Computer Art Journal*, which is on the reading list for this course. The Library does not currently subscribe, and will need to add this title to the collection.

Elective Courses

Learning Design and Media

Headings covering the topics of this course are included on the Blackwell forms profile for Surrey.

Models of Networked Practice

Headings covering the topics of this course are covered on the Blackwell forms profile for Surrey. The majority of the titles on the course reading list are available at the SFU Library, and several are already in the Surrey collection. However, four titles should be acquired for Surrey.

Perspectives on activity theory / Y.Engestrom et al., eds., 1999. (Learning in doing : social, cognitive and computational perspectives) Cambridge Univ.Press. 0521431271. **$165**

Managing industrial knowledge : creation, transfer and utilization / I.Nonaka & D.Teece, eds., 2001. Sage Publs.. 0761954988. **$132**

Knowledge management foundations / S.Fuller, 2002. Butterworth-Heinemann. 0750673656. **$33**

Social Structures: A Network Approach / Wellman & Berkowitz, 1997. JAI Press/Elsevier. 0762302917. 1997 **$52**

One-time cost: $382

Encoding Media Practice

All the in-print books on the reading list for this course are either already held at Surrey or on the list of acquisitions for other courses. Headings covering the topics of this course are included on the Blackwell forms profile for Surrey.

Theory and Design of Games

Headings covering the topics of this course are included on the Blackwell forms profile for Surrey.

Exploring Interactivity

Headings covering the topics of this course are included on the Blackwell forms profile for Surrey, but two additional titles should be acquired.

Bringing design to software / T.Winograd, ed., 1996. ACM Press/Addison-Wesley. 0201854910. **$46**

New Thinking in Design: Conversations on Theory and Practice / C.Mitchell, 1996. 0-471-28604-4 **$105**

One-time cost: $151

Embodiment and Electronic Performance

Of the 24 books on the course reading list, eleven are held at the Surrey Library, with another nine available at the Bennett or Belzberg libraries. The following titles should be acquired for Surrey.

Absent body / D.Leder, 1990. Univ. of Chicago Press 0-226-46999-9 **$61**

Cybersexualities : a reader on feminist theory, cyborgs and cyberspace / J.Wolmark, ed., 1999. Edinburgh Univ. Press. 0748611185. **$110**

Feminist theory and the body : a reader / Price & Shildrick, eds. Routledge. 0415925665. **$44**

Flesh and machines : how robots will change us / R.Brooks, 2002. Pantheon/Random House. 0375420797. **$34**

The Future of the body / M. Murphy, 2002. Putnam 0-87477-730-5 **$33**

Instrumental Realism : Interface Between Philosophy of Science and Philosophy of Technology / D.Ihde, 1991. Indiana Univ. Press. 025320626X **$64**

Naked to the bone : medical imaging in the twentieth century / B.H.Kevles, 1997. (Sloan technology series) Rutgers Univ. Press. 0813523583 **$79**

The Routledge reader in gender and performance / edited by L.Goodman, ed., 1998. 0415165822. **$119**

This sex which is not one / L.Irigaray, 1985. Cornell Univ. Press. 0801493315 **$24**

One-time cost: $568

Spatial Computing

Headings covering the topics of this course are included on the Blackwell forms profile for Surrey, but two titles from the course reading list should be added to the Surrey collection.

Curves and surfaces for computer-aided geometric design : a practical guide / G.Farin, 4th ed., 1997. (Computer science & scientific computing) Academic Press. 0122490541. 4th. (Book + CD) **$91**

Geometric concepts for geometric design / W.Boehm, 1994. AK Peters. 1568810040. **$78**

One-time cost: $169

Methods for Research into Technological Systems

Many of the books on the course reading list are now out of print, or are older works, and the majority of these are available in the Bennett Library. As the course reading list is meant to be suggestive only, the addition of the Blackwell subject heading Social Science Research to the Surrey forms profile will bring in new titles useful for this course as described under the Research Methods and Strategies course. One recent title should be acquired for the Surrey collection.

Cross-National Research Methods in the Social Sciences / L.Hantrais, et al., 2000. Pinter Publishers 1-85567-344-4 **$165**

One-time cost: $165

Other courses

There are no library costs associated with the remaining courses in the program:

- Special Topics (12 courses)
- Directed Readings (3 courses)
- MA Thesis
- MSc Thesis
- PhD Candidacy
- PhD Dissertation

Total library costs

The sum of all one-time costs outlined above is $3968. The Library therefore assesses a one-time cost of $4000 to acquire the items listed above.

Total one-time cost: $4000

The ongoing costs to support this program are calculated as follows:

Addition of Social Science Research heading to Blackwells profile, and selection of approximately 10 new books per year: $1000

New journal acquisitions: *Computer Art Journal* $230 (print + online)

The one-time acquisitions outlined above will ensure that the majority of items on the course reading lists will be available to students and faculty. However, more depth will be required to properly support a graduate program. The size of the Surrey Librarys acquisitions budget has meant that even recent imprints (2000 and onward) central to graduate studies at SIAT have not been acquired in the year of their publication. Without an additional allocation, the SFU Surrey Library will be unable to keep up even a core collection of new publications in this field. An additional $8,000 per year will be required to allow the Surrey library to collect deeply enough to acquire relevant new imprints in the subject areas of this program at a level suitable for graduate studies.

The program proposal identifies the uniqueness of the research to be undertaken within the School. Adequate library holdings will be essential to making this the world-class program it aspires to be.

Total ongoing costs: $9,230/year

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