SIMON FRASER UNIVERSITY S. 83-23

MEMORANDUM As amended at Senate - Jan. 10/83

To: Senate

From: Office of the Dean of Graduate Studies

Subject: Graduate Curriculum Changes -
Change in title for CMPT 820
Change in description for CMPT 821
New Course Proposals - CMPT 822-3,
CMPT 842-3, CMPT 851-3 and CMPT 852-3

Date: December 22, 1982

Action undertaken by the Executive Committee, Senate Graduate Studies Committee at its meeting on December 13, 1982, gives rise to the following motion:-

MOTION:

"That Senate approve and recommend approval to the Board of Governors, as set forth in S.83-23 , the change in title for CMPT 820, the change in description for CMPT 821 and the following new course proposals:

CMPT 822-3
CMPT 842-3
CMPT 851-3
CMPT 852-3"

J.M. Webster
Dean of Graduate Studies

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owing changes (from 3 to 7) in Special
es:

Special Topics in Theoretical Computing Science
Special Topics in Artificial Intelligence
Special Topics in Programming Languages
Special Topics in Database Systems
- Special Topics in Computer Architecture
- Special Topics in Operating Systems
- Special Topics in Hardware Design"

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Mr. H.M. Evans, Registrar and Secretary to the Senate Committee on Graduate Studies

From: Janet Blanchet, Administrative Assistant, Faculty of I.D.S.

Subject: NEW GRADUATE COURSE PROPOSALS AND CURRICULUM CHANGES, COMPUTING SCIENCE

Date: November 3, 1982

At a meeting of the Faculty of Interdisciplinary Studies Graduate Studies Committee members of the committee reviewed and approved the following curriculum changes and new course proposals as set forth in the attached documentation:

Special Topics

Three existing Special Topics course titles have been modified to show greater specificity.
Four new Special Topics courses have been added to the curriculum.

Title Change

Existing title: CMPT 820-3, Heuristic Programming.

Proposed title: CMPT 820-3, Artificial Intelligence.

Course Description Change

Existing description:

CMPT 821-3, Pattern Recognition and Image Processing. The representation of patterns and images; filtering and image enhancement; simple discrimination algorithms; statistical and structural approaches; applications in medicine, earth resources, etc.

Proposed description:

CMPT 821-3, Pattern Recognition and Image Processing. The representation of patterns and images; basic image processing techniques; discrimination algorithms; statistical, structural and syntactical approaches; applications in medicine, earth sciences, etc.

New Course Proposals

CMPT 822-3, Computational Vision.

CMPT 842-3, Distributed Computing.

CMPT 851-3, Reliable and Fault-Tolerant Computing.

CMPT 852-3, VLSI System Design.

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Mr. H.M. Evans, Registrar and
Secretary to the Senate Committee
on Graduate Studies

New Graduate Course Proposals and
Curriculum Changes,
Computing Science November 3, 1982

Dr. S. Verdun-Jones, Acting Dean of Interdisciplinary Studies, has held discussions with Dr. J. Chase, Secretary to the Senate Committee on Academic Planning, and Mr. H.M. Evans, Secretary to the Senate Committee on Graduate Studies, and it has been ascertained that the changes incorporated in the foregoing do not constitute a major program proposal, and therefore there is no need to route them via the Senate Committee on Academic Planning.

Would you please place these items on the agenda of the Senate Committee on Graduate Studies.

JB/rj

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Dr. John Chase, Secretary of SCAP
[redacted]

From: Dr. S.N. Verdun-Jones,
Acting Dean,
Faculty of I.D.S.

Subject: Computing Science Graduate Course Proposals

Date: 1982-10-24

Our File No. 1G2(a)

I am forwarding copies of the proposed changes in the graduate course structure of the Computing Science Department. At the present time, I am requesting that you peruse these proposals in order to establish whether or not they constitute "major" changes and, therefore, require in-principle approval by SCAP.

The proposed graduate course changes include the following:

1. Expanding the number of special topics courses from three to seven and assigning special topics course no.'s to particular areas in Computing Science.

2. Changing one course title

3. Changing one course description

4. Introduction of four new courses

The Computing Science Department has emphasized that the mounting of four new courses will not require additional resources. In fact, the proposed new courses have been offered in the past as special topics courses. In my submission, the proposed changes represent "fine tuning" of an existing graduate program and, therefore, should not be categorized as "major" changes.

Simon N. Verdun-Jones

SVJ:mf

cc: Dr. N. Cercone,
Computing Science

Dr. W.S. Luk,
Chairman,
Graduate Program Cmtee.
Computing Science

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MEMORANDUM

To: Dr. S. Verdun-Jones, Acting Dean Interdisciplinary Studies	From: W.S. Luk, Chairman Graduate Studies Committee Computing Science
Subject: New Graduate Course Proposals	Date: 20 October 1982

Since our graduate program was first proposed four years ago, it has undergone only one minor revision. Meanwhile, there have been a great number of changes related to our graduate program. First of all, our graduate program has become more mature. We now have more experience in actually running our own graduate program. Our graduate enrollment at the Master's level is growing. Our Ph.D. program is just in place and already there are Ph.D. students in the Department. Perhaps more importantly, some of the faculty members have since left the Department and many more have since joined us. This year, half of the graduate courses in our Department are being or will be offered as special topics courses. Some other graduate courses are being taught quite differently from the calendar descriptions. Naturally there is a lot of confusion for the instructors and the students alike. To rationalize, we are proposing new courses that are currently taught as special courses and modifying course titles and descriptions of some existing graduate courses. From the viewpoint of attracting new graduate students, it is also important to bring our graduate curriculum up-to-date in a discipline as dynamic as computing science.

We would like to emphasize that the attached course proposals do not constitute a major shift in direction in our graduate program and no additional resources are required to mount these proposed courses.

W.S. Luk

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Attachments
- list of course changes
- four course proposals

Computing Science Graduate Course Changes — October, 1982

1) Renumbering special topics courses:

Existing: CMPT 881 Special Topics
CMPT 882 Special Topics
CMPT 883 Special Topics

Proposed: CMPT 881 Special Topics in Theoretical Computing Science
CMPT 882 Special Topics in Artificial Intelligence
CMPT 883 Special Topics in Programming Languages
CMPT 884 Special Topics in Database Systems
CMPT 885 Special Topics in Computer Architecture
CMPT 886 Special Topics in Operating Systems
CMPT 887 Special Topics in Hardware Design

2) Changing course title:

Existing: CMPT 820-3 Heuristic Programming
Heuristic problem solving; planning; concept formation; game playing and decision making; theorem proving and heuristic strategies; perception and vision; question-answering; comprehension of natural language.

Proposed: CMPT 820-3 Artificial Intelligence

3) Changing course description:

Existing: CMPT 821-3 Pattern Recognition and Image Processing
The representation of patterns and images; filtering and image enhancement; simple discrimination algorithms; statistical and structural approaches; applications in medicine, earth resources, etc.

Proposed: CMPT 821-3 Pattern Recognition and Image Processing
The representation of patterns and images; basic image processing techniques; discrimination algorithms; statistical, structural and syntactical approaches; applications in medicine, earth sciences, etc.

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Dr. Wo-Shun Luk Computing Science	From: Maurice Deutsch Library - Sciences
Subject:	Date: 82/10/27

With regard to the proposed changes in the 880 series of graduate level Special Topics courses and the four proposed new graduate courses (822, 842, 851, 852) the Library can provide adequate monograph and periodical resources. The two Blackwell computerized book profiles automatically retrieved practically all of the English language monographic material dealing with computers, computing science, hardware, software, and related fields. There is a growing body of indexing and abstracting publications and services available in the Library, both in printed and computer searchable forms. (Attached is a brief one page description of availability of computer searching services in the Library). Material not available at SFU can usually be borrowed or photocopied from UBC or elsewhere in Canada or the U.S.

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SIMON FRASER UNIVERSITY

New Graduate Course Proposal F

CALENDAR INFORMATION:

Department: Computing Science Course Number: 822

Title: Computational Vision

Description: A seminar based on the Artificial Intelligence approach to vision. Computational vision has the goal of discovering the algorithms (continued on attached....

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if anv:

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: 10 When will the course first be offered: 83-1

How often will the course be offered: once every four or five semesters

JUSTIFICATION:

Computational vision is a major area of Artificial Intelligence and an active research area in the Computing Science Department.

RESOURCES:

Which Faculty member will normally teach the course: Dr. Brian V. Funt

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Research papers will be provided by the instructor.

Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: Date: Oct 22, '82

Faculty Graduate Studies Committee: Date: NOV 1 1982

Faculty: Date:

Senate Graduate Studies Committee: Date:

Senate: Date:

Description continued:

and heuristics which allow a two-dimensional array of light intensities to be interpreted as a three-dimensional scene. By reading and discussing research papers -- starting with the original work on the analysis of line-drawings, and ending with the most recent work in the field -- participants begin to develop a general overview of computational vision, and an understanding of the current research problems.

APPENDIX A -- Outline of the Course CMPT 822 proposal

Early Work

L.G. Roberts, Machine perception of three-dimensional solids
A. Guzman, Decomposition of a visual scene into three-dimensional bodies
G. Falk, Interpretation of imperfect line data as a three-dimensional scene

Edge-detection and Region Growing

C.R. Brice and C.L. Fennema, Scene analysis using regions
Heuckel, A local visual operator which recognizes edges and lines

Gradient Space and Reflectance Map Techniques

Mackworth, Interpreting pictures of polyhedral scenes
Horn and Brachman, Using synthetic images to register real images with surface models
T. Kanade, Recovery of the three-dimensional shape of an object from a single view
B.K.P. Horn, Understanding image intensities

Scene Labelling

Huffman, Impossible objects as nonsense sentences
D. Waltz, Understanding line drawings of scenes with shadows

Representations: Primal Sketch, Intrinsic Images, 2½D sketch, Generalized Cones

Marr, Representing visual information
Barrow and Tenenbaum, Recovering Intrinsic Scene Characteristics from Images
Nevatia and Binford, Description and recognition of curved objects

Parallel Processing

Waltz, A parallel model for low-level vision
B. Funt, Problem-solving with diagrammatic representations

Psychological Studies

J. P. Frisby, Seeing: Illusion, Brain and Mind
Land, The Retinex Theory of Color Vision
Hudel and Wiesel, Brain Mechanisms of Vision
D. Marr and T. Poggio, A computational theory of human stereo vision

Industrial Applications

Perkins, Model-Based Vision System
A.P. Ambler, H.G. Barrow, C.M. Brown, R.M. Burstall and R.J. Popplestone, A versatile system for computer-controlled assembly

SIMON FRASER UNIVERSITY

New Graduate Course Proposal F

CALENDAR INFORMATION:

Department: Computing Science Course Number: 842

Title: Distributed Computing

Description: Parallel computation, network topology, communications protocols, ISO standards, data communication, local area networks, distributed operating systems and databases.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any:

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: When will the course first be offered: 83-2

How often will the course be offered: once per year

JUSTIFICATION:

With increased availability and quality, it is now practical to construct both local and long-haul networks reliably. There is an acute need for training students in this new emerging field to take advantage of the available new technology.

RESOURCES:

Which Faculty member will normally teach the course: T. Kameda, W.S. Luk

What are the budgetary implications of mounting the course: none

Are there sufficient Library resources (append details): Research papers will be provided by the instructor.

Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: Date: Oct. 22, '82

Faculty Graduate Studies Committee: Date: NOV 1 1982

Faculty: Date:

Senate Graduate Studies Committee: Date:

Senate: Date:

Syllabus for a proposed graduate course
in Distributed Computing -- CMPT 842

1. Introduction

   Why distributed? Applications, design issues, protocol hierarchies

2. Network Topology

   Different topologies, correctivity, delay, capacities

3. Data Communication

   Digital signal transmission, multiplexing, virtual circuit, parset switching, concentration

4. Protocols

   Data link protocols, flow control engineering, host-to-host protocols, examples (ARPA, DECNET, SNA), ISO standards

5. The Communication Subset

   Routing algorithms, congestion control, deadlock, broadcasting

6. Distributed Operating Systems and Databases

References

A.S. Tanenbaum "Computer Networks"

SIMON FRASER UNIVERSITY

New Graduate Course Proposal Form

CALENDAR INFORMATION:

Department: COMPUTING SCIENCE Course Number: 851

Title: Reliable and Fault-Tolerant Computing

Description: This course will cover fault-tolerance in hardware and software, viewing it as a powerful tool to assure the reliability and to provide continuous availability of computing systems. Existing fault-tolerant systems will also be studied.

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any:

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: When will the course first be offered:

How often will the course be offered: Once a year

JUSTIFICATION: The objective of this course is to consider the issues related to diagnosing and locating failures in digital systems, and the related problem of design of ultra reliable systems: systems which do not fail despite the presence of physical defects, systems which diagnose their own failures, and systems which are easily tested. The often critical applications, and increased complexity of current systems makes this course well justified.

RESOURCES:

Which Faculty member will normally teach the course: H. Reghbati, T. Kameda, A. Liestman

What are the budgetary implications of mounting the course: None

Are there sufficient Library resources (append details): Yes

Appended: a) Outline of the Course
b) An indication of the competance of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: Date: Oct. 22, 82

Faculty Graduate Studies Committee: Date: NOV 1 '82

Faculty: Date:

Senate Graduate Studies Committee: Date:

Senate: Date:

CMPT 851

RELIABLE AND FAULT-TOLERANT COMPUTING

Course Outline:

1. Approaches to Reliable Computing
   - Fault-Avoidance: Perfectionism in Hardware and Software
   - Fault-Tolerance: Reliability and Availability without Perfection

2. Specification of Fault-Tolerance
   - Fault Pathology: The Nature of Undersired Events
   - Basic Models and Quantitative Measures
   - Acceptance Criteria and Procedures

3. Principles of Protective Redundancy
   - Levels of Redundancy: Internal, Block, Network
   - Forms of Redundancy: Hardware, Software, Time
   - Functions of Redundancy: Masking, Detection, Recovery

4. Implementation: Fault-Tolerant System Case Studies
   - Long-Life Systems: JPL-Star and USAF FTSC
   - Spacecraft Computers
   - Real-Time Control: Space Shuttle; SIFT and FTMP Multiprocessors
   - High Availability: ESS Processors with On-Line Repair
   - Recent Advances: IBM, UNIVAC, INTEL, TANDEM, AUGUST, ETC.
   - Local Networks: Distributed System Issues

5. Evaluation and Design Tools
   - Advanced Modeling: Transient Faults
   - Degradability, Repair
   - Interactive Evaluation: The Aries 81 Design Tool

6. Fault-Tolerance in Software
   - The N-Version Programming and Recovery Block Approaches
   - Formal Specification: The "Hard Core" of Software

7. Conclusions and Prognosis: How Far Can We Go?

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CMPT 851

Library Resources

TEXTS

1. D. Siewiorek et al., "The Theory and Practice of Reliable System Design", Digital Press, 1982.

2. J. Wakerly, "Error Detecting Codes, Self Checking Circuits and Applications", North Holland, 1978.

3. M. Breuer et al., "Diagnosis and Reliable Design of Digital Systems", Computer Science Press, 1976.

4. D. Pradhan, "Fault-Tolerant Computing: Theory and Techniques", Prentice-Hall, 1983.

5. A. Arizienis, "Principles of Fault-Tolerant Computing", to be published, 1983.

Some of the above texts which are not currently available in the library will be ordered. There are many journals and conference proceedings relevant to this area, most of which are available in the library. Students can get access to the other publications through "Interlibrary Loans". The personal holdings of Reghbati, Kameda, and Liestman is also of value.

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SIMON FRASER UNIVERSITY

New Graduate Course Proposal F/

CALENDAR INFORMATION:

Department: Computing Science Course Number: 852

Title: VLSI System Design

Description: This course links two fields that traditionally have been considered two separate entities: computer architecture and integrated circuit design. (continued on attached)

Credit Hours: 3 Vector: 3-0-0 Prerequisite(s) if any:

ENROLLMENT AND SCHEDULING:

Estimated Enrollment: When will the course first be offered:

How often will the course be offered: once per year

JUSTIFICATION:

The objective of this course is to overcome the traditional separation between the computer architect and integrated circuit designer. In current technology, computer designers must be well versed in both fields -- computer architecture and design of ... (continued on attached)

RESOURCES:

Which Faculty member will normally teach the course: H. Reghbati, L. Hafer, R. Hobson

What are the budgetary implications of mounting the course: none

Are there sufficient Library resources (append details): please see attached

Appended: a) Outline of the Course
b) An indication of the competence of the Faculty member to give the course.
c) Library resources

Approved: Departmental Graduate Studies Committee: Date: Oct. 22, 82

Faculty Graduate Studies Committee: Date: NOV 1 1982

Faculty: Date:

Senate Graduate Studies Committee: Date:

Senate: Date:

New Graduate Course Proposal for CMPT 852

VLSI System Design

DESCRIPTION continued:

The vehicle used to demonstrate the interaction of layout issues and architectural concepts is metal oxide semiconductor technology.

JUSTIFICATION continued:

of integrated circuits -- in order to fully exploit the possibilities in VLSI chips.

CMPT 852

VLSI SYSTEM DESIGN

Course Outline:

1. Introduction

2. Integrated Circuit Layout

   Stick diagrams
   Function mapping
   Structured layouts
   Modular cells

3. IC Processing and Relative Dimensions

   MOS technology
   Parametrized design rules

4. Physics of MOS transistors and Time Scale

   MOS transistor operation
   MOS circuit simulation
   System timing

5. Hierarchical Circuit Modules

   Logic cell family
   Designing with module libraries

6. Existing Layout Tools

   Hand layout and digitization
   Interactive systems

7. Software Developments

   Intermediate descriptive form
   Human-oriented input language
   Joint data base
   High-level design tools

8. Constraints on Chip Design

   1/0 pins
   Chip size and materials limitations

9. Reliability and Testing

   Design for testability
   Debugging integrated circuits
   Test generation

10. Highly Concurrent Systems

    Algorithms for VLSI processor arrays
    Hierarchically organized machines
    Highly concurrent structures

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CMPT-852

Library Resources

TEXTS

1. C. Mead and L. Conway, "Introduction to VLSI Systems", Addison-Wesley, 1980.

2. S. Muroga, "VLSI System Design", Wiley-Interscience, 1982.

A copy of "Introduction to VLSI Systems" is available in the Library. A copy of "VLSI System Design" is being ordered for the library. The journals and conference proceedings in this area are available through the following sources:

1. Current holdings of the Library.
2. Interlibrary Loans
3. Personal holdings of: H. Reghbati, L. Hafer, and R. Hobson.

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