

# SIMON FRASER UNIVERSITY

## MEMORANDUM

**To:** Senate

**From:** Senate Committee on  
Undergraduate Studies

**Subject:** School of Engineering Science -  
Curriculum Revisions

**Date:** October 1, 1986

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Action undertaken by the Senate Committee on Undergraduate Studies at its meeting of September 30, 1986 gives rise to the following motion:

### **MOTION:**

"That Senate approve and recommend approval to the Board of Governors, as set forth in S.86-53, the proposed curriculum changes including:

New courses: ENSC 330-4 Materials Science  
                  ENSC 423-4 Modern Control Systems  
                  ENSC 435-4 Quality Control and Reliability  
                                  in Manufacturing

and the deletion of:

                  ENSC 230-3 Engineering Materials  
                  ENSC 435-3 Design of Machine Components  
                  ENSC 497-0 Internship I

and the schedules of studies for the options

- (a) Robotics and Control, and
- (b) Manufacturing Systems Engineering"

### **FOR INFORMATION:**

Acting under delegated authority at its meeting of September 30, 1986 the Senate Committee on Undergraduate Studies approved

**Editorial Changes to Calendar Description and/or Title for:**

ENSC 101 through 108 Engineering Communications  
ENSC 280-5 Linear Systems Dynamics  
ENSC 380-4 Production Systems  
ENSC 382-4 Introductory Control Systems  
ENSC 436-4 Manufacturing Processes  
ENSC 438-4 Robotics and Control  
ENSC 439-4 Computer Aided Design and Manufacturing  
ENSC 480-4 Industrial Engineering  
ENSC 498-3 Engineering Science Thesis Proposal  
ENSC 499-9 Engineering Science Undergraduate Thesis

**Prerequisite Changes to:**

ENSC 280-5 Linear Systems Dynamics  
ENSC 436-4 Manufacturing Processes  
ENSC 438-4 Robotics and Control  
ENSC 439-4 Computer Aided Design and Manufacturing  
ENSC 480-4 Industrial Engineering  
ENSC 498-3 Engineering Science Thesis Proposal

**Credit Hour Change - From 3 Credits to 4 Credits for:**

ENSC 380 Production Systems  
ENSC 436 Manufacturing Processes  
ENSC 438 Robotics and Control  
ENSC 439 Computer Aided Design and Manufacturing  
ENSC 480 Industrial Engineering

**Course Number Changes:**

ENSC 380-4 Production Systems (previously 480)  
ENSC 480-4 Industrial Engineering (previously 380)

**SIMON FRASER UNIVERSITY**

SCUS 86-12

**MEMORANDUM**

To.....R. Heath, Registrar.....

From...J. Blanchet, Secretary to the.....  
Faculty of Applied Sciences Undergraduate  
Studies Committee.....

Subject.....Engineering Science Curriculum  
Revisions. (ASU. 86-5).

Date.....September 19/86.....

At a meeting of the Faculty of Applied Sciences Undergraduate Studies Committee held on Tuesday, September 16/86, members of the committee approved curriculum revisions proposed for the School of Engineering Science as set forth in the attached document. With the exception of three new course proposals, all courses in this package were approved by Senate; they are set forth in Senate paper S. 82-21.

Would you please place this item on the next agenda of the Senate Committee on Undergraduate Studies.

*J. Blanchet*

## SIMON FRASER UNIVERSITY

## M E M O

To: Faculty of Applied Sciences Undergraduate  
Curriculum Committee

From: Dr. J.K. Cavers, Acting Director  
School of Engineering Science

Date: 15 September 1986

Subject: Curriculum Changes

Attached please find curriculum changes for consideration by the FAS Undergraduate Curriculum Committee. These result from starting options in Robotics and Control and in Manufacturing Systems Engineering. As well, some minor changes to tidy up some of our current program are also included. With the exception of three new courses, all courses were originally approved by Senate as set forth in S.82-21. The changes are summarized below:

New Courses

ENSC 330-4 Materials Science  
ENSC 423-4 Modern Control Systems  
ENSC 435-4 Quality Control and Reliability in Manufacturing

Editorial Changes to Calendar Description and/or Title:

ENSC 101 through 108 Engineering Communications  
ENSC 280-5 Linear Systems Dynamics  
ENSC 380-4 Production Systems  
ENSC 382-4 Introductory Control Systems  
ENSC 436-4 Manufacturing Processes  
ENSC 438-4 Robotics and Control  
ENSC 439-4 Computer Aided Design and Manufacturing  
ENSC 480-4 Industrial Engineering  
ENSC 498-3 Engineering Science Thesis Proposal  
ENSC 499-9 Engineering Science Undergraduate Thesis

Prerequisite Changes:

ENSC 280-5 Linear Systems Dynamics  
ENSC 436-4 Manufacturing Processes  
ENSC 438-4 Robotics and Control  
ENSC 439-4 Computer Aided Design and Manufacturing  
ENSC 480-4 Industrial Engineering  
ENSC 498-3 Engineering Science Thesis Proposal

Credit Hour Change - From 3 Credits to 4 Credits:

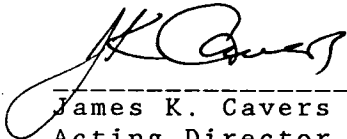
ENSC 380 Production Systems  
ENSC 436 Manufacturing Processes  
ENSC 438 Robotics and Control  
ENSC 439 Computer Aided Design and Manufacturing  
ENSC 480 Industrial Engineering

Course Number Change

ENSC 380-4 Production Systems (previously 480)  
ENSC 480-4 Industrial Engineering (previously 380)

Typical schedules for the two new options are included for information.

Thank you for your consideration.



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James K. Cavers  
Acting Director  
School of Engineering Science

Attachments

SIMON FRASER UNIVERSITY

M E M O

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To: Faculty of Applied Sciences Undergraduate  
Curriculum Committee

From: Dr. J.K. Cavers, Acting Director  
School of Engineering Science

Date: 15 September 1986

Subject: Course Deletion

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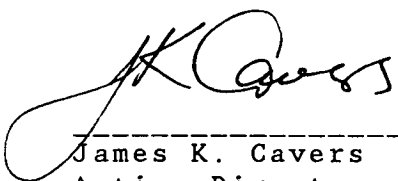
We request that the following course be deleted from the  
Calendar:

ENSC 230-3 Engineering Materials

ENSC 435-3 Design of Machine Components  
(to be replaced by ENSC 435-4 Quality Control  
and Reliability in Manufacturing)

ENSC 497-0 Internship I

Thank you.

  
-----  
James K. Cavers  
Acting Director  
School of Engineering Science

Attachments

• EDITORIAL CHANGES  
TO DESCRIPTION  
ONLY

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Engineering Science  
Abbreviation Code: ENSC Course Number: 101 through 108 Credit Hours:      Vector:     

Title of Course: Engineering Communications

Calendar Description of Course:

See Attached.

Nature of Course Seminar

Prerequisites (or special instructions):

What course (courses), if any, is being dropped from the calendar if this course is approved:

2. Scheduling

How frequently will the course be offered?

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible?

3. Objectives of the Course

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 1986 09 15

19. Sept 86

JK Owens  
Department Chairman

[Signature]  
Dean

[Signature]  
Chairman, SCUS

- ENSC 100            Engineering Communications  
Develops the student's written, verbal and graphical communication skills. This work is spread throughout the duration of the engineering program and includes evaluation of laboratory reports, course essays and project reports. The student will register for one component (ENSC 101-0 to ENSC 108-0) of the course each semester. These courses are graded on a credit/no entry basis.
- ENSC 101-0        Engineering Communications I  
first component of ENSC 100
- ENSC 102-1        Engineering Communications II  
second component of ENSC 100
- ENSC 103-1        Engineering Communications III  
third component of ENSC 100
- ENSC 104-1        Engineering Communications IV  
fourth component of ENSC 100
- ENSC 105-1        Engineering Communications V  
fifth component of ENSC 100
- ENSC 106-1        Engineering Communications VI  
sixth component of ENSC 100
- ENSC 107-1        Engineering Communications VII  
seventh component of ENSC 100
- ENSC 108-0        Engineering Communications VIII  
eighth component of ENSC 100



SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

- EDITORIAL CHANGES TO DESCRIPTION
- PREREQUISITE CHANGE

1. Calendar Information

Abbreviation Code: ENSC Course Number: 280

Department: Engineering Science

Credit Hours: 5 Vector: 3-0-4

Title of Course: Linear Systems Dynamics

Calendar Description of Course:

See Attached

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

ENSC 125, 222

What course (courses), if any, is being dropped from the calendar if this course is approved:

2. Scheduling

How frequently will the course be offered?

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible?

3. Objectives of the Course

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept '86

J. K. Owens  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

**ENSC 280-5 Linear System Dynamics**

[3,0,4]

Properties of linear systems, with examples taken from a variety of physical processes. Linearity and linearization. Time domain analysis: step and impulse responses, the convolution input/output relation; differential equations and finite order systems. Fourier analysis of signals and systems; frequency response; reciprocal time/frequency relations. Laplace transform analysis for finite order systems; pole-zero diagrams; simulation diagrams, block diagrams. Use of feedback to improve tracking error, response time, linearity and parameter sensitivity. Modelling and approximation of physical systems. Much of the material is presented in a project-oriented lab environment.

Prerequisites: ENSC 125, 222

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Engineering Science

Abbreviation Code: ENSC Course Number: 330

Credit Hours: 4 Vector: 2-0-4

Title of Course: Materials Science

Calendar Description of Course:

See Attached.

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

CHEM 105, PHYS 121

What course (courses), if any, is being dropped from the calendar if this course is approved: ENSC 230-3 Engineering Materials

2. Scheduling

How frequently will the course be offered? Once per year

Semester in which the course will first be offered? 87-3

Which of your present faculty would be available to make the proposed offering possible? Hiring underway.

3. Objectives of the Course

To give the students an exposure to different types of materials and their properties and performance

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

JK Bowers  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

**ENSC 330-4 Materials Science [Formerly ENSC 230-3]**

[2,0,4] An introductory course in materials science which covers materials - their structures, properties, and performance; crystal structures and instruments for structure determination; polymers, ceramics, composites; quality control, reliability, and mean time between failure analysis.

Prerequisites: CHEM 105, PHYS 121

SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

- EDITORIAL CHANGES TO DESCRIPTION
- COURSE NUMBER AND CREDIT HOUR CHANGE

1. Calendar Information

Abbreviation Code: ENSC Course Number: 380

Department: Engineering Science  
Credit Hours: 4 Vector: 2-0-4

Title of Course: Production Systems

Calendar Description of Course:

See Attached

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

MATH 272

What course (courses), if any, is being dropped from the calendar if this course is approved: ENSC 480-3 Production Systems

2. Scheduling

How frequently will the course be offered? Once per year.

Semester in which the course will first be offered? 1987-3

Which of your present faculty would be available to make the proposed offering possible? Hiring underway

3. Objectives of the Course

To provide the student with a broad understanding of production systems

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual


Space

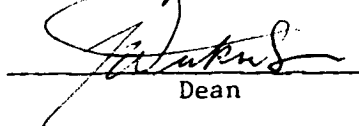
Equipment

5. Approval

Date: 86 09 15

19 Sept 86

  
Department Chairman

  
Dean

\_\_\_\_\_  
Chairman, SCUS

**ENSC 380-4 Production Systems**

[2,0,4]

The meaning of production, the economist's and the engineer's view; systems approach. Production as materials processing and information processing. Characteristics of production operations: their energy, space, material yields, environmental control, and scale implications. Introduction to the basic features of production systems and methods of modelling their operation; material flow, information and control systems. Forecasting, inventories, service level and its measurement, periodic and continuous review inventory models, A-B-C analysis, aggregate inventory models. The role of inventories in physical distribution. Inventories in manufacturing: requirements planning versus order point control. Planning production capacity. Production control and scheduling.

Prerequisite: MATH 272

• EDITORIAL CHANGES  
TO DESCRIPTION &  
TITLE

SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Engineering Science

Abbreviation Code: ENSC Course Number: 382

Credit Hours: 4 Vector: 3-0-2

Title of Course: Introductory Control Systems

Calendar Description of Course:

See Attached

Nature of Course

Prerequisites (or special instructions):

What course (courses), if any, is being dropped from the calendar if this course is approved:

2. Scheduling

How frequently will the course be offered?

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible?

3. Objectives of the Course

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

J. K. Owens  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

ENSC 382-4 **Introductory Control Systems**

[3,0,2]

Review of control concepts, linear vs non-linear feedback, performance criteria. Effects of linear feedback on dynamic response. Compensation design: root locus, Bode plots. Discrete time approximations of continuous time systems, Z-transforms, sampling theorem and frequency response. State variable formulation, solution of linear systems, observability and controllability. Examples of simple second-order non-linear behavior. Introduction to optimum control. Laboratory work is included in this course.

Prerequisite: ENSC 280



NEW COURSE

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Engineering Science

Abbreviation Code: ENSC Course Number: 423

Credit Hours: 4 Vector: 2-0-4

Title of Course: Modern Control Systems

Calendar Description of Course:

See Attached

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

ENSC 382

What course (courses), if any, is being dropped from the calendar if this course is approved:

2. Scheduling

How frequently will the course be offered? Once per year

Semester in which the course will first be offered? 1988-1

Which of your present faculty would be available to make the proposed offering possible? T. McGeer, D. Ingraham

3. Objectives of the Course

To further expose students to the control systems introduced in ENSC 382 and give them an opportunity to apply these in a major project.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

J. K. Owens  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

ENSC 423-4 **Modern Control Systems**

[2,0,4]

Mathematical modelling of physical dynamic systems. State space formulation of single and multivariable control problems, eigenvalue and modal analysis. Design techniques for optimized linear control. Optimum control: trajectory optimization, trajectory tracking, Ricatti equation. Each student completes a major project in modelling and control which usually includes a practical demonstration.

Prerequisite: ENSC 382

NEW COURSE

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Engineering Science

Abbreviation Code: ENSC Course Number: 435

Credit Hours: 4 Vector: 2-0-4

Title of Course: Quality Control and Reliability in Manufacturing

Calendar Description of Course:

See attached.

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

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ENSC 380

What course (courses), if any, is being dropped from the calendar if this course is approved:

ENSC 435 Design of Machine Components

2. Scheduling

How frequently will the course be offered? Once per year.

Semester in which the course will first be offered? 1988-1

Which of your present faculty would be available to make the proposed offering possible? Hiring underway

3. Objectives of the Course

To expose students to the techniques of quality control in use in manufacturing environments

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

JK Owens  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

ENSC 435-4 **Quality Control and Reliability in Manufacturing**

[2,0,4]

Aspects of quality control and reliability in manufacturing environments will be discussed, including stress and strain, failure modes, reliability testing, statistical and experimental methods, and destructive/nondestructive testing.

Prerequisite: ENSC 380

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

- CREDIT HOUR CHANGE
- EDITORIAL CHANGES TO DESCRIPTION
- PREREQUISITE CHANGE

1. Calendar Information

Abbreviation Code: ENSC Course Number: 436

Title of Course: Manufacturing Processes

Calendar Description of Course:

See Attached

Department: Engineering Science

Credit Hours: 4 Vector: 2-0-4

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

ENSC-380

What course (courses), if any, is being dropped from the calendar if this course is approved: ENSC 436-3

2. Scheduling

How frequently will the course be offered? Once per year

Semester in which the course will first be offered? 1988-1

Which of your present faculty would be available to make the proposed offering possible? Hiring underway

3. Objectives of the Course

To provide the students with an understanding of the Manufacturing Processes

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

[Signature]  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

**ENSC 436-4 Manufacturing Processes**

[2,0,4]

The principles of manufacturing unit processes including casting, forming, machining, and joining. Interactions between design, materials (metals, polymers, ceramics) and processes. Advantages and limitation, relative costs and production rates of competitive processes.

Prerequisite: ENSC 380

SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

- CREDIT HOUR CHANGE
- EDITORIAL CHANGES TO CALENDAR DESCRIPTION & TITLE
- Prerequisite Change

1. Calendar Information

Abbreviation Code: ENSC Course Number: 438

Title of Course: Robotics and Control

Calendar Description of Course:

See attached.

Department: Engineering Science

Credit Hours: 4 Vector: 2-0-4

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

ENSC 382

What course (courses), if any, is being dropped from the calendar if this course is approved:

ENSC 438-3 Automation and Robotics

2. Scheduling

How frequently will the course be offered? Once per year

Semester in which the course will first be offered? 1988-1

Which of your present faculty would be available to make the proposed offering possible? hiring underway

3. Objectives of the Course

To continue the principles and theories learned in ENSC 382

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

JK Owens  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

ENSC 438-4 **Robotics and Controls**

[2,0,4]

Industrial robotics and control systems principles, coordination and integration with other automated equipment. The design of industrial robots, including programming articulated elements, languages for control, machine vision. The design of automatic control systems. Case studies of selected automated processes.

Prerequisite: ENSC 382



SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

- CREDIT HOUR CHANGE
- EDITORIAL CHANGES TO CALENDAR DESCRIPTION
- PREREQUISITE CHANGE

1. Calendar Information

Department: Engineering Science

Abbreviation Code: ENSC Course Number: 439

Credit Hours: 4 Vector: 2-0-4

Title of Course: Computer Aided Design and Manufacturing

Calendar Description of Course:

See attached.

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

ENSC 105, 382

What course (courses), if any, is being dropped from the calendar if this course is approved: ENSC 439-3

2. Scheduling

How frequently will the course be offered? Once per year

Semester in which the course will first be offered? 1988-1

Which of your present faculty would be available to make the proposed offering possible? Hiring underway

3. Objectives of the Course

To expose the students to the methods for computer aided design and manufacturing.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

J. K. Coates  
Department Chairman

[Signature]  
Dean

Chairman, SCUS

**ENSC 439-4 Computer Aided Design and Manufacture**

[2,0,4]

Survey of methods for computer aided design and manufacturing (CADAM), including experience with basic systems in the workshop component of the course. The student will be introduced to computer integrated manufacturing and flexible manufacturing systems concepts, which demonstrate his understanding and implementation of the ideas presented in the course. The "Quick Chip" facility will be available for student projects, as well as a manufacturing cell consisting of several robots and computer control systems.

Prerequisites: ENSC 105 and ENSC 382

- COURSE NUMBER
- CREDIT HOUR CHANGE
- EDITORIAL CHANGES TO CALENDAR DESCRIPTION
- TITLE
- PREREQUISITE CHANGE

SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Engineering Science

Abbreviation Code: ENSC Course Number: 480

Credit Hours: 4 Vector: 2-0-4

Title of Course: Industrial Engineering

Calendar Description of Course:

See attached.

Nature of Course Lecture/Laboratory

Prerequisites (or special instructions):

MATH 232, 272 and ENSC 380

What course (courses), if any, is being dropped from the calendar if this course is approved:

ENSC 380-3 Industrial Engineering

2. Scheduling

How frequently will the course be offered? Once per year.

Semester in which the course will first be offered? 1988-1

Which of your present faculty would be available to make the proposed offering possible? Hiring underway.

3. Objectives of the Course

To provide the student with an introductory understanding of the processes of industrial engineering.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas: NIL

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: 86 09 15

19 Sept 86

JK Caves  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

ENSC 480-4 **Industrial Engineering**

[2,0,4]

A basic course which provides an introductory understanding of decision making, organization and system optimization. The fundamentals underlying rational decision making in large engineering systems, and the concepts and scope of industrial engineering are presented. Topics covered include: static optimization, steepest descent and quadratic convergence strategies, linear programming, simplex methods and duality, network analysis, finite graphs, critical path scheduling, decision trees and Bayesian estimation, recursive formulation of multistage decision problems, dynamic programming, and queuing theory.

Prerequisites: MATH 232 and MATH 272  
and ENSC 380

SENATE COMMITTEE ON UNDERGRADUATE STUDIES  
NEW COURSE PROPOSAL FORM

- EDITORIAL CHANGES TO CALENDAR DESCRIPTION & TITLE
- PREREQUISITE CHANGE

1. Calendar Information

Department: ENGINEERING SCIENCE

Abbreviation Code: ENSC Course Number: 498

Credit Hours: 3 Vector: 0-0-0

Title of Course: Engineering Science Thesis Proposal

Calendar Description of Course:

See attached.

Nature of Course Research project

Prerequisites (or special instructions):

ENSC 396 or permission of the Director

What course (courses), if any, is being dropped from the calendar if this course is approved:

ENSC 498-3 Internship II

2. Scheduling

How frequently will the course be offered?

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible?

3. Objectives of the Course

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

**NO CHANGES**

5. Approval

Date: 86 09 15

19 Sept 86

J. K. Coates  
Department Chairman

[Signature]  
Dean

\_\_\_\_\_  
Chairman, SCUS

**ENSC 498-3 Engineering Science Thesis Proposal**

This is the first session of compulsory internship and is usually taken during the seventh academic semester. The student's time in this course is devoted to supervised study, research and development and work leading to a formal proposal for the project work in ENSC 499. This activity can be directly augmented by other course work and by directed study. The locale of the work may be external to the University or within a University laboratory, or may bridge the two locations. Supervision may be by the company sponsoring the internship or by faculty members, or through some combination. A plan for the student's ENSC 498 activities must be submitted to the School at least one month prior to the start of the semester in which the course will be taken. Preparation of the undergraduate thesis project proposal is the formal requirement of this course and the basis upon which it is graded. Grading will be on a Pass/Fail basis.

Prerequisite: ENSC 396 or permission of  
the Director

•NEW TITLE

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: ENGINEERING SCIENCE

Abbreviation Code: ENSC Course Number: 499

Credit Hours: 9 Vector: 0-0-0

Title of Course: Engineering Science Undergraduate Thesis

Calendar Description of Course:

See attached.

Nature of Course Thesis

Prerequisites (or special instructions):

ENSC 498-3

What course (courses), if any, is being dropped from the calendar if this course is approved: ENSC 499-9 Engineering Science Project

2. Scheduling

How frequently will the course be offered?

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible?

3. Objectives of the Course

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

*NO CHANGES*

5. Approval

Date: 86 09 15

19 Sept 86

*J. K. Covert*  
Department Chairman

*[Signature]*  
Dean

\_\_\_\_\_  
Chairman, SCUS

**ENSC 499-9 Engineering Science Undergraduate Thesis**

A thesis is based on the research, development and engineering project undertaken in the student's internship. Registration for ENSC 499 takes place in the semester in which the thesis will be presented and defended, normally during Semester 8. Formal approval of the topic by the School of Engineering Science is given by the granting of the grade of Pass for ENSC 498. The locale of the work, supervision and other arrangements follow those for ENSC 498. Grading of the thesis will be on a Pass/Fail basis, but recognition will be given to outstanding work.

Prerequisite: ENSC 498



ENGINEERING SCIENCE  
COMMON CORE

COURSES AND TYPICAL SCHEDULE

September 15, 1986

**SEMESTER ONE**

CHEM 104-3	General Chemistry I
CHEM 115-2	General Chemistry Laboratory I
Cmpl I-3	first complementary studies elective
*CMPT 101-4	Introduction to High Level Programming Language
*ENSC 101-0	Engineering Communications I
*MATH 151-3	Calculus I
*PHYS 120-3	Physics I

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18 semester hours credit

**SEMESTER TWO**

CHEM 105-3	General Chemistry II
*CMPT 105-3	Fundamental Concepts of Computing
*ENSC 102-1	Engineering Communications II
*ENSC 125-5	Basic Electronics Engineering
*MATH 152-3	Calculus II
*PHYS 121-3	Physics II
*PHYS 131-2	General Physics Laboratory

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20 semester hours credit

**SEMESTER THREE**

Cmpl II-3	second complementary studies elective
*CMPT 290-3	Introduction to Digital Circuit Design
*ENSC 103-1	Engineering Communications III
*ENSC 222-5	Electronic Design I
*MATH 232-3	Elementary Linear Algebra
*MATH 251-3	Calculus III
*Scie I-3	first science elective <sup>(1)</sup>

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21 semester hours credit

**SEMESTER FOUR**

*CMPT 201-4	Data and Program Organization
*CMPT 390-3	Digital Circuits and Systems
ECON 200-3	Principles of Economics I - Microeconomic Principles
*ENSC 104-1	Engineering Communications IV
*ENSC 280-5	Systems Dynamics
Math I-3	first Mathematics elective <sup>(2)</sup>
*MATH 272-3	Introduction to Probability and Statistics I

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22 semester hours credit

\* = course which should be taken at this point in the program (consequences of deviations from this schedule are the responsibility of the student).

- (1) For Electronics Engineering, Engineering Physics, Computer Engineering, and Biomedical Engineering PHYS 221-3 is a required prerequisite and should be taken here. For Manufacturing Systems Engineering, MATH 262-4 should be taken here.
- (2) For Electronics Engineering and Engineering Physics, MATH 252-3 is a required prerequisite and should be taken here.

## ROBOTICS AND CONTROL ENGINEERING

### COURSES AND TYPICAL SCHEDULE

September 15, 1986

#### **SEMESTER FIVE**

Cmpl III-3	third complementary studies elective
CMPT 205-3	Intro. to Formal Topics in Computing Science
CMPT 391-3	Microcomputer Hardware Workshop
*ENSC 105-1	Engineering Communications V
ENSC 300-3	Engineering Design and Management
Math II-3	second Mathematics elective
PHYS 344-3	Thermal Physics

19 semester hours credit

#### **SEMESTER SIX**

Cmpt I-3	first Computing Science elective
*CMPT 479-4	Special Topics in Computer Systems
*ENSC 106-1	Engineering Communications VI
ENSC 301-3	Engineering Economics
*ENSC 321-4	Electronic Design II
ENSC 382-4	Control System Design
KIN. 100-3	Introduction to Human Structure and Function

22 semester hours credit

#### **SEMESTER SEVEN**

CMPT 410-3	Artificial Intelligence Survey
Enc I-4	first Engineering Science elective <sup>(4)</sup>
Enc II-4	second Engineering Science elective <sup>(4)</sup>
*ENSC 107-1	Engineering Communications VII
*ENSC 439-4	Computer Aided Design and Manufacturing
ENSC 498-3	Industrial Internship II
Scie II-3	second science elective <sup>(3)</sup>

22 semester hours credit

#### **SEMESTER EIGHT**

Cmpl IV-3	fourth complementary studies elective
ENSC 108-0	Engineering Communications VIII
ENSC 438-4	Robotics and Control
ENSC 499-9	Engineering Science Project

16 semester hours credit

**TOTAL 160 semester hours credit**

(3) An approved course in a basic, applied or mathematical science

(4) Chosen from:

ENSC 423-4	ENSC 429-4	ENSC 439-4
ENSC 425-4	ENSC 435-4	ENSC 480-4
ENSC 426-4	ENSC 436-4	CMPT 495-3
ENSC 428-4	ENSC 438-4	CMPT 496-4

With permission, one or more Directed Studies courses may be chosen in this elective category.

MANUFACTURING SYSTEMS ENGINEERING

COURSES AND TYPICAL SCHEDULE

September 15, 1986

**SEMESTER FIVE**

Cmpl III-3      third complementary studies elective  
\*CMPT 391-3      Microcomputer Hardware Workshop  
\*ENSC 105-1      Engineering Communications V  
ENSC 300-3      Engineering Design and Management  
\*ENSC 330-3      Materials Science (Engineering Materials)  
Math XXX-3      Operations Research  
PHYS 344-3      Thermal Physics

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19 semester hours credit

**SEMESTER SIX**

\*CMPT 479-4      Special Topics in Computer Systems  
\*ENSC 106-1      Engineering Communications VI  
ENSC 301-3      Engineering Economics  
\*ENSC 380-3      Industrial Engineering  
\*ENSC 436-3      Manufacturing Processes  
KIN. 100-3      Introduction to Human Structure and Function  
MATH 263-4      Engineering Mechanics II

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21 semester hours credit

**SEMESTER SEVEN**

\*ENSC 107-1      Engineering Communications VII  
\*ENSC 382-4      Control System Design  
\*ENSC 439-4      Computer Aided Design and Manufacturing  
\*ENSC 480-3      Production Systems  
ENSC 498-3      Industrial Internship II  
KIN. 480-3      Human Factors in the Working Environment  
MATH 362-3      Fluid Mechanics I

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21 semester hours credit

**SEMESTER EIGHT**

Ensc I-4      first Engineering Science elective<sup>(4)</sup>  
ENSC 108-0      Engineering Communications VIII  
ENSC 438-4      Robotics and Controls  
ENSC 499-9      Engineering Science Project

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17 semester hours credit

**TOTAL 160 semester hours credit**

(4) chosen from:

ENSC 423-4	ENSC 429-4	ENSC 439-4
ENSC 425-4	ENSC 435-4	ENSC 480-4
ENSC 426-4	ENSC 436-4	CMPT 495-3
ENSC 428-4	ENSC 438-4	CMPT 496-4

With permission, one or more Directed Studies courses may be chosen in this elective category.

SIMON FRASER UNIVERSITY

M E M O

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To: Undergraduate Curriculum Committees  
Faculty of Arts, Faculty of Education, Faculty of  
Business Administration and Faculty of Science

From: Dr. J.K. Cavers, Acting Director  
School of Engineering Science

Date: 15 September 1986

Subject: New Courses

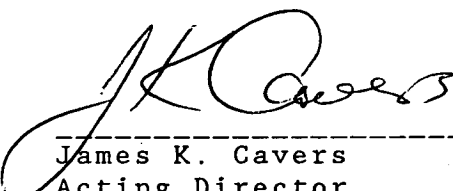
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Documentation is attached for three new courses in Engineering  
Science.

ENSC 330-4 Materials Science  
ENSC 423-4 Modern Control Systems  
ENSC 435-4 Quality Control and Reliability in Manufacturing

Please consider these for overlap in your Faculty.

Thank you.

  
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James K. Cavers  
Acting Director  
School of Engineering Science

Attachments