

SIMON FRASER UNIVERSITY

S.79-74

MEMORANDUM

To..... SENATE

From..... SENATE COMMITTEE ON UNDERGRADUATE
STUDIES

..... FACULTY OF SCIENCE - NEW COURSE

Subject..... PROPOSALS:

MATH 262-4 - Engineering Mechanics I

Date.....

~~MATH 263-4 - Engineering Mechanics II~~

PHYS 212-1 - Engineering Problems in Dynamics

Action taken by the Senate Committee on Undergraduate Studies at its meeting of May 15, 1979 gives rise to the following motion:

MOTION I

"That Senate approve and recommend approval to the Board of Governors, as set forth in S.79-74, the proposed new courses:

MATH 262-4 - Engineering Mechanics I

MATH 263-4 - Engineering Mechanics II

PHYS 212-1 - Engineering Problems in Dynamics."

It was noted that if these course are approved MATH 161-3 - Statics, would be discontinued.

It was also observed that these courses are ^eusable in the Applied Mathematics stream and the provision of the courses would facilitate transfer if students were to remain for additional studies at SFU before proceeding to engineering. There has been close liaison, particularly with the University of British Columbia to facilitate transfer arrangements.

Time Waiver: SCUS approved a waiver of the normal time lag requirement in order that MATH 262-4 and PHYS 212-1 may be first offered in Fall 79-3 and that MATH 263-4 may be first offered in Spring 80-1, subject to approval of the courses by Senate and the Board.



Norman R. Reilly
Chairman

SIMON FRASER UNIVERSITY

SCUS 79-11

MEMORANDUM

To Mr. H.M. Evans
Registrar and Secretary

Subject SENATE COMMITTEE
UNDERGRADUATE STUDIES

From N. Heath
Administrative Assistant
to the Dean of Science

Date 1979 04 26

NEW COURSE PROPOSALS MATH 262, 263 and PHYS 212

Three new course proposals approved by the Faculty of Science are attached for consideration and approval by SCUS and Senate. Also attached are documents which provide justification for the new courses and other relevant information.

Would you please suggest to the Committee the following motion:

"That SCUS approve the proposed new courses:

MATH 262-4 Engineering Mechanics I,
MATH 263-4 Engineering Mechanics II,
PHYS 212-1 Engineering Problems in Dynamics,

as described on the attached pages, and forward these to Senate with a recommendation that they be approved."


N. Heath

NH/mgj

Attachments

RECEIVED

APR 27 1979

REGISTRAR'S OFFICE
MAIL DESK

SIMON FRASER UNIVERSITY

MEMORANDUM

To Mr. H.M. Evans
Registrar

From J.M. Webster
Dean of Science

Subject Date 1979 04 25

Please be advised that recently I discussed, in some detail, the Engineering Transfer courses with Dr. N. Riseborough, Director of Engineering Core Programme, Faculty of Applied Science, University of British Columbia.

He was well satisfied with these courses and saw them as paralleling the transfer which is already in operation into second year engineering from some of the community colleges.

He agreed that we should pursue the processing of the courses through our committees and Senate and he will have them examined by the appropriate authorities at UBC. Both Dr. Riseborough and myself would like to see approval of the new courses in the transfer package so that students that register at SFU for this fall semester can be advised of the availability of second year Engineering entry at UBC.

Enclosed is a list of the proposed courses that students will need in order to enter second year engineering at UBC. Of these, only three courses (MATH 262-4, 263-4 and PHYS 212-1) are new and need approval by Senate and its Committees. Please contact me if you need further clarification.


J.M. Webster

JMW/mgj

Attachments

SIMON FRASER UNIVERSITY

MEMORANDUM

To..... Faculty of Science.....

From..... N. Heath, Assistant to the

Dean of Science

Subject.. Engineering Transfer.....

Date..... 1979 03 02.....

The Faculty of Science Undergraduate Curriculum Committee at its meetings of 79-02-27 and 79-02-22 approved the attached proposal.

The documentation consists of the following items:

1. List of proposed courses enabling transfer into first year and second year Applied Science (Engineering) at U.B.C.
2. Memorandum of C. Graham to L. Kemp dated 79-02-27.
3. New course proposal - MATH 262-4 Engineering Mechanics I
4. New course proposal - MATH 263-4 Engineering Mechanics II
5. Memorandum of C. Graham to L. Kemp dated 78-10-10.
6. Memorandum of C. Graham to L. Kemp dated 78-09-22.
7. New course proposal PHYS 212-1 Engineering Problems in Dynamics.
8. Course outline and notes for PHYS 211-3 (for information).
9. Letter from J. Webster to Dean of Engineering (sample).
10. Reply from Associate Dean Carlson, University of Manitoba.
11. Reply from Dean McLaughlin, University of Waterloo.
12. Reply from Dean Etkin, University of Toronto.


N. Heath

NH/km
Attach.

A PROPOSED FIRST YEAR ENGINEERING TRANSFER

Semester One

MATH 151-3	Calculus I	
CHEM 104-3	General Chemistry I	
CHEM 115-2	General Chemistry Laboratory	
PHYS 120-3	Physics I	
ENGL 3	(Required: one of 101, 102, 103)	
GEOG 111-3	Physical Geography	
CMPT 103-3	Introduction to Programming	Total Credits 17

Semester Two

CHEM 105-3	General Chemistry II	
MATH 152-3	Calculus II	
PHYS 121-3	Physics II	
PHYS 131-2	General Physics Laboratory	
ENGL 3	(Required: one of 101, 102, 103)	
GEOG 112-3	Introductory Geology	Total Credits 17

At this point a student could transfer into the first year of Engineering at SFU or UBC.

Semester Three

CHEM 261-3	Physical Chemistry I	
MATH 253-4	Calculus III	
MATH 232-3	Elementary Linear Algebra	
MATH 262-4 (Proposed)	Engineering Mechanics I (statics & engineering problems)	
PHYS 221-3	Intermediate Electricity and Magnetism	
GEOG 121-3	Economic Geography	Total Credits 20

Semester Four

MATH 310-3	Introduction to Ordinary Differential Equations	
MATH 312-4	Multidimensional Calculus	
* MATH 263-4 (Proposed)	Engineering Mechanics II (dynamics & engineering problems)	
* PHYS 211-3	Intermediate Mechanics	
* PHYS 212-1 (Proposed)	Engineering Problems in Dynamics	
PHYS 233-2	Introductory Physics Laboratory	
PHYS 344-3	Thermal Physics	
GEOG 141-3	Social Geography	Total Credits 19
		Grand Total Credits 73

*Students to select either the MATH 263-4 course or the PHYS 211-3 plus PHYS 212-1 course.

At this point a student could transfer into the second year of Engineering at UBC.

SIMON FRASER UNIVERSITY

MEMORANDUM

To..... Dr. C.L. Kemp, Chairman
..... Faculty of Science Undergraduate
..... Curriculum Committee

From G.A.C. Graham, Chairman
..... Undergraduate Studies Committee
..... Mathematics Department

Subject REVISION OF SYLLABUSES FOR MATH
..... 262-4, 263-4, ENGINEERING MECHANICS I, II

Date February 27, 1979

By our letter of October 10, 1978, we altered the proposed syllabuses
for

MATH 262-4, Engineering Mechanics I

MATH 263-4, Engineering Mechanics II

in such a way as to dovetail better with

PHYS 211-3, Intermediate Mechanics

PHYS 212-1, Engineering Problems in Dynamics.

In particular we removed a full section on Kinetics of Particles and Newton's
Second Law from 262-4 to 263-4 and we put some material on beams into 262-4.

On Thursday February 22, 1979, the Faculty of Science Undergraduate
Curriculum Committee requested that the Mathematics Department re-examine
these revised syllabuses for MATH 262-4, 263-4 to determine if further changes
of material between the courses might be made.

The Chairman and Engineering Committee of the Mathematics Department have
given this matter careful consideration. As a result we have decided to put
all the material On Beams and Cables into the first course (262-4).

With these changes, in addition to those made in October we have
departed significantly from what we thought to be highly desirable. We
believe that any further changes deemed necessary to smoothen the transition
between Math 262-4 and Phys 211-3, 212-1 may be made in the composition of
Phys 212-1.

These revised course proposals deserve unanimous support.

G.A.C. Graham
G.A.C. Graham

GACG/dr

cc: Dr. M. Singh, Chairman, Mathematics
..... Engineering Program Committee, Mathematics

Encl. Revised course proposal forms.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE PROPOSAL FORM

Calendar Information

Department: Mathematics

Abbreviation Code: MATH Course Number: 262 Credit Hours: 4 Vector: 3-2-0

Title of Course: ENGINEERING MECHANICS I

Calendar Description of Course:

Vectors. Reduction of force systems, equipollent systems of forces. Plane statics, free body diagram, trusses, frames, friction. Statics in space. Beams and cables. Kinematics of particles.

Nature of Course Lecture/tutorial

Prerequisites (or special instructions):

MATH 152-3 (preferably) or MATH 155-3 must precede or be taken concurrently;
PHYS 120-3.

What course (courses), if any, is being dropped from the calendar if this course is approved: MATH 161-3 is to be dropped if and only if the package for Engineering Mechanics consisting of MATH 262-4, 263-4 is approved. It is expected that teaching resources will be generated by the current revision of upper level mechanics courses.

2. Scheduling

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

Semester in which the course will first be offered? Fall 1979

Which of your present faculty would be available to make the proposed offering possible: Drs. Lardner, Pechlaner, Sharma, Shoemaker, Singh and others.

Objectives of the Course - The aim is to provide a solid grounding in the basic principles of mechanics while introducing students to the art of problem solving. Emphasis is placed on the mechanics of some structures such as trusses and frames and of mechanisms and systems involving mainly the general planar motion of rigid bodies. A dominant aim is to illustrate how basic techniques (free body isolation, vector representations and the use of simplified equivalent force systems) are applied to the solution of problems on these systems and to provide the student with the opportunity to practice these techniques.

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

NONE

NOTE: The material of MATH 262-4, 263-4 was offered in Fall 78, Spring 79 through a combination of regular and Selected Topics courses - Math 161, 291, 292, as part of regular faculty load.

5. Approval

Date: 1979 02 27

Manshar Singh
Department Chairman

26 April '79
[Signature]
Dean

22 May 1979
[Signature]
Chairman, SCUS

MATHEMATICS 262-4
ENGINEERING MECHANICS I
[3-2-0]

1. Statics of particles.
2. Equivalent force systems with reference to rigid bodies.
3. Equilibrium of rigid bodies.
4. Analysis of structures - trusses, frames.
5. Friction.
6. Beams and cables; shear and bending moments.
7. Rectilinear and curvilinear motion of particles.

Specifically, chapters 1 - 4 and sections 6.1 - 6.5, 6.7 - 6.12, 7.1 - 7.9, 8.1 - 8.4 and Chapter 11 of the textbook.

PREREQUISITES: MATH 152-3 (preferably) or MATH 155-3 must precede or be taken concurrently; PHYS 120-3.

TEXTBOOK: Vector Mechanics for Engineers, Statics and Dynamics
(the combined volume), Third Edition
by F. P. Beer and E. R. Johnston, Jr.
PUB: McGraw-Hill

FORMAT: No tutorial is scheduled for this course. There will be a weekly two-hour problem session attendance at which is mandatory. In addition, homework is assigned and counts towards the final grade.

Emphasis and Aims:

The aim is to provide a solid grounding in the basic principles of mechanics while introducing students to the art of problem solving.

Emphasis is placed on the mechanics of some structures such as trusses and frames and of mechanisms and systems involving mainly the general planar motion of rigid bodies. A dominant aim is to illustrate how basic techniques (free body isolation, vector representations and the use of simplified equivalent force systems) are applied to the solution of problems on these systems and to provide the student with the opportunity to practice these techniques.

Comment:

The package MATH 262-4, 263-4 covers almost the same material as is done in the first year in Engineering Mechanics at any North American university.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE PROPOSAL FORM

Calendar Information

Department: Mathematics

Abbreviation Code: MATH Course Number: 263 Credit Hours: 4 Vector: 3-2-0

Title of Course: ENGINEERING MECHANICS II

Calendar Description of Course:

Centroids. Moments of inertia. Principles of dynamics; work and energy.

Newton's laws. Kinematics and kinetics of rigid bodies, plane motion of rigid bodies.

(Dynamics of Rigid Bodies is the main topic for this course.)

Nature of Course Lecture/tutorial

Prerequisites (or special instructions):

MATH 262-4; MATH 251-3 (or 253-4) must precede or be taken concurrently.

Students may not count more than one of MATH 262-4 or PHYS 212-1 for credit.

What course (courses), if any, is being dropped from the calendar if this course is approved: MATH 161-3 is to be dropped if and only if the package for Engineering Mechanics consisting of MATH 262-4, 263-4 is approved. It is expected that teaching resources will be generated by the current revision of upper level mechanics courses.

2. Scheduling

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

Semester in which the course will first be offered? Spring 1980

Which of your present faculty would be available to make the proposed offering possible: Drs. Lardner, Pechlaner, Sharma, Shoemaker, Singh and others

Objectives of the Course - The aim is to provide a solid grounding in the basic principles of mechanics while introducing students to the art of problem solving. Emphasis is placed on the mechanics of some structures such as trusses and frames and of mechanisms and systems involving mainly the general planar motion of rigid bodies. A dominant aim is to illustrate how basic techniques (free body isolation, vector representations and the use of simplified equivalent force systems) are applied to the solution of problems on these systems and to provide the students with the opportunity to practice these techniques.

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

NONE

NOTE: The material of MATH 262-4, 263-4 was offered in Fall 78, Spring 79 through a combination of regular and Selected Topics courses - Math 161, 291, 292, as part of regular faculty load.

5. Approval

Date: 1979 02 27

26 April '79

22 May 1979

Mansoor Singh
Department Chairman

[Signature]
Dean

[Signature]
Chairman, SCUS

SCUS 73-34b:- (When completing this form, for instructions see Memorandum SCUS 73-34a. Attach course outline).

MATHEMATICS 263-4
ENGINEERING MECHANICS II
[3-2-0]

1. Centroids, centre of gravity.
2. Moments of inertia.
3. Kinematics and kinetics of particles, energy and momentum methods.
4. Kinematics of rigid bodies.
5. Plane motion of rigid bodies: forces and acceleration.
6. Plane motion of rigid bodies: energy and momentum methods.

Specifically, sections 12.1 - 12.10, 13.1 - 13.15, 5.1 - 5.10, 9.1 - 9.14, 14.1 - 14.8, 15.1 - 15.9, 16.1 - 16.8, 17.1 - 17.9 of the textbook. Dynamics of Rigid Bodies is the main topic of this course.

PREREQUISITES: MATH 262-4; 251-3 (or 253-4) must precede or be taken concurrently.

TEXTBOOK: Vector Mechanics for Engineers, Statics and Dynamics
(the combined volume), Third Edition
by F.P. Beer and E.R. Johnston, Jr.
PUB: McGraw-Hill

FORMAT: No tutorial is scheduled for this course. There will be a weekly two-hour problem session attendance at which is mandatory. In addition, homework is assigned and counts towards the final grade.

Emphasis and Aims:

The aim is to provide a solid grounding in the basic principles of mechanics while introducing students to the art of problem solving.

Emphasis is placed on the mechanics of some structures such as trusses and frames and of mechanisms and systems involving mainly the general planar motion of rigid bodies. A dominant aim is to illustrate how basic techniques (free body isolation, vector representations and the use of simplified equivalent force systems) are applied to the solution of problems on these systems and to provide the student with the opportunity to practice these techniques.

Comment:

The package MATH 262-4, 263-4 covers almost the same material as is done in the first year in Engineering Mechanics at any North American university.

1978-11-21

SIMON FRASER UNIVERSITY

MEMORANDUM

To Dr. C.L. Kemp, Chairman
Faculty of Science Undergraduate
Curriculum Committee
Subject RATIONALE FOR MATH 262-4, 263-4,
ENGINEERING MECHANICS I, II (REVISED)
AND CORE ENGINEERING PROGRAM

From Dr. G.A.C. Graham, Chairman
Undergraduate Studies Committee
Mathematics Department

Date October 10, 1978

As a result of recent discussions involving Dean Webster and others we have altered the proposed syllabuses for

Math 262-4, Engineering Mechanics I
Math 263-4, Engineering Mechanics II

so as to enhance the possibility that the first of these two courses and

Physics 211-3, Intermediate Mechanics (possibly expanded)

may be found sufficient for some students to gain standing for the full year of Mechanics for first year Engineers that is available at UBC. With this reorganization Phys 211-3 (possibly expanded) could also supplement Math 262-4: at the same time the overlap between Phys 211-3 (possibly expanded) and Math 263-4 will not be significant since Phys 211-3 is a Theoretical Mechanics course (in fact it is predominantly a course on the Dynamics of Fundamental Particles) and Math 263-4 (and Math 262-4) are Applied Mechanics courses, being devoted primarily to the development of the arts of problem solving in the domain of Mechanics of rigid bodies.

The revised courses Math 262-4, 263-4 still duplicate the content of the corresponding UBC Mechanics offering, so that students who satisfactorily complete them fully deserve to automatically gain the appropriate transfer credit at UBC. However, just as Math 161-3, Statics (which, by virtue of its Calendar description and the textbooks* that we have been using for it, is readily seen to be an Applied Mechanics course) is an integral part of our Applied Mathematics program and a prerequisite for

MATH 361-3, Mechanics of Deformable Media,

MATH 467-3, Vibrations,

MATH 468-4, Continuum Mechanics,

MATH 469-4, Fluid Dynamics,

MATH 470-4, Variational Calculus,

the courses Math 262-4, 263-4, which represent a development of Math 161-3, represent a legitimate and worthwhile curriculum development within that program. Also, since Math 161-3 is not a Theoretical Mechanics course it has been omitted from our Physics and Mathematical Physics programs at SFU in favour of Physics 211-3 and the same would presumably apply to Math 262-4, 263-4.

*these include

1. Vector Mechanics for Engineers by F.P. Beer & E.R. Johnston, Jr. published by McGraw-Hill
2. Statics by J.L. Meriam, published by John Wiley & Sons
3. Engineering Mechanics Vol. 1 by I.H. Shames, published by Prentice-Hall

We are currently using #1 which is also the textbook for Phys 155(3) at UBC. Previously we used #2 which has also been a textbook for UBC's Phys 155. #3 was used earlier.

In their proposal of September 25, 1978, Drs. Huntley and Frindt claim that there is no need to copy any UBC course in order to construct a transfer program. While we can agree with that statement as it stands we do not agree that SFU needs what is, at best, a second rate program and we are not prepared to contemplate spending the coming years assessing and reassessing such a program for signs of vitality, instead of being able to go on to make further developments in the direction of applied science with the sure knowledge that sound and reliable foundations have been laid down. In contrast, we in Mathematics feel that SFU's Core Engineering Program should duplicate UBC's key course offerings as closely as possible so that without shortchanging the transferring (or non-transferring) student, there will be high enrollments and a program to be proud of. It is for this reason that we wish to have the appropriate Applied Mechanics courses regularised now.

Finally, we note that, in complete contrast to the Physics Department, the Mathematics Department has 6 faculty members who have developed professional careers in Mechanics: there are a further 4 Mathematics faculty members with Engineering education at the degree level.

G.A.C. Graham.
G.A.C. Graham

GACG/dr

cc: Dr. A.H. Lachlan, Acting Chairman, Mathematics
Engineering Program Committee, Mathematics

Encl: Dr. Graham's letter of September 22, 1978
Revised Course Proposal Forms
Core Engineering Program
Dr. Sharma's letter of July 3, 1978

SIMON FRASER UNIVERSITY

MEMORANDUM

To Dr. C.L. Kemp, Chairman
Faculty of Science Undergraduate
Curriculum Committee

From Dr. G.A.C. Graham, Chairman
Undergraduate Studies Committee
Mathematics Department

Subject RATIONALE FOR MATH 262, 263
ENGINEERING MECHANICS I, II
AND CORE ENGINEERING PROGRAM

Date September 22, 1978

The Mathematics Department is currently participating in the development of a Core Engineering Program whose satisfactory completion will enable students to gain entry into the Second Year of Applied Science (Engineering) at UBC. This has its immediate origin in a memorandum of November 1, 1977 from Dean Webster urging just such a development. With a view to this program the Mechanics Faculty in the Department have designed the courses

MATH 262-4, Engineering Mechanics I

MATH 263-4, Engineering Mechanics II

to provide SFU students with an equivalent to the full year of Mechanics for first year Engineers that is available at UBC. For 1978-79 this material is being taught through a combination of the regular and Selected Topics courses MATH 161, 291, 292.

Since Engineering Mechanics is central to UBC's Core Engineering Program and our program is primarily a feeder program to UBC, it has been found appropriate to duplicate the content of the corresponding UBC Mechanics offering. This is the more so since, for seven of the nine types of Engineering taught at UBC, the material is mandatory in the sense that students who have completed UBC's PHYS 216(2), Mechanics and Special Relativity, have to take the Engineering Mechanics course to obtain credit for First Year Applied Science.

Although the program is not yet fully determined the attached sheets headed "Core Engineering Program" list a package of courses, including MATH 262-4, 263-4, which forms the framework for what will finally be its agreed composition. For the moment, programs for each individual student are having to be confirmed with UBC. We look forward to determining with others, including the appropriate authorities at UBC, a definitive course package for the Core Engineering Program.

At this time no one can be certain of the marketability of this program. However, we understand that there are 450 students in First Year Engineering at UBC and with proper advertising of a well determined program it would seem that a class of 45 students at SFU might well be expected on the basis of geographical considerations. Simon Fraser has the added attraction of the semester system which would allow students to complete the Core Engineering Program in, say, five semesters compared to the mandatory two calendar years at UBC.

A letter from Dr. Darbari Sharma is included for your information.

G.A.C. Graham
G.A.C. Graham

GACG/dr

cc: Dr. A.H. Lachlan, Acting Chairman, Mathematics
Engineering Program Committee, Mathematics

Enclosures: Core Engineering Program; Dr. Sharma's letter of July 3, 1978

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Physics

Abbreviation Code: PHYS Course Number: 212 Credit Hours: 1 Vector: (0-2-0)

Title of Course: Engineering Problems in Dynamics

Calendar Description of Course:

Nature of Course Two-hour per week problem sessions, supervised by
Physics faculty
Prerequisites (or special instructions):

Prerequisite or corequisite: PHYS 211-3

What course (courses), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered? Twice per year

Semester in which the course will first be offered? Fall, Summer

Which of your present faculty would be available to make the proposed offering possible? J. C. Irwin, D. J. Huntley

A. S. Arrott, J. F. Cochran, R. F. Frindt and others

3. Objectives of the Course

To provide engineering problem-solving experience in dynamics,
as part of a program allowing transfer from SFU into Second-Year
Engineering at U.B.C.

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

None

5. Approval

Date: 1979-03-02

A. S. Arrott
Department Chairman

26 April '79
John D. Webster
Dean

22 May 1979
Norman E. Kelly
Chairman, SCUS

Physics 212-1: Engineering Problems in Dynamics

Structure:

One two hour per week Faculty supervised problem session in engineering dynamics.

Problems will be taken from standard engineering texts.

We also have on hand (courtesy of R. Frindt, Alberta, and D. Huntley, U.B.C.) two complete sets of engineering mechanics problems with solutions (on squared paper with one inch margins, and an arrow pointing to the answer).

Problem sets also are available from U.B.C.

Emphasis will be placed on the use of the free body diagram in solving problems.

PHYSICS 211: INTERMEDIATE MECHANICS

An intermediate mechanics course covering kinematics, dynamics, energy momentum, free, forced and damped oscillations, rigid body motion, gravitation.

COURSE OUTLINE

1. **Kinematics:** Velocity, acceleration in 1 dimension, relative motion, motion in 2 and 3 dimensions, circular motion, general planar motion.
2. **Dynamics of Particles:** Newton's Laws, momentum, conservation of momentum, variable mass systems, impulsive forces, projectiles, motion in a resistive medium.
3. **Work and Energy:** Work, power, kinetic and potential energy, conservation of energy, elastic collisions, collisions in center of mass coordinates.
4. **Gravitation and Orbital Motion:** Newton's Law of gravitation, gravity, gravitational potential, two body central force motion, Kepler's Laws, earth satellites, Coriolis acceleration.
5. **Free and Forced Oscillations:** Simple harmonic motion, kinetic and potential energy, damped oscillations, forced oscillations, resonance.
6. **Translational and Rotational Motion of Rigid Bodies:** Translational motion and center of mass, rotation about a fixed axis, angular momentum, moments of inertia, kinetic energy, general plane motion, general 3-d motion, gyroscopes.

Further Notes on Physics 211

1. Text:

We have used several different texts in this course.

The three most recent texts are:

R.J. Stephenson, "Mechanics, and Properties of Matter",
2nd Ed.

A.P. French, "Newtonian Mechanics".

C. Kittel, W.D. Knight and M.A. Ruderman, "Mechanics"
(Berkeley Physics, Vol. 1.), 2nd Edition.

Of these, the book by Stephenson most accurately reflects the course content of Phys 211. Other texts have been tried because some professors consider Stephenson rather concise. The book was written for students planning to major in physics or enter a co-op plan in engineering at M.I.T.

The text by French is considered to be too wordy and is also badly organized.

The Berkeley Mechanics text is being tried for the first time this (Fall '78) semester. It is part of a two year college course intended for students majoring in physical science or engineering at Berkeley. The last third of the book (relativistic mechanics) is not included in Physics 211. The section in Chapter 3 on "Electric and Magnetic Forces on a Charged Particle" is not included in our course outline and is not emphasized in the course. The basic mechanics in this book is quite standard.

We would recommend the text by Stephenson for a Physics 211 class consisting of physical science and engineering students. However, most "dynamics" texts for engineering (such as Beer and Johnston, "Vector Mechanics for Engineers: Dynamics") could be also used as a text for Physics 211.

Further Notes on Physics 211 (continued)

2. The Free Body Diagram:

It must be made clear that the "free body diagram" concept (introduced in Physics 121) is primarily a problem solving aid. It is particularly useful for solving engineering problems. Most physicists call such diagrams "force diagrams". Our faculty with an engineering physics background have always used "free body diagrams" in Physics 211, almost daily. (Of course, the free body diagram is most particularly emphasized in engineering problem solving sessions.)

3. Rigid Body Motion:

To indicate the coverage of rigid body motion in Physics 211, the enclosed summary was handed out to students when the text by Stephenson was used.

yellow

F-1-21



22 December 1978

Dr. A.J. Carlson
Associate Dean of Engineering
University of Manitoba
Winnipeg, Manitoba

Dear Dr. Carlson:

Further to our telephone conversation, I am enclosing, for your scrutiny and review, documentation for a transfer package of courses that will enable students to transfer from SFU into the second year of Engineering at another university.

Materials enclosed:-

- (i) Proposed overall course programme.
- (ii) Details of courses given in the Mathematics Department
- (iii) Details of courses given in the Physics Department.

Note the following points:-

- a) This transfer package assumes that students enter SFU from High School with Grade 12 Math, Physics and Chemistry.
- b) The first year at SFU is basic science and electives.
- c) The second year at SFU is equivalent to the first year in Engineering.
- d) Engineering Drawing is deferred to second year Engineering (i.e. first year after leaving SFU).

I should appreciate your reviewing this proposed transfer package and giving me your opinion on the following points:-

- a) If a student had taken this package of courses and achieved a satisfactory grade, would he be eligible for entry into your second year of Engineering?

b) You will note from the overall programme that students are asked to choose between two different presentations of statics and dynamics, namely:-

- (i) MATH 262-4 Engineering Mechanics I
MATH 263-4 Engineering Mechanics II

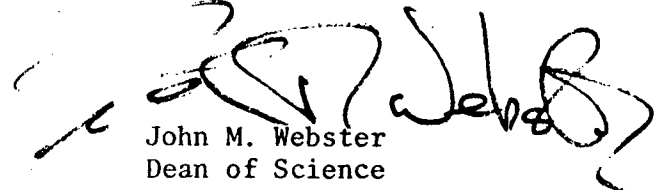
OR

- (ii) MATH 262-4 Engineering Mechanics I
PHYS 211-3 Intermediate Mechanics
PHYS 212-1 Engineering Problems in Dynamics

As you probably recognize, MATH 262-4 and 263-4 are new courses set up for the transfer package and cover statics and dynamics. Most of statics is in 262-4 and most of the dynamics is in 263-4. The PHYS 211-3 course is part of the Physics Majors programme and Physics students will continue to take it. Those who wish to transfer to engineering also will be required to do the problem session of PHYS 212-1. I particularly would like your opinion as to whether you would accept equally students who have taken either of these two options.

I greatly appreciate your willingness to provide your opinion on this matter and look forward to receiving your reply at your earliest convenience.

Yours sincerely,



John M. Webster
Dean of Science

JMW/mgj

Attachments



The University of Manitoba
Faculty of Engineering

Office of the Associate Dean

Winnipeg, Manitoba
Canada R3T 2N2

January 9, 1979

Dr. J.M. Webster,
Dean,
Faculty of Science,
Simon Fraser University,
Burnaby, B.C.
V5A 1S6

Dear Dr. Webster;

In reply to your letter of December 22nd, I have reviewed your proposed transfer package and give you my opinion on the points noted:

(a) Yes, a student who has taken this package of courses and achieved a satisfactory grade would be eligible for entry into our second year of Engineering. As noted in point (b) he would have to take Graphics and Technical Writing in order to completely clear our first year.

(b) Yes, we would consider equally the students who have taken either of these two options.

Further, our Graphics in first year is given in four consecutive periods and sometimes this presents some difficulty with timetabling it with a reasonable second year program.

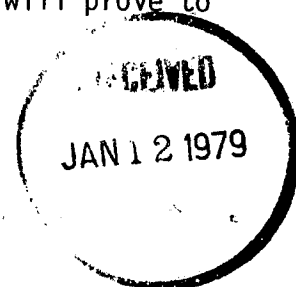
On the positive side, CMPT 103-3 Introduction to Programming would be deemed as equivalent to our one term of Introduction to Computing. Also GEOG 121-3 Economic Geography and GEOG 141-3 Social Geography together would be considered as meeting 6 credit hours requirement of our non-technical electives in third or fourth year.

The proposed package of courses, with the above reservations, is a good preparation for students entering Engineering at the first year or second year level. Completion of the package, you would agree, would not necessarily mean acceptance at the University of Manitoba.

I hope that the above assessment and comments will prove to be of value to you.

Sincerely,

A.J. Carlson
A.J. Carlson,
Associate Dean



AJC/vs

University of Waterloo



Waterloo, Ontario, Canada
N2L 3G1

Faculty of Engineering
Office of the Dean
519/885-1211

January 16, 1979.

Dean J. M. Webster,
Dean of Engineering,
Simon Fraser University,
Burnaby, B.C. V5A 1S6.

Dear Dean Webster:-

I have reviewed the material that you sent to me in detail. The students, who possess a satisfactory average from this programme, would be admissible into second year engineering at the University of Waterloo.

I would like to add some qualifications, however. The competition into second year at the University of Waterloo and the University of Toronto is very severe. It is the practice of our Faculty to admit students who have completed their first year of Science into some engineering programmes, if their averages are high enough and if we have spaces available. Students from your programme would have good knowledge of the basics in science and mathematics. However, as you indicate, they have had no exposure to engineering graphics or our other first year courses in engineering, such as synthesis and design. These latter courses may be unique to Waterloo. Students from your programme would be admissible into Electrical and Chemical Engineering, most probably without make-up time. The other branches of engineering would probably insist upon engineering graphics.

I hope the above is satisfactory for your purposes.

Yours truly,

W. A. McLaughlin
W. A. McLaughlin,
Dean of Engineering.

WAMcL/PT



UNIVERSITY OF TORONTO

TORONTO, CANADA

M5S 1A4

FACULTY OF APPLIED SCIENCE AND ENGINEERING

OFFICE OF THE DEAN

January 19, 1979.

Dean John M. Webster,
Faculty of Science,
Simon Fraser University,
BURNABY, B.C. V5A 1S6

Re: Transfer Students from S.F.U.

Dear Dean Webster:

Your letter of January 4th was referred to Dr. W. D. Baines, Chairman of our Faculty Committee on Advanced Standing, and he has evaluated your programs from the point of view of admission to our Second Year.

Although, as I indicated earlier, we would wish to consider each student on his merits, and would be influenced by the grades obtained in the various subjects, our general conclusion is that good students would be eligible for admission to the Second Year in most of our programs. Many students would be required to make up First Year courses in Engineering Graphics and Computer Programming, but on the other hand most would be relieved of some of our Second Year subjects since they would have successfully completed the equivalent work at S.F.U. Dr. Baines has expressed a preference for Option (i) in Engineering Mechanics, but I myself lean towards a Physics approach rather than a Mathematics approach, and might prefer Option (ii) - particularly because of the emphasis on Problems in PHYS 212-1.

I hope these comments will be of some assistance to you in planning your program.

Sincerely yours,

B. Etkin

Dean

BE/mwn

c.c. Professor W. D. Baines

