

**NATIVE ACCESS
PROGRAM FOR ENGINEERING
(NAPE)**

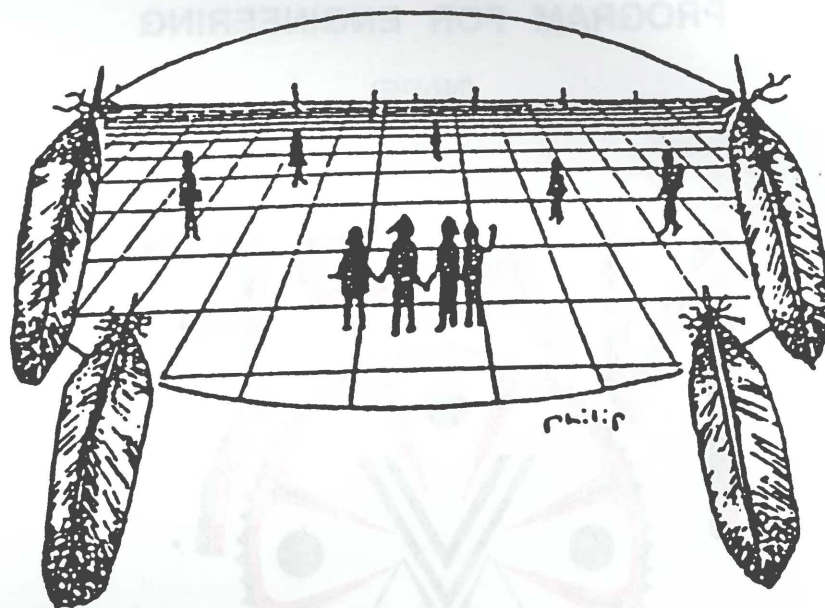


As Developed by
The Aboriginal Peoples
and
The School of Engineering
at
Lakehead University
Thunder Bay, Ontario

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PREAMBLE

In the spring of 1991 the School of Engineering at Lakehead University investigated both the need for Native engineers and the potential for the establishment of an engineering access program for Native students. The encouraging and positive responses from discussions with Native organizations and authorities lead to the development of a workshop for representatives from Native organizations, community groups, tribal authorities and provincial organizations. These individuals including local elders made a unanimous decision to proceed with the program development in cooperation with the Native community.

Committees were formed to deal with the tasks of program development, finance, and the recruitment and selection of students. As a consequence, the Native Access Program for Engineering has been designed by representatives of the Native community and the School of Engineering.

GENERAL INFORMATION

The Native Access Program for Engineering (NAPE) provides the Aboriginal Peoples from the Province of Ontario with access to an engineering education by providing an academic program of pre-engineering instruction which permits students to make the transition into engineering education. An academic, cultural and social support system (tutors, elders, counsellors) is available throughout the students' entire education period. The objective of NAPE is to help Native students who because of residence in remote areas or a lack of adequate formal education cannot obtain access to an engineering education.

While at Lakehead University, students will have the opportunity to follow the program path outlined below:

Stage One: The Native Access Program for Engineering

1. **Orientation Program:** a six-week program for all students starting mid-July and consisting of introductory courses in mathematics, sciences, communications, calculator/computer skills and an orientation course designed to make the student feel comfortable at the University and in the City.
2. **The Native Access Program:** one academic year of study in mathematics, chemistry, physics, communications and life/study skills. The students academic programs are designed to suit their needs. Students who are academically prepared may be permitted to register for selected regular engineering technology diploma courses.

Stage Two: Engineering Technology Diploma Programs

Lakehead University offers three year engineering technology programs in Chemical, Civil, Electrical and Mechanical Engineering. Students who are successful in the Native Access Program are encouraged to enroll in the program of their choice. Graduates of this program will be able to obtain employment as engineering technologists or, if qualified, proceed to engineering degree studies.

Stage Three: Post-Diploma Bachelor of Engineering Degree Programs

Lakehead University has unique post-diploma engineering degree programs in Chemical, Civil, Electrical, and Mechanical Engineering. These programs are accredited by the Canadian Engineering Accreditation Board, consequently graduates who meet the professional qualifications are eligible for registration as a Professional Engineers in their province or territory of practice.

The Native Access Program for Engineering begins in mid-July, with an intake of approximately 15 students. Students who are accepted into this program attend the six week orientation program which is completed by the end of August. Students have about a two week break prior to the beginning of the Fall Term.

The access program is designed to allow students to make a smooth transition into one of the four engineering programs, Civil, Chemical, Electrical and Mechanical, offered by the School of Engineering. Engineering programs are among the most demanding programs at the University. They are mathematics and science orientated, consequently, students should have a strong aptitude and desire to excel in these areas in addition to a strong interest in engineering. Students should be prepared to spend a great deal of time in independent study which can take up most evenings and weekends. The program will begin with a modest but demanding workload which will intensify with time so that students can be prepared for the high demands expected of them in the engineering program.

The access program has an administration, instruction and counselling staff devoted exclusively to it. Tutors and sessional lecturers are part of the academic team available to NAPE students. The social and academic support system will be available to access students through their years of study in engineering. The access program provides the academic background necessary for engineering study so that Aboriginal students can be confident that they will have the potential to compete with or lead the regular entry student body.

Students are able to apply for admission to the engineering programs while they are in the access program and be admitted once they have completed the access requirements.

THE SELECTION PROCESS

The School of Engineering is intent that the Native Access Program for Engineering be successful. Consequently, it is important to select students who have not only academic capability, but also the desire, dedication and drive to become an engineer. The program which has been designed jointly by the Native Community and the School of Engineering provides the student with the necessary academic background and confidence to be successful. Students must be aware that instructors, elders, counsellors, etc. provide their best efforts but in so doing will make high demands on students.

Selection Criteria

The student should have an application form and the request for reference forms for the Native Access Program for Engineering. These forms are available from the NAPE office or the School of Engineering. Students who wish to be considered for admission to NAPE must submit all of the following documents before the application will be considered:

1. Completed application form and personal statement.
2. Official copies of transcripts from all previous secondary and post-secondary education.
3. Three letters of reference (from individuals, other than family, who know the candidate well, e.g. teachers, counsellors, employers, elders, etc.).

In order to be considered for selection an applicant must:

1. Be a resident of the Province of Ontario.
2. Be of Native ancestry.
3. Be admissible to Lakehead University (see Academic below).
4. Have the personal requirements necessary to be successful in engineering (see Personal below).
5. Be interviewed.

Selection to the program is dependent upon the following factors:

Academic

The categories of students who are considered for admission to the program are:

1. **Adult students:** Applicants who are at least twenty-one years of age in the calendar year of entry, who are residents of the Province of Ontario, and who have not attended post-secondary institutions (full-time) for two years prior to their admission, are considered for entry as adult students.
2. **Students who meet the normal admission requirements for the diploma programs in Engineering Technology.** The admission requirements are stated under the section "School of Engineering Programs" in this booklet and in the Lakehead University Calendar.
3. **Extraordinary Admissions:** The University is prepared to consider applicants for admission who have been away from formal education for at least two years at any time because of reasons beyond their control. **Each case is considered on its own merits.**

Personal

Applicants must have the personal qualities that show the potential to succeed in the field of engineering. The following factors are considered:

1. Recent involvement in pursuing educational goals.
2. Interest in engineering.
3. Perseverance in educational and non-educational tasks.
4. Maturity, stability and financial responsibility.
5. Commitment of family.
6. Work history.

Interview

All applications are reviewed carefully to select candidates for an interview. Candidates should be prepared to be invited to attend a personal interview at Lakehead University. The interviews are conducted by members of the Native Community and Lakehead University.

PROGRAM SUPPORTS

Academic Support

The program instructors and staff assist students to adjust to and become successful in their program of study. This involves academic program planning, course selection, registration, tutorial and remedial supports, study skills and an on-going evaluation of the student's progress.

Students are assigned to an instructor who will act as their academic advisor through their NAPE and engineering study. In addition to excellent instructor-student contact inside and outside of lectures and laboratories, the students are able to obtain the services of a tutor. Tutoring assistance will be made available throughout the entire program.

Instructors, staff and tutors help the student:

- gain confidence in their abilities
- develop a hard work ethic
- become both a team worker and an independent thinker.

Personal Support

The program counsellor assists students and their families with the personal and social adjustments of attending the university. The counsellor works with students to solve problems that may arise in all areas of their lives, and to develop and clarify career goals. The counsellor can also assist students in the following ways:

- Relocating student and family.
- Locating suitable living accommodation.
- Counselling on financial matters.
- Arranging for personal tutors.
- Helping students to make the adjustment to Thunder Bay.
- Maintaining community ties.
- Making arrangements for students to obtain advice from an Elder.
- Organizing social events such as curling, hockey, baseball, family picnics, etc.

The counsellor is available to the student at all times and students must visit the counsellor on a regular basis. Regular visits will help the students and counsellor to know one another and provide quality counsel on an on-going basis thereby preventing potential problems.

Student - Community - University Linkage

The School of Engineering considers the student-community-university linkage to be exceptionally important for the success of many students. The student's program of study is perceived to be a cooperative venture between program instructors and counsellors, the student, and the band counsellors/education authorities, where applicable. Consequently the following practices are part of the program:

- information on student progress can be shared between all responsible parties following authorization by the student.
- community and program counsellors work together to assist the student and resolve problems.
- wherever possible community linkages developed during the recruitment and selection of students are maintained by visitations and other communications.
- where suitable the student's family are involved in orientation and counselling.
- the team approach and the buddy system is encouraged to assist in the strengthening of the support system.

THE ORIENTATION PROGRAM

All students enter a six-week orientation period which begins in mid-July and finishes at the end of August. During this period staff and students have an opportunity to get to know each other. Staff assess student academic capability and, in consultation with the student, plan the student's future academic program.

Orientation is designed to help students obtain information and skills that will enhance their success in the access and diploma programs. The orientation is informal so that students will feel comfortable and gain confidence in their ability to succeed at the university. The courses are designed to meet the student's needs but at the same time to make certain demands with the intent to prepare students for the challenge of engineering. Consequently, instructors make increasing demands on students during the orientation period and students are expected to do homework.

Orientation includes courses in mathematics, science, communications, calculator and computer skills as well as an orientation course which includes study and life skills.

Students are expected to achieve 70% in each course during orientation, prior to registering in advanced courses, otherwise they may have to repeat courses in the Fall Term. It is essential that students have these pre-requisite skills before attempting the more advanced courses.

Orientation Activities

Students:

- Learn about the profession of engineering through films, tours, guest speakers, etc.
- Meet local elders to obtain advice and counsel to students through the traditional ways.
- Attend lectures in mathematics, science, communications, calculator/computer skills.
- Learn to use calculators, computer software, and problem solving skills to do assignments.
- Obtain assistance to find accommodations, day care and schools for children, if applicable.
- Develop study groups with other students.
- Adjust to the City of Thunder Bay.
- Become familiar with Lakehead University and learn about the various services and features that make it an exciting place to be a student.
- Learn the rules and regulations that students are expected to abide by in both NAPE and Lakehead University.
- Get to know the NAPE instructors.

Program of Study for Orientation

Courses*	Lecture	Lab.
NAPE 1090 -- Introductory Mathematics	5	0
NAPE 1092 -- Communications	3	0
NAPE 1093 -- Calculator and Computer Skills	2	4
NAPE 1094 -- Introduction to Engineering Science	<u>3</u>	<u>1.5</u>
	13	5.5

*The number nine (9) in the third digit indicates a non-credit course.

Orientation Program Schedule (Mid-July to End of August)

1. First Day

Introductions and Welcomes
 Description of NAPE
 Question Period
 Lunch
 Registration for Orientation
 Orientation Program
 Tour of University

2. Orientation Program Timetable

A typical timetable for the first five weeks follows. It should be noted that additional tutoring and study periods may be scheduled, consequently students should not assume that their day is complete at the end of the schedule shown. Additional time will also be essential for individual study and assignments.

The sixth week is timetabled by the instructors during the orientation program to provide the time necessary for make-up lectures, review, exams, etc. The latter part of the week is used for counselling and registration for fall term NAPE courses.

ORIENTATION PROGRAM TIMETABLE

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:30	1	4	2	5	3
9:30	2 Math	5 Math	3 Math	1 Math	4 Math
10:30	3 Calculator/ Computer Skills	1 Science	4 Science	2 Calculator/ Computer Skills	5 Science
11:30	11 Orientation	14 Study Skills	12 Orientation	15 Orientation	13 Orientation
12:30	12	15	13	11	14
1:30	13 Communications	11 Calculator/ Computer Skills	14 Communications	12 Calculator/ Computer Skills	15 Communications
2:30	21 Science Laboratory	24 "	22 Study	25 "	23 Function or Free
3:30	22	25	23	21	24
4:30	23	21	24	22	25
5:30					
6:30					
7:30 -					

3. Orientation Hour

This scheduled period is flexible to accommodate program and student needs but will involve tours, guest speakers, and films/videos for the first five weeks. The student's spouse is encouraged to participate in many of these activities. A typical schedule of events is as follows:

<u>Week One</u>	Tuesday Wednesday Thursday Friday Monday	Study Skills (Time Management) Tenant Act University Services: Recreational Bus Tour of City Thunder Bay Services (recreation, hospitals, day care, etc.)
<u>Week Two</u>	Tuesday Wednesday Thursday Friday	Study Skills Budgeting Guest Speaker - Elder University Services: Academic, Conduct Code
<u>Week Three</u>	Monday Tuesday Wednesday Thursday Friday	Community Native Services Study Skills Engineering Lab Tour: Part 1 Sensitization/Rights/Harassment Film/Video
<u>Week Four</u>	Monday Tuesday Wednesday Thursday Friday	Engineering Student Forum Study Skills Guest Speaker: Economic Development of Native Communities Engineering at L.U.
<u>Week Five</u>	Monday Tuesday Wednesday Thursday Friday	University Services: Library Health Services Study Skills Guest Speaker - Elder Engineering Lab Tour: Part 2 Guest Speaker: Native Engineer
<u>Week Six</u>	Examinations	followed by Fall registration and a barbecue

Orientation Course Outlines

NAPE 1090 — Introductory Mathematics (5,0)

This course involves performing operations with algebraic expressions and manipulating equations and formulas. Algebra will be the major emphasis of this course, which includes the multiplication of polynomials, factoring, and simplifying expressions containing radicals. Functional notation, working with positive and negative fractional exponents, and analytical geometry will be discussed. The main topics are: combining like terms, parentheses and multiplication, addition, subtraction, division and multiplication of fractions, first degree equations, working with formulas, graphing, lines, linear inequalities, absolute value, distance, integer exponents, multiplication of polynomials, factoring, square roots, rationalization, radicals, rational exponents, functions, notation, solving equations and complex fractions.

NAPE 1092 — Communications (3, 0)

The intention of this course is to prepare students to write a technical paper. Students will research an engineering topic in the library, submit a minimum 5 page typed paper using Wordprocessing, and make a presentation to the class during the final week of class. The course will review basic English principles.

NAPE 1093 — Calculator and Computer Skills (2, 4)

Students will develop calculator skills for use in other courses and introductory computer skills for report writing. Lectures and laboratories will be integrated to accommodate the needs of other courses. Any programming skills involved will be in BASIC.

NAPE 1094 - Introduction to Engineering Science (3, 1½)

This is an introductory course for those that have a very limited science

background. However, it is necessary to complete it before registering for introductory chemistry and physics in the Fall Term. The major topics are: heat, applied chemistry, and magnetism and electricity. These topics consist of the following units: the kinetic molecular theory, thermal expansion, heat transfer by convection, conduction and radiation, quantity of heat, the law of conservation of energy, fractional distillation of crude oil, acids and bases, hard and soft water, magnetism, and electric current and circuits. Laboratory work will be a major component of this course.

NAPE ACADEMIC PROGRAM

This pre-engineering program continues the instruction in fundamentals of mathematics, physics, chemistry and communications which began in the orientation program, however the intensity and difficulty increases as the courses proceed. The student's program consists of those courses selected at the end of the orientation program. Students normally complete NAPE courses within one year, and therefore it may take four years before the student completes the technology diploma. If students do not require the NAPE courses they can study the diploma program of their choice with the assistance from the NAPE support system.

Attendance and Study

The study of engineering requires self-discipline and hard work. NAPE students are expected to develop the study habits of any engineering student. These require:

1. Regular and punctual attendance in lectures, laboratories and tutorials in all courses.
2. Completion of all assignments within the deadlines specified by the instructor, and the writing of all tests and examinations in their courses.
3. Meetings with their academic advisors on a regular basis to discuss their academic progress.
4. Private study outside of scheduled laboratory and problem sessions. Students can expect to devote most evenings and weekends to a concentrated work effort.

Summer Activities

Students who have the academic need will be expected to devote the summers to do further academic work if they have adequate financial support. Alternatively, students will be encouraged to work in an engineering related job during the summer months. Assistance in finding summer jobs will be provided.

Academic Regulations

Student progress and performance are monitored and evaluated on a regular basis to identify individual needs for extra tutoring and academic counselling. At the end of each term an overall evaluation will be made of each student's status. The following criteria will be used in this evaluation:

- a student must achieve at least 65% in a NAPE course before proceeding to a more advanced course in the same field.
- an average of 65% in NAPE courses is considered to be the minimum acceptable level of academic performance for advancement.
- students are normally be permitted to repeat a course only once.
- a student who does not achieve an average of at least 50% in NAPE courses will normally be required to withdraw from the program.
- prior to any dismissal, each student's case will be considered on an individual basis to determine if there are any relevant circumstances to prevent such action. Consideration for re-admission requires a petition from the student.
- students must register for at least four courses per term, otherwise they may lose their funding.

The student is responsible for being familiar with the University Code of Student Behavior and Disciplinary Procedures. It is also understood that every student by the act of registering, agrees to abide by all the rules, regulations, policies and procedures of Lakehead University and of the Faculties or Departments/School's in which the student is registered. These matters are presented in the Lakehead University Code

of Student Behaviour and Disciplinary Procedures Leaflet and in the University Calendar. NAPE staff assists students with questions and problems which arise from regulations.

Students who find that they are unable to perform their normal academic duties for any reason (illness, stress, family problems, etc.) are required to contact their counsellor immediately so that appropriate assistance can be provided.

Program of Study

Fall Term*		Lecture	Lab.
NAPE 1190	Introduction to Engineering Mathematics I	4	1
NAPE 1192	Communications	3	0
NAPE 1193	Study Skills & Reasoning	2	0
NAPE 1194	Introduction to Engineering Chemistry I	3	1.5
NAPE 1195	Introduction to Engineering Physics I	<u>3</u>	<u>1.5</u>
Total Hours		15	4

Winter Term*

NAPE 1290	Introduction to Engineering Mathematics II	4	1
NAPE 1291	Introduction to Engineering Mathematics III	3	1
NAPE 1294	Introduction to Engineering Chemistry II	3	1.5
NAPE 1295	Introduction to Engineering Physics II	<u>3</u>	<u>1.5</u>
Total Hours		13	5

* Students who have adequate academic standing will be counselled to register in one or more courses from Year I of the Engineering Technology program.

NAPE Course Descriptions

NAPE 1190 – Introduction to Engineering Mathematics I (4-1; 0-0)

This course is intended for those students who either do not have grade 12 advanced mathematics or require a review of those concepts. This course will help prepare students for all first-year engineering technology mathematics courses. The course includes the following topics: solving equations, linear, quadratic and polynomial functions, special functions, exponents and logarithms, and analytical geometry.

NAPE 1192 – Communications (3-0; 0-0)

This is a course in English language skills, composition and public speaking, and introduces the student to structured written and oral technical communication. Word processing will be used for written assignments.

NAPE 1193 – Study Skills and Reasoning (2-0; 0-0)

Various components of study skills will be presented including: time management, effective listening and note taking, exam writing, and library skills.

NAPE 1194 – Introduction to Engineering Chemistry I (3-1½; 0-0)

This course is an introduction to the general principles of chemistry that will provide a foundation for students who will continue to study chemistry in first-year of the technology diploma. The course is designed to provide a fundamental background that will enable students to understand chemical concepts, handle chemical intelligently and safely, and appreciate the applications and implications of chemistry in technology and society. The core units of study include: matter, elements and chemical bonding, and gases.

NAPE 1195 – Introduction to Engineering Physics I (3-1½ 0-0)

This course is an introduction to the general principles of physics that will provide a foundation for students who will continue to study physics in first-year of the technology diploma. This course is designed to provide students with the background that will enable them to understand physical concepts, apply scientific techniques, and appreciate the applications and implications of physics in technology and society. The core units of study include: geometric optics, mechanics, and electricity.

NAPE 1290 – Introduction to Engineering Mathematics II (0-0; 4-1)

This course is a continuation of Introduction to Engineering Mathematics I. This course will help to prepare students for calculus and other first-year engineering technology mathematics courses. This course includes the following topics: trigonometry, conics, sequences and series, and the binomial theorem.

NAPE 1291 – Introduction to Engineering Mathematics III (0-0; 3-0)

This course is an introduction to many of the concepts explored in calculus. Topics to be covered include: limits, the definition of the derivative, techniques of differentiation, and some applications of the derivative, such as curve sketching.

NAPE 1294 – Introduction to Engineering Chemistry II (0-0; 3-1½)

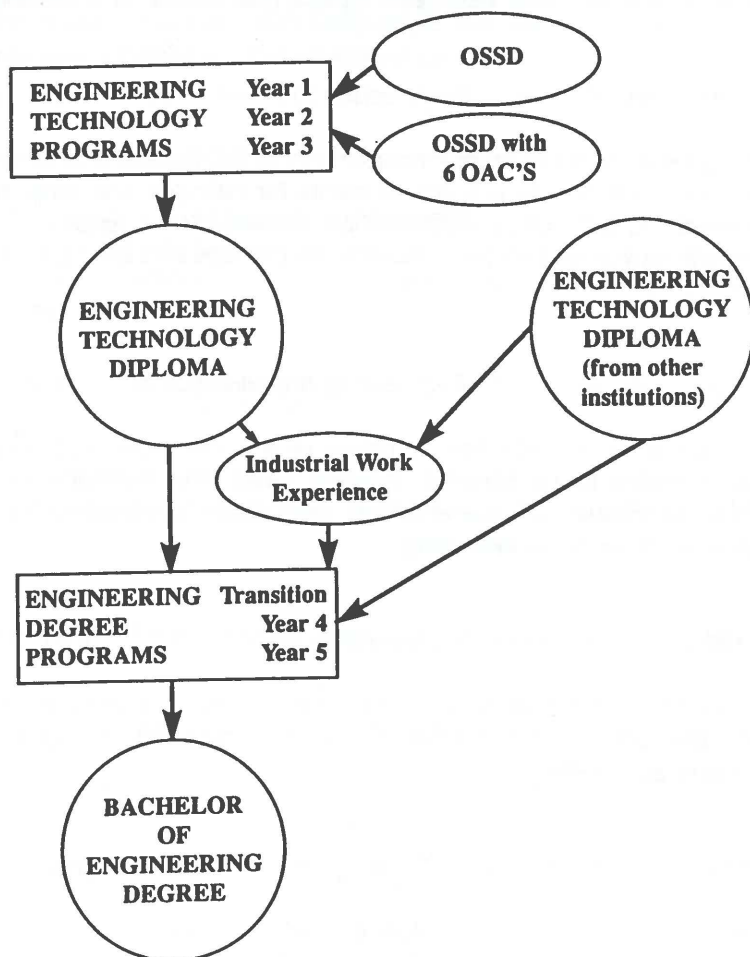
This course is a continuation of NAPE 1194. The core units of study include: chemical reactions, chemical-reaction calculations, solutions, and industry and society.

NAPE 1295 – Introduction to Engineering Physics II (0-0; 3-1½)

This course is a continuation of NAPE 1195. The core units of study include: electromagnetism, sound, nuclear physics, and kinematics.

SCHOOL OF ENGINEERING PROGRAMS

The School of Engineering offers a unique combination of Engineering Technology and Engineering Degree programs in Chemical, Civil, Electrical, and Mechanical Engineering. The following flow chart illustrates how upon completion of a Diploma in Engineering Technology students may enter a Post-Diploma Bachelor of Engineering Degree Program.



Admission Criteria

1. High School graduates with the OSSD/SSGD with grade 11 and 12 advanced level mathematics and science with an overall average of at least 60% may enter the first year of technology. These students can complete a diploma program in three years prior to entry to a two-year post-diploma degree program.
2. High school students with the OSSHGD or OSSD with six OAC's with a minimum average of 60% and an average of 60% in mathematics may enter the second year of engineering technology. These students can complete a technology program in two years and take a two-year post-diploma degree program. Where:
 OSSD = Ontario Secondary School Diploma
 SSGD = Secondary School Graduate Diploma
 OSSHGD = Ontario Secondary School Higher Graduate Diploma
 OAC = Ontario Academic Credit - for engineering the six OAC's must include calculus, algebra, chemistry and physics.
3. Native students who have completed their assigned program of NAPE courses with an average of at least 65% may be admitted to the first year of engineering technology.

Consequently, students who enter Year I of the Engineering Technology program can complete their diploma in three years and an engineering degree in two subsequent years for a total of five years. Students who enter Year II of the Engineering Technology program can complete their diploma in two years and the engineering degree in two more for a total of four years.

When students are in the third year of their engineering technology program they will decide to apply for degree studies or to gain employment as a graduate engineering technologist. For those who decide to apply to the degree program the **Admission Criteria** are as follows:

Technology graduates:

- (1) *Applicants must have a Diploma in Technology from a Community College, Lakehead University or the equivalent with an average of at least 70% in the final year of their program to be eligible for admission consideration*
or
- (2) *Applicants with two or more years of relevant industrial experience must have a Diploma in Technology from a community college, Lakehead University or the equivalent with an average of at least 65% in their final year of their program to be eligible for admission consideration.*

Advantages to NAPE Students of Lakehead University's Combination of Diploma and Degree Programs:

- Students may enter the first year of technology with an Ontario grade 12 education, and become involved in engineering education.
- Unlike most engineering degree programs which concentrate on mathematics and sciences in the first two years, the engineering technology programs have a greater content of engineering science and design. Consequently, students will soon have adequate training to work at meaningful engineering tasks in their summer employment.
- The mathematics and sciences are spread out over the years so that they are taken as they are needed. In this way, students have a greater opportunity to appreciate their relevance.
- Upon completion of the engineering technology program, students may obtain employment as graduate engineering technologists. For some students this graduation will provide them with a career after two or three years of study, a benefit which is not available after two years of study in a conventional engineering degree program. For those students who are "fed up with studying" or who have uncertainties, this stage provides an excellent

opportunity to go to work and contemplate their future and possibly return to degree studies. Students who are doing well in their academic endeavour may choose to apply for the degree program immediately upon completion of the engineering technology program.

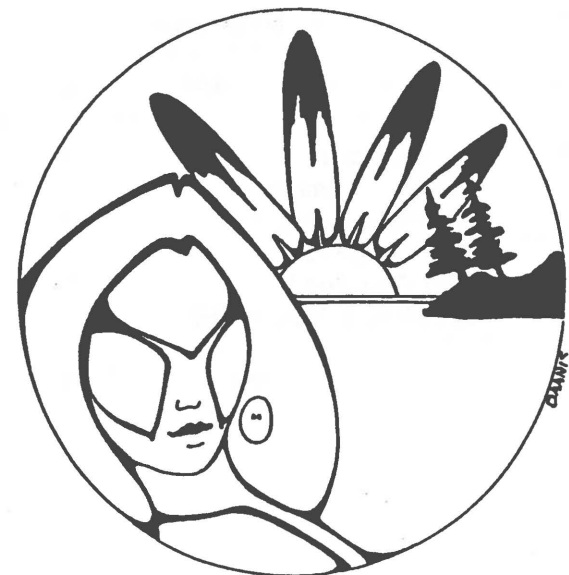
Academic Regulations

It is the responsibility of each student registered at Lakehead University to know the academic regulations associated with his/her program. The student should therefore read and understand the regulations for:

- the University
- the Faculty of Professional Studies
- the School of Engineering regulations for (a) the Diploma programs and (b) the Degree programs.

Each student should also be familiar with the University Code of Student Behavior and Disciplinary Procedures.

Advice and counselling on these requirements is provided by program instructors and staff.



COMMON FIRST-YEAR ENGINEERING TECHNOLOGY

NAPE students who have adequate academic preparation are permitted to register in Engineering Technology I courses. To help students understand what courses are available at this level this portion of the regular calendar is reproduced here.

The first year is common to Chemical, Civil, Electrical and Mechanical Engineering Technology programs. After this common first year, students select one of these technology programs for their second year studies.

Program of Study

Fall Term		Lect.	Lab.
Engineering 1131	Drawing I	1	3
Engineering 1134	Technology I	3	1
Chemistry 1060	Intro. to Chemistry	3	1.5
Mathematics 1050	Trig. & Anal. Geom.	3	2
Mathematics 1052	Intro. Calculus	3	2
Physics 1030	Intro. Mechanics & Heat	<u>3</u>	<u>3</u>
Total Hours		16	12.5
Winter Term		Lect.	Lab.
Engineering 1535	Technology II	3	1.5
Chemistry 1060	Intro. to Chemistry	3	1.5
English 1074	Technical Writing I	2	
Mathematics 1070	Matrix Algebra	3	2
Mathematics 1072	Intro. Calculus II	3	2
Physics 1010	Electricity & Magnetism	<u>3</u>	<u>2</u>
Total Hours		17	9

Course Descriptions

Fall Term

Engineering 1131 - Drawing I (1-3;0-0)

Basic engineering drawing techniques, office standards and practices, fits and functions of components and assemblies. Dimensioning. Use of perspective and practice in sketching. Applications of CAD.

Engineering 1134 - Engineering Technology I (3-1;0-0)

The purpose of this course is to introduce and apply graphical and analytical communication methods. Topics include: graphical and analytical solutions to problems in statistics; use of formulae and units; introduction to the laws of conservation and their application.

Chemistry 1060 - Introduction to Chemistry (3-1½; 0-0)

A course in the basic principles of physical, inorganic, and organic chemistry for students without Year 5 (Grade 13/OAC) Chemistry or equivalent. Topics include: atomic structure, the periodic table, chemical bonding, the states of matter, solutions, chemical equilibrium, oxidation and reduction, electrochemistry, introductory organic chemistry. (Two lectures weekly: laboratory and problems sessions in alternate in alternate weeks).

Mathematics 1050 - Trigonometry and Analytical Geometry (3-2; 0-0)

Functions, linear and quadratic equations. Angles, trigonometric functions, identities, sine and cosine rules. The conic sections, polar coordinates, inequalities.

Mathematics 1052 - Introductory Calculus (3-2; 0-0)

Basic algebraic operations, exponential and logarithmic functions. Limits, differential calculus, maxima and minima, related rates.

Physics 1030 - Electricity and Magnetism (3-3; 0-0)

An introductory, non-calculus course in mechanics and heat. Topics include: translational and rotational kinematics and dynamics, momentum, potential and kinetic energy, thermal expansion and conduction, specific and latent heat, and the ideal gas law.

Winter Term

Engineering 1535 - Engineering Technology II (0-0; 3-1½)

The topics of energy, statistics, graphical representation and computing systems are presented and related to a student project. Graphical and analytical solutions of dynamic problems.

Chemistry 1060 - Introduction to Chemistry (0-0; 3-1½)

A course in the basic principles of physical, inorganic, and organic chemistry for students without Year 5 (Grade 13/OAC) Chemistry or equivalent. Topics include: atomic structure, the periodic table, chemical bonding, the states of matter, solutions, chemical equilibrium, oxidation and reduction, electrochemistry, introductory organic chemistry. (Two lectures weekly: laboratory and problems sessions in alternate in alternate weeks).

English 1074 - Technical Writing I (0-0; 2-0)

Analytical studying for information, logic and techniques of expression. The student will be expected to study a variety of materials including prose, business communications, forms and journals in his/her field. Emphasis will be placed on the style necessary for technical communication. The awareness of the complexities of technical communication and the analytical skills developed through a study of various materials will be used to improve the student's technical writing abilities. Each student must possess a recommended dictionary.

Mathematics 1070 - Matrix Algebra (0-0; 3-2)

Matrices, Gaussian elimination, determinants, Cramer's rule. Vectors, dot and cross products, vector equations of lines and planes.

Mathematics 1072 - Introductory Calculus II (0-0; 3-2)

Differentiation of trigonometric, exponential and logarithmic functions. Induction, sequences and series, the binomial theorem. Methods and applications of integral calculus.

Physics 1010 - Electricity and Magnetism (0-0; 3-2)

The fundamental theory of electricity and magnetism including D.C. network theorems, magnetic circuits, D.C. instruments, A.C. components and networks.