

Engineering / Applied Programming Circle

[Proposal 1](#)

[Proposal 2](#)

The Department of Engineering in the Faculty of Applied Science at UBC-O offers graduate programs leading to M.A.Sc. and Ph.D. degrees. Current fields of study include RF/microwave engineering, RF hardware, antennas and propagation, channel modeling, global navigation satellite systems, properties of metals, semiconductors and heterogeneous materials, devices and real-time systems, color removal from pulp mill effluent and dye wastewater by biosorption of fungal biomass, removal of color and disinfection by-product (DBP) precursors from water sources, endocrine disruptors and water quality, membrane technologies for water and wastewater treatment, wastewater reclamation and reuse, aircraft wake vortices, aircraft wing optimization and winglet design.

Opportunities exist to engage in studies in conjunction with the Dominion Radio Astrophysical Observatory (DRAO), the Cancer Center of the Central Okanagan, the Department of Physics and Astronomy at UBC-O, the BC Ministry of Health, the BC Ministry of Water, Land and Air Protection, Environment Canada, Western Economic Diversification and the National Research Council of Canada.

Research collaborations presently exist with Electrical and Computer Engineering and Geomatics Engineering at the University of Calgary, the Department of National Defense, Geoide, the Pollution Control and Waste Management Research Group in the Department of Civil Engineering at UBC-V, and the Departments of Earth and Environmental Science and Chemistry at UBC-O. Faculty members also collaborate with industry in a number of research areas.

The normal entrance requirement is a bachelor's degree in a recognized area of engineering or its equivalent. The application must be supported by a potential graduate supervisor. A research proposal will be required. A minimum TOEFL score of 550 is required from individuals with permanent residence outside of North America. A GRE score may be required.

For a master's degree, 30 credits are needed for graduation, normally consisting of 12 credits for the thesis, 12 credits of core course work from the list of core courses offered within the Department of Engineering and 6 additional credits. Attendance at a weekly graduate student seminar and one presentation per semester is worth 3 credits.

Proposal #1

Engineering Programs at UBC Okanagan and New Okanagan College

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Engineering Programs at UBC Okanagan and New Okanagan College

Recommendation

This University Circle recommends that a School of Engineering and a Department of Computer Science be created within a new faculty (possibly the Faculty of Applied Science) at UBC-O. In September 2005, the School of Engineering would offer the first year of the UBC-V Engineering program as well as an Engineering Graduate Studies program (Figure 1) and the Department of Computer Science would offer an undergraduate program with an Internetworking and Telecommunications option (Proposal 2). Both the Engineering and Computer Science undergraduate programs would be offered in collaboration with New Okanagan College. In subsequent years, the Engineering School would expand to facilitate full undergraduate degree programs in Electrical, Environmental and Mechanical Engineering offering unique specializations such as RF engineering, water and wastewater management, and aeronautical engineering. An Engineering Transfer Program and Bridge Program would be offered at New Okanagan College to facilitate student transfer between UBC-O and New Okanagan College. Refer to Figure 2 for pictorial view of the future programs.

Background and Rationale

For some time, the Faculty of Engineering Technologies has been investigating the possibility of programming at the engineering or applied degree level. Most recently, this has focused on the areas of information technology, and radio frequency (electrical), aerospace and environmental engineering. A number of steps have been taken towards this end including an MOU between OUC, the NRC Dominion Radio Astrophysical Observatory, Industry Canada, and Vitesse (Reskilling) Canada Inc to form a Radio Engineering Research Centre; OUC involvement in the newly formed provincial government's BC Aerospace Consortium; the creation of the BC Freshwater Institute; and most recently the Okanagan Partnership which recommends that Engineering and related programming be offered in the Okanagan.

The creation of UBC-O and the New Okanagan College in September 2005 is the ideal opportunity to establish engineering and applied computing programming at the undergraduate and graduate levels. Current faculty at OUC are qualified to teach undergraduate programming in both Engineering and Computer Science. Some of these faculties are active researchers with existing research funding and are prepared to also offer graduate studies in Engineering starting in September 2005.

The University Circle considered various approaches to beginning engineering programs and determined a timeline that could establish engineering programs, both undergraduate and graduate, in a very short time frame. This relies upon dedicated faculty, utilizing UBC Vancouver's CEAB accreditation as much as possible, and a willingness to share resources between UBC-O and New Okanagan College.

First Year General Engineering at UBC-O (September 2005)

The first step is to establish the first year of general engineering for September 2005. By utilizing identical courses and structure as UBC-V for first year engineering, the academic approvals required should be minimal. Appendix A shows the details in terms of courses to be offered, with some possibilities to capitalize on existing OUC courses. There are staff currently employed by OUC that could immediately begin teaching the engineering level courses (Drs. Fu, Hay, Klukas, Nسدoly, Merkl, etc.). General science laboratories could be utilized to reduce the capital investment. The requirement to have students purchase a suitable laptop computer will remove the requirement for a standard computer lab, provided proper wireless access is present in the classrooms.

While a market survey must be completed, the initial assumption is an intake of 120 FTE. This would lend itself to lecture sections of 120 or 60 students, and lab sections of 20 students.

Four-Year Engineering Programs at UBC-O (Starting September 2006)

Using a phased-in approach starting in September 2006, UBC-O would eventually offer (1) an electrical engineering program with different fourth year electives compared to UBC-V; (2) a unique environmental engineering program; (3) a mechanical engineering program with different fourth year electives compared to UBC-V. At this point, it is anticipated that the unique fourth year electives in electrical and mechanical engineering will be in the areas of RF engineering and aeronautical engineering respectively. Ideally, engineering undergraduate students at UBC-O and UBC-V will be able to take courses at both campuses in order to benefit from the specializations offered at each. Engineering labs could be taught by instructors at New Okanagan College in order to utilize existing lab space, equipment, and expertise. An emphasis on a more practical approach to engineering will differentiate engineering at UBC-O from other engineering programs. The program general details are outlined in Appendix B.

Graduate Studies in Engineering at UBC-O (September 2005)

Simultaneous with the creation of the first year engineering program would be the establishment of a Graduate Studies Program in Engineering at UBC-O. Initial fields of study would include RF engineering, propagation channel modeling, semiconductor and heterogeneous materials, color removal from pulp mill effluent and dye wastewater, membrane technologies for water and wastewater treatment, aircraft wake vortices, aircraft wing optimization and winglet design. Currently, Drs. Fu and Klukas hold NSERC research grants and could accept graduate students at UBC-O in September 2005. Other current faculty members such as Drs. Nسدoly, Paeth and Merkl will apply for research funding. It is anticipated that collaboration will occur with faculty from other Departments such as Physics and Astronomy, and Earth and Environmental Science. Co-supervision of graduate students and cross-listing of courses will produce the critical mass necessary. Approximately 4-6 graduate students are anticipated for 2005.

Partnership Modeling

There are many models where one could utilize partnership arrangements between universities and colleges in applied programming; these are shown in Appendix C.

The University Circle group considered these models and settled on the model illustrated in Figures 1 and 2. This model allows multiple paths between degree and diploma programs for students. Sharing between institutions occurs where it makes the most sense: lab equipment and instructional expertise (there are no shared classes between engineering diploma and degree students). New Okanagan College would continue to offer the current Engineering Technology programs, as well as a university transfer program in engineering (applied science). In time, the College could offer an engineering bridge program similar to Camosun College.

The program model also notes a diploma exit from the engineering degree program. Having a formal mechanism in place may allow the New Okanagan College to attract students who are underachieving in engineering both at UBC-O and UBC-V. The students who currently leave engineering programs are often quite capable of completing an engineering technology diploma but typically are unaware of this option.

Engineering Transfer at OC in Partnership with UBC-O (September 2005)

The re-establishment of engineering transfer should also be seriously considered by the new Okanagan College. Very few resources are required to put this program back in place (Appendix D gives the history of the program at OUC) and it may be an important feeder for both engineering and engineering technology programs. This will provide greater access to students in the Okanagan region, and should ladder seamlessly into engineering programs at UBC-O and UBC-V (note that the OUC program is fully articulated with UBC, U Vic and Simon Fraser).

Engineering Bridge at OC in Partnership with UBC-O (June 2007)

The final element allowing full flexibility for students would be the establishment of an engineering bridge program at the New Okanagan College in partnership with UBC-O. Based on the highly successful model in place at Camosun College, graduates of accredited engineering technology programs would take a six-month set of science, math and engineering courses, allowing direct entry into third year of engineering at UBC-O and UBC-V. This model has proven to be a superb route for engineering technologists who wish to further their careers in engineering. Having a bridge program in place at New Okanagan College would allow Camosun College to focus exclusively on U Vic while New Okanagan College could focus exclusively on UBC.

Possible Timelines

September 2005

- 1st year Engineering Transfer program re-established at OC in partnership with UBC-O
- Year 1 of UBC-O Engineering Program established, identical to UBC-V
- Graduate Studies in Electrical, Environmental and Mechanical Engineering established

June 2006

- Radio Engineering Research Center established, partnership between DRAO, Industry Canada, Vitesse, UBC-O, OC

September 2006

- Year 2 of UBC-O Electrical Engineering program established, identical to UBC-V
- Year 2 of unique UBC-O Environmental Engineering program established
- Year 2 of UBC-O Mechanical Engineering program established, identical to UBC-V

June 2007

- Engineering Bridge program established

September 2007

- Year 3 of UBC-O Electrical Engineering program established, identical to UBC-V
- Year 3 of unique UBC-O Environmental Engineering program established
- Year 3 of UBC-O Mechanical Engineering program established, identical to UBC-V

September 2008

- Year 4 of UBC-O Electrical Engineering program established, with different electives than UBC-V
- Year 4 of unique UBC-O Environmental Engineering program established
- Year 4 of UBC-O Mechanical Engineering program established, with different electives than UBC-V

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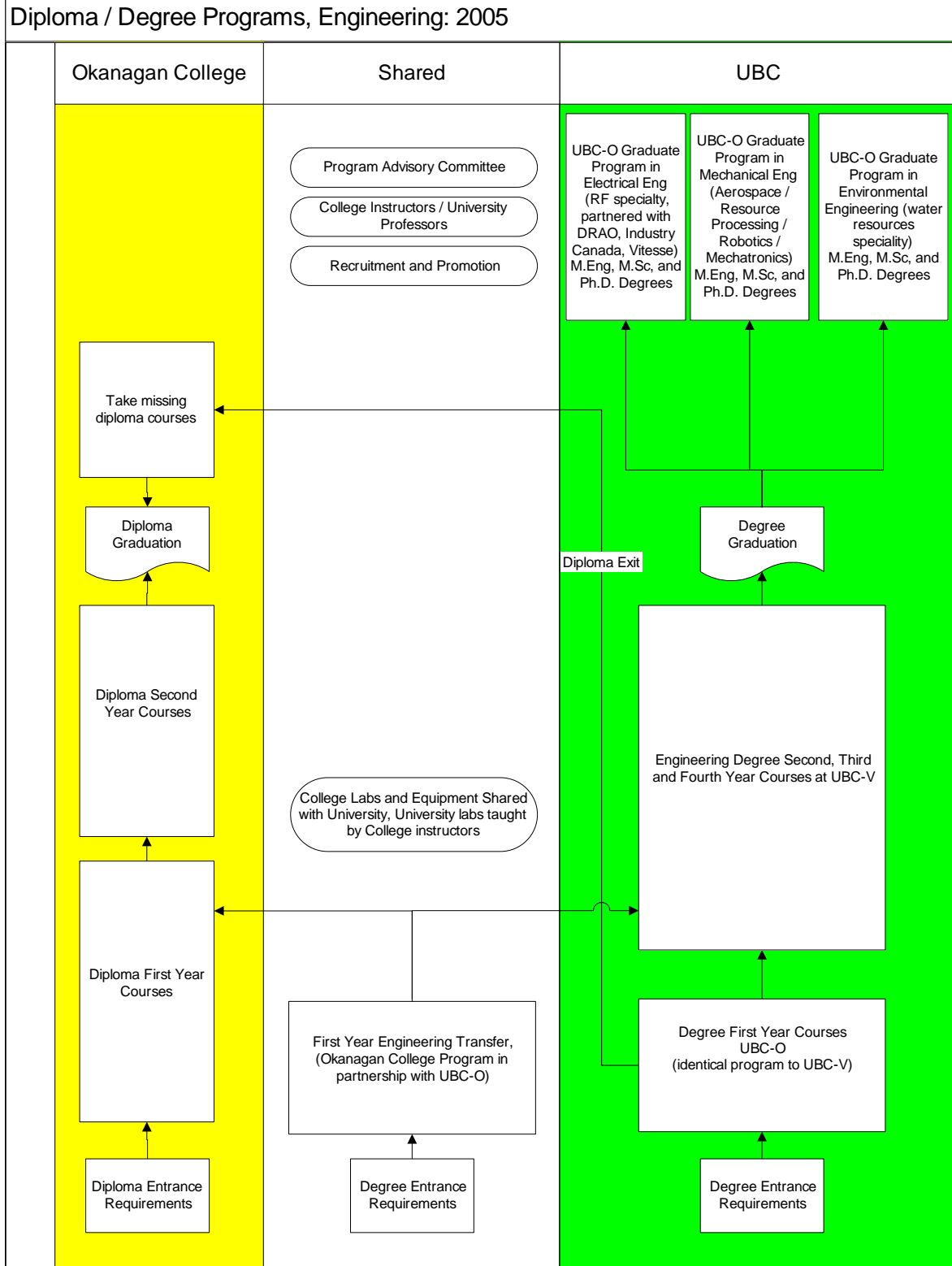


Figure 1: Initial Program Establishment

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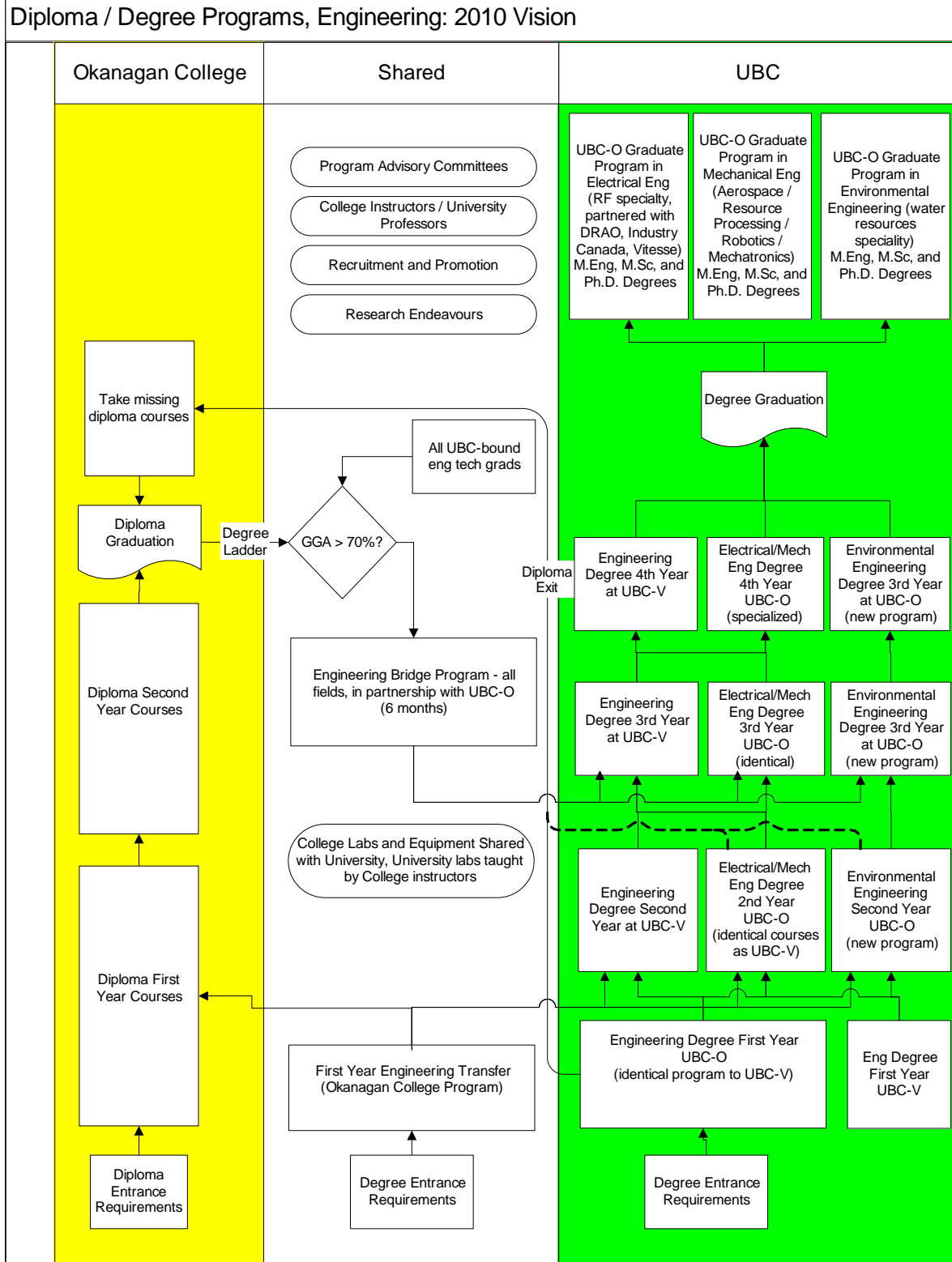


Figure 2: Programming Fully Established

Appendix A: First Year Engineering Courses

It is proposed that UBC-O would offer the same first Engineering courses as UBC-V. The following course names and numbers are from the current UBC-V calendar.

Could equivalent courses already offered by UBC-O (OUC) could be substituted. (See, for example, CPSC 152)

Course Number	Course Name	Credits	Hours [lecture-lab-tutorial]
APSC 121	Society and the Engineer	(1)	[1-0-0]
	<ul style="list-style-type: none"> - Taught by Dept. of Engg. - 1 lecture section of 120 (1 lecturer) 		
APSC 122	Introduction to Engineering	(0)	[1-0-0]
	<ul style="list-style-type: none"> - Taught by Dept. of Engg. - 1 lecture section of 120 (1 lecturer) 		
APSC 150	Engineering Case Studies	(6)	[3-4-2]
	<ul style="list-style-type: none"> - Taught by Dept. of Engg. - A full year course - 2 lecture sections of 60 each (2 lecturers) - Labs sections of 30 each (4 lab instructors – lecturers/grad students) - Lab space could be simple classrooms 		
CHEM 154	Chemistry for Engineering	(3)	[3-3*-0] * alternate weeks
	<ul style="list-style-type: none"> - Taught by Dept. of Chemistry - New course required of Dept. of Chemistry - 2 lecture sections of 60 each (2 lecturers) - Multiple lab sections - Requires use of chemistry labs 		
CPSC 152	Principles of Software Devel.	(3)	[3-2-1]
	<ul style="list-style-type: none"> - Taught by Dept. of Computer Science OR Dept. of Engineering (may require name change) - An equivalent course already offered by Dept. of Computer Science may be substituted - 2 lecture sections of 60 each (2 lecturers) - 6 lab sections of 20 each (6 lab instructors – graduate students) - 4 tutorial sections of 30 each (4 tutorial instructors – lecturers/grad students) - Lab space need only be classrooms as students would use personal laptops 		

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- ENGL 112 Strategies for University Writing (3)
- Taught by Dept. of English
 - An equivalent course already offered by Dept. of English may be substituted
 - Multi-section lectures
- MATH 100 Differential Calculus (3) [3-0-0]
 with Applications to Physical Sciences and Engineering
- Taught by Dept. of Math
 - New course required of Dept. of Math
 - 2 lecture sections of 60 each (2 lecturers)
- MATH 101 Integral Calculus (3) [3-0-0]
 with Applications to Physical Sciences and Engineering
- Taught by Dept. of Math
 - New course required of Dept. of Math
 - 2 lecture sections of 60 each (2 lecturers)
- MATH 152 Linear Systems (3) [3-1*-0]
- Taught by Dept. of Math
 - New course required of Dept. of Math
 - 2 lecture sections of 60 each (2 lecturers)
 - Lab instructor required (may be lecturer)
- PHYS 153 Elements of Physics (6) [3-0-1;3-3-1]
- Taught by Dept. of Physics and Astronomy
 - New course required of Dept. of Physics and Astronomy
 - A full-year course
 - 2 lecture sections of 60 each (2 lecturers)
 - Multiple lab sections
 - Requires use of Physics labs
 - 4 tutorial sections of 30 each (4 tutorial instructors – lecturers/grad students)
- PHYS 170 Mechanics 1 (3) [3-0-1]
- Taught by Dept. of Physics and Astronomy OR Dept. of Engg. (may require name change)
 - 2 lecture sections of 60 each (2 lecturers)
 - 4 tutorial sections of 30 each (4 tutorial instructors – lecturers/grad students)

Complementary Studies Elective

(3)

- The UBC-V calendar specifies the minimum requirements for the 21 credits required in Complementary Studies.
- Some of these requirements are satisfied by Applied Science and Engineering courses that will need to be developed at UBC-O over time.
- Initially, the Complementary Studies elective in first year will be chosen from courses (or equivalent courses) already offered at UBC-O.
 - Humanities and Social Science electives
 - In general, scientific geography courses, statistical courses, studio/performance courses in fine arts, music and theatre courses, and courses that teach language skills are not acceptable.

Appendix B: Program Details

Program Name: **First Year Engineering** Faculty: **TBD**

Description	Year 1 of the standard UBC engineering program. Students would continue on to year 2 at UBC-O or UBC-V
Rationale	<ol style="list-style-type: none"> 1) forms the basis for series of applied programs to follow 2) undergraduate programming facilitates graduate level research 3) Okanagan Partnership has identified need for applied science programming at UBC-O and OC
Resources Required (estimate only; full business plan required)	<p>Assumptions:</p> <ul style="list-style-type: none"> • Admission into 1st year engineering: 120 in Sept 2005 • All 1st year students req'd to purchase/lease laptop computer • 1st year classes will be split into no more than 2 lecture sections (60 students each), and up to 6 lab sections (20 students each). Note: if Phys/Chem labs run alternating weeks, then only 3 lab sections will be required. • 3, one-term, undergraduate courses/year = full teaching load/faculty member <p>Staff:</p> <ul style="list-style-type: none"> • 5 FTE sufficient for all first year engineering-specific courses (APSC and CPSC courses as listed in UBC-V Calendar) • Chemistry: 0.5 FTE; Physics: 1.0 FTE; Math 1.0 FTE • Note: there is a cadre of existing staff at OUC with applicable education/experience that could be utilized, including Dr. Fu, Dr. Hay, Dr. Klukas, Ron Light, Dr. Merkl, Dr. Nesyoly, Mr. Ashman, Mr. Engman, Mr. Gagnon, Mr. Langedyk, and Dr. Paeth <p>Physical Space:</p> <ul style="list-style-type: none"> • Require use of large lecture theatre(s) (capacity 120) for single section courses such as APSC 121 and APSC 122, APSC 150 • Require use of large classrooms (capacity 60) for multi-section classes • Require use of Physics and Chemistry labs <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • Physics may require additional equipment for PHYS 153
Earliest Implementation Date	Sept 2005
Priority	High

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Program Name: **Electrical Engineering** Faculty: **TBD**

Description	4-year electrical engineering undergraduate degree program
Rationale	<ol style="list-style-type: none"> 1) Okanagan Partnership has identified need for programming in radio engineering, electronic systems, integrated circuits and bioelectronics at UBC-O and OC 2) OUC had previously determined the need for programming in radio frequency (RF) engineering 3) OUC has existing resources that can be utilized under UBC-O and OC to facilitate the establishment of this program 4) Program would capitalize on existing UBC-V CEAB accreditation while creating a unique program focused on the strengths and needs of Okanagan industry 5) Program is a step required by the MOU between NRC's Dominion Radio Astrophysical Observatory, Industry Canada, Vitesse (Reskilling) Canada Inc, and OUC
Resources Required (estimate only; full business plan required)	<p>Assumptions:</p> <ul style="list-style-type: none"> • 1st year general engineering program in place starting 2005 • 2nd year start date: 2006, 3rd year: 2007, 4th year 2008 • 40 students maximum start year two of the program (single lecture section; two lab sections) <p>Staff:</p> <ul style="list-style-type: none"> • 4 additional FTE Electrical Engineering faculty hired in each of 2006, 2007, 2008 • 1 additional FTE Math faculty hired (could be some commonality with Mech Eng program) • Support staff: 1 FTE 2005, possibly 1 additional FTE 2007 • 3.0 additional FTE for lab instruction (EE labs taught by OC Electronic Engineering Technology faculty) <p>Physical Space:</p> <ul style="list-style-type: none"> • Labs: either use existing OC labs or provide two labs capable of seating 24 students each (12 stations if partnering utilized) <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • If UBC-O equips both labs above, estimate \$200,000 for basic electronic equipment and associated software (2006)
Earliest Implementation Date	Phased in approach starting Sept 2006
Priority	High

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Program Name: **Environmental Engineering** Faculty: **TBD**

<p>Description</p>	<p>4-year environmental engineering undergraduate degree program. The program will focus on environmental analysis and environmental engineering design, construction, operation and maintenance, including safe drinking water provision, water pollution control, solid and hazardous waste disposal and recycling, and air pollution control and climate change.</p>
<p>Rationale</p>	<ol style="list-style-type: none"> 1) The Okanagan region is one of the fastest-growing population areas in Canada. The region's environment is fragile and under stress. The program can help address the common environmental problems that have been identified as urgent by the communities and various government agencies, including: <ol style="list-style-type: none"> a. Limited water resources (water quantity) b. Availability of safe drinking water c. Reuse of highly treated wastewater effluent as a water resource d. Solid and hazardous waste disposal and recycling e. Contaminated site remediation f. Air pollution and climate change 2) Okanagan Partnership has identified need for applied programming in water, air, environmental and resource management 3) OUC has identified the need to build capacity in environmental programming and has established the Fresh Water Institute, with under-graduate degree and diploma programs with a water focus 4) OUC has existing resources that can be utilized under UBC-O and OC to facilitate the establishment of this program
<p>Resources Required (estimate only; full business plan required)</p>	<p>Assumptions:</p> <ul style="list-style-type: none"> • 1st year general engineering program in place starting 2005 • 2nd year start date: 2006, 3rd year: 2007, 4th year 2008 • Students: maximum of 40 per year from 2006. <p>Staff:</p> <ul style="list-style-type: none"> • 1 additional FTE water and wastewater engineering (2006) • 1 additional FTE water resources - hydrology / hydraulics (2007) • 1 additional FTE solid waste mgt. and contaminated site remediation (2008) • 1 additional FTE climate change and air pollution (2008) • 1 additional FTE lab instructor (2006) <p>Physical Space:</p> <ul style="list-style-type: none"> • 1 classroom (2006) • Environmental Engineering Labs: <ul style="list-style-type: none"> • Water and wastewater lab (2006) • Hydraulic lab (2007) • Solid waste and site remediation lab (2008) • Air pollution lab (2009) <p>Note : OC labs may be utilized as appropriate</p> <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • equipment and instruments used in the above labs.

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Earliest Implementation Date	Phased in approach starting Sept 2006
Priority	High

Program Name: **Mechanical Engineering** Faculty: **TBD**

Description	4-year mechanical engineering undergraduate degree program
Rationale	<ol style="list-style-type: none"> 1) Okanagan Partnership has identified need for programming in robotics, mechatronics, resource processing technologies and aeronautical engineering, all which fall under the purview of mechanical engineering 2) Program would capitalize on existing UBC-V CEAB accreditation while developing a unique mix of options not found elsewhere in western Canada, in particular the focus on aerospace in support of the industry in the Okanagan 3) OUC had previously identified the need to develop programming in support of the growing aerospace industry in the Okanagan
Resources Required (estimate only; full business plan required)	<p>Assumptions:</p> <ul style="list-style-type: none"> • 1st year general engineering program in place starting 2005 • 2nd year start date: 2006, 3rd year: 2007, 4th year 2008 • 40 students maximum start year two of the program (single lecture section; two lab sections) <p>Staff:</p> <ul style="list-style-type: none"> • 4.0 additional FTE Mechanical Engineering faculty in each of 2006, 2007, 2008 • 1.0 additional FTE Math department (could be some commonality with Electrical Eng program) • Support staff: 1 FTE 2005, possibly 1 FTE 2007 • 3.0 additional FTE for lab instruction (ME labs taught by OC Mechanical Engineering Technology faculty) <p>Physical Space:</p> <ul style="list-style-type: none"> • Use existing OC labs where possible • Land for wind tunnel at suitable location <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • Wind tunnel: \$5.1 million (funding currently being sought federally and provincially) • Software and associated equipage: TBD
Earliest Implementation Date	Phased in approach starting Sept 2006

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Priority	High
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Program Name: **Graduate Studies in Engineering** Faculty: **TBD**

Description	Graduate engineering program leading to MSc. and Ph.D. degrees in Electrical, Environmental and Mechanical Engineering
Rationale	<ol style="list-style-type: none"> 1) Okanagan Partnership has identified the need for research in: (i) water, air, environmental and resource management; (ii) radio engineering, electronic systems, integrated circuits, bioelectronics; (iii) resource processing technologies; (iv) applied computing, robotics, mechatronics; and (v) aeronautical engineering. 2) There are exiting engineering faculty with research focus in these areas, including Klukas, Neddoly & Paeth (RF engineering, GPS and semiconductor physics), Gagnon and Merkl (aeronautical engineering) and Fu (water and wastewater management) 3) Research Task Force identified RF Engineering and water resource science / watershed sustainability as research clusters 4) NSERC research grant funding is currently held by Klukas and Fu, facilitating some graduate student intake in 2005 5) Establishment of the Radio Engineering Research Centre (RERC) hinges on research capacity at UBC-O in RF Engineering
Resources Required (estimate only; full business plan required)	<p>Staff:</p> <ul style="list-style-type: none"> • Strategic hiring of key individuals for undergraduate engineering programs will facilitate growth of graduate programming. For example, the EE faculty member hired in 2006 should be a senior researcher in RF/Microwave Engineering as recommended by Research Task Force • Graduate course cross-listing between Physics and Electrical Engineering, and Earth & Environmental Science and Environmental Engineering could result in personnel savings <p>Physical Space:</p> <ul style="list-style-type: none"> • Graduate student office space: 4-6 in 2005, with additional space required in 2006 and beyond • Graduate labs: 3 labs, one each for EE, ME and EnvE • Assume that some graduate students will utilize undergraduate EE lab space when appropriate • Assume that some graduate students will utilize existing facilities and equipment at DRAO • Research labs, offices and equipment at the RERC may be utilized by UBC-O graduate students <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • Assume infrastructure funding provided by public/post secondary partnership and federal/provincial granting agencies <p>Other:</p> <ul style="list-style-type: none"> • Start-up faculty research funding for graduate student support/equipment in 2005 • TA positions at UBC-O to supplement graduate student income

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Earliest Implementation Date	Sept 2005
Priority	High

Program Name: **Engineering Bridge Faculty: Engineering Technologies**

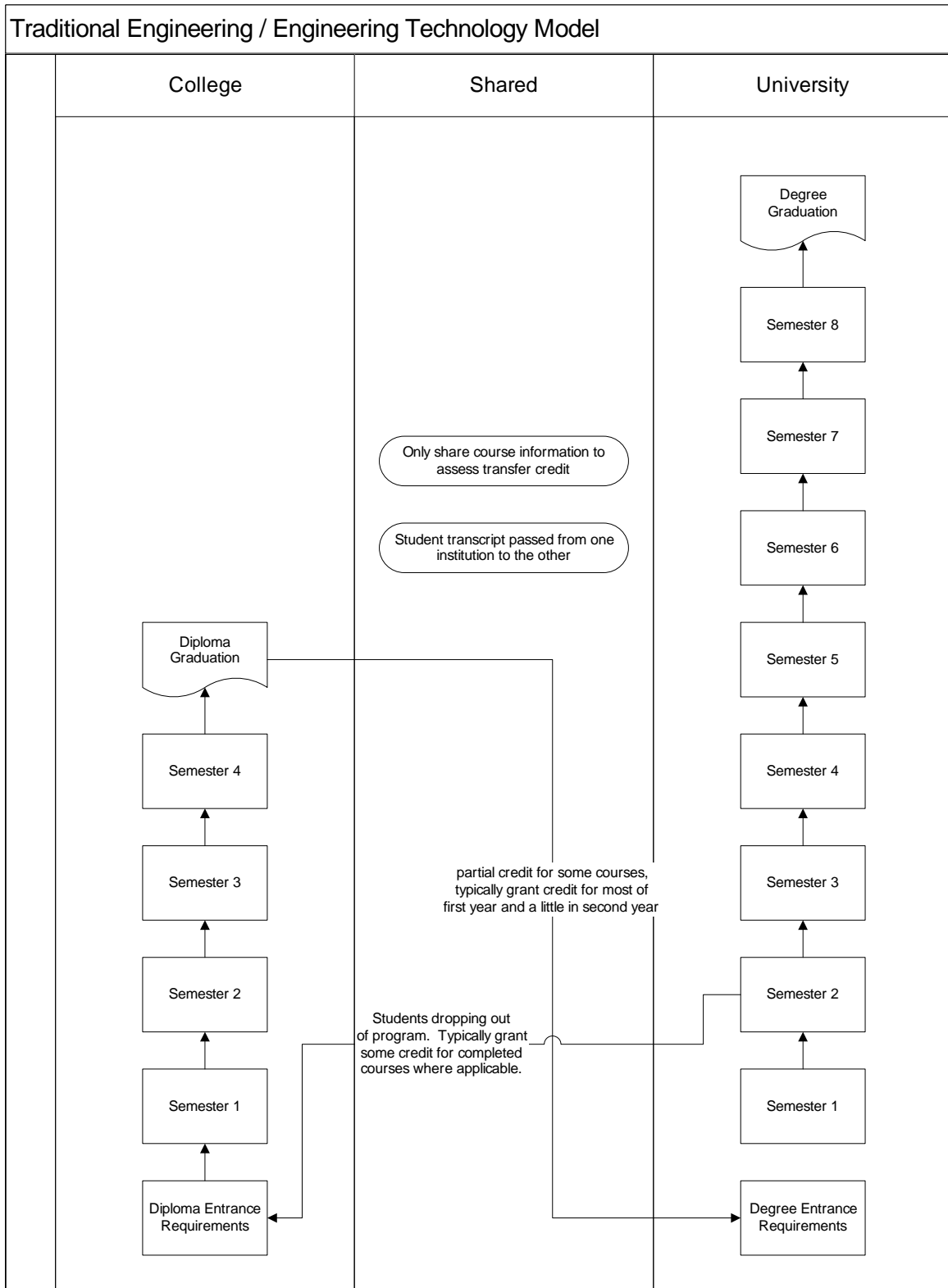
Description	6-month engineering bridge program providing laddering for engineering technology diploma graduates to continue on to an engineering degree (similar to Camosun College model)
Rationale	<ol style="list-style-type: none"> 1) There is consistent interest expressed from OUC students and graduates desiring a local option to continue studies in engineering 2) The current bridge program offered by Camosun College is at capacity and primarily serves U. Vic. The proposed bridge program would primarily serve UBC-V and UBC-O 3) The engineering technology diploma – bridge - engineering degree completion route has been shown to provide high quality graduates
Resources Required (estimate only; full business plan required)	<p>Staff:</p> <ul style="list-style-type: none"> • Will vary depending on number of disciplines involved: assume 3.0 FTE for single discipline, add 1.0 FTE per additional discipline <p>Physical Space:</p> <ul style="list-style-type: none"> • This would have to be assessed based on campus; if offered at SKC it is possible that existing space will be adequate <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • If accommodated by existing engineering technology and university transfer labs, equipage should be adequate
Earliest Implementation Date	Sept 2006
Priority	Moderate

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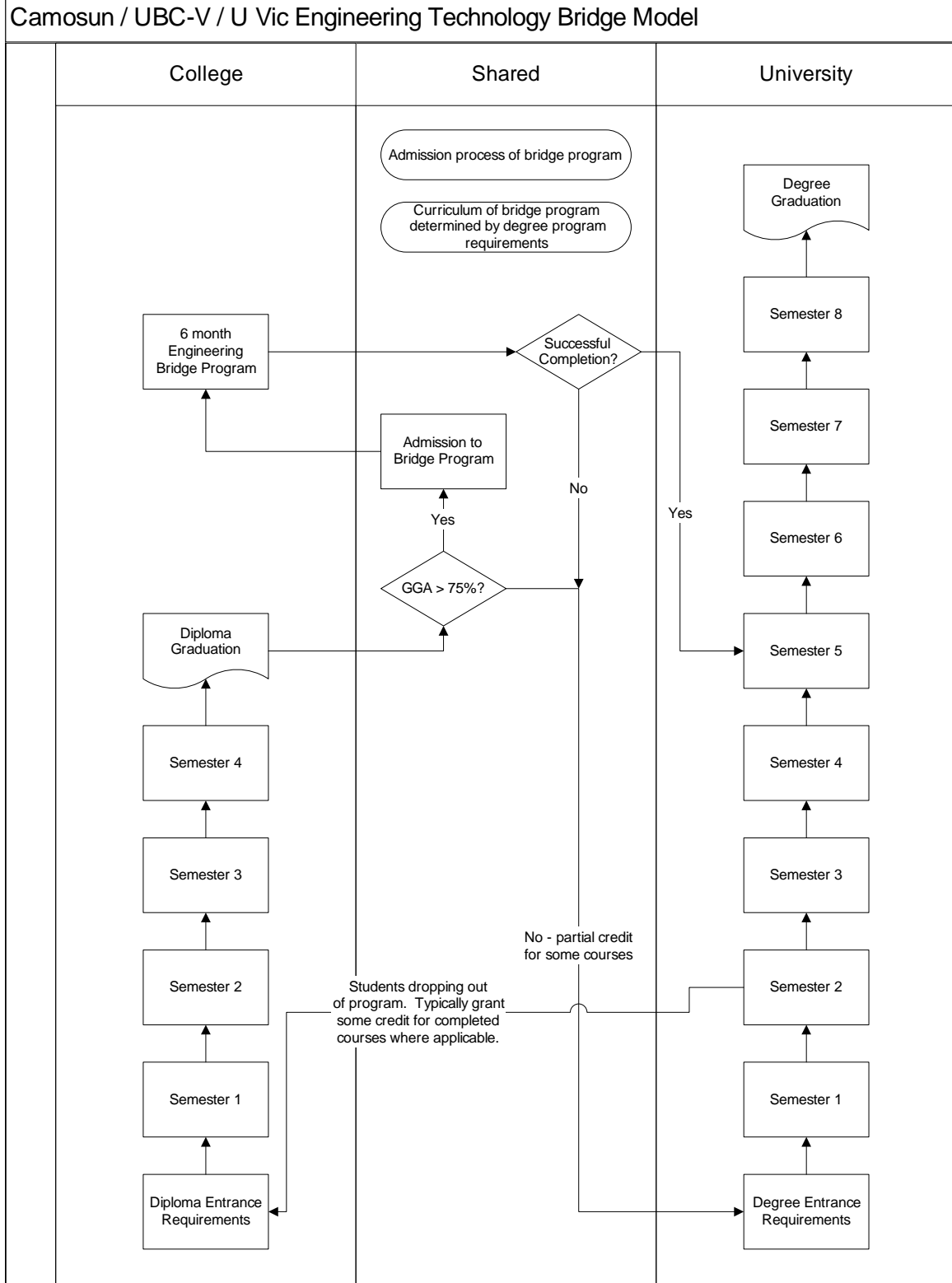
Program Name: **Engineering Transfer Program** Faculty: **TBD**

Description	Engineering transfer program providing first year engineering for students attending Okanagan College
Rationale	<ol style="list-style-type: none"> 1) Okanagan Partnership has identified the need to re-establish the first year general model 2) The program was previously offered by OUC and is in the academic plan of the Faculty of Engineering Technologies for re-establishment 3) All courses required are approved and articulated, although the articulation should be revisited as it has been quite some time since the program was offered
Resources Required (estimate only; full business plan required)	<p>Staff:</p> <ul style="list-style-type: none"> • Many of the required courses are existing courses, although it will depend on the overall university transfer programming available at OC; assume 0.5 FTE beyond existing capacity <p>Physical Space:</p> <ul style="list-style-type: none"> • The availability of labs/classrooms at OC would have to be assessed; there is a high likelihood that there will be no additional requirements placed upon OC <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • Normal physics, chemistry and computer laboratories should be adequate in terms of equipage
Earliest Implementation Date	Sept 2005
Priority	High

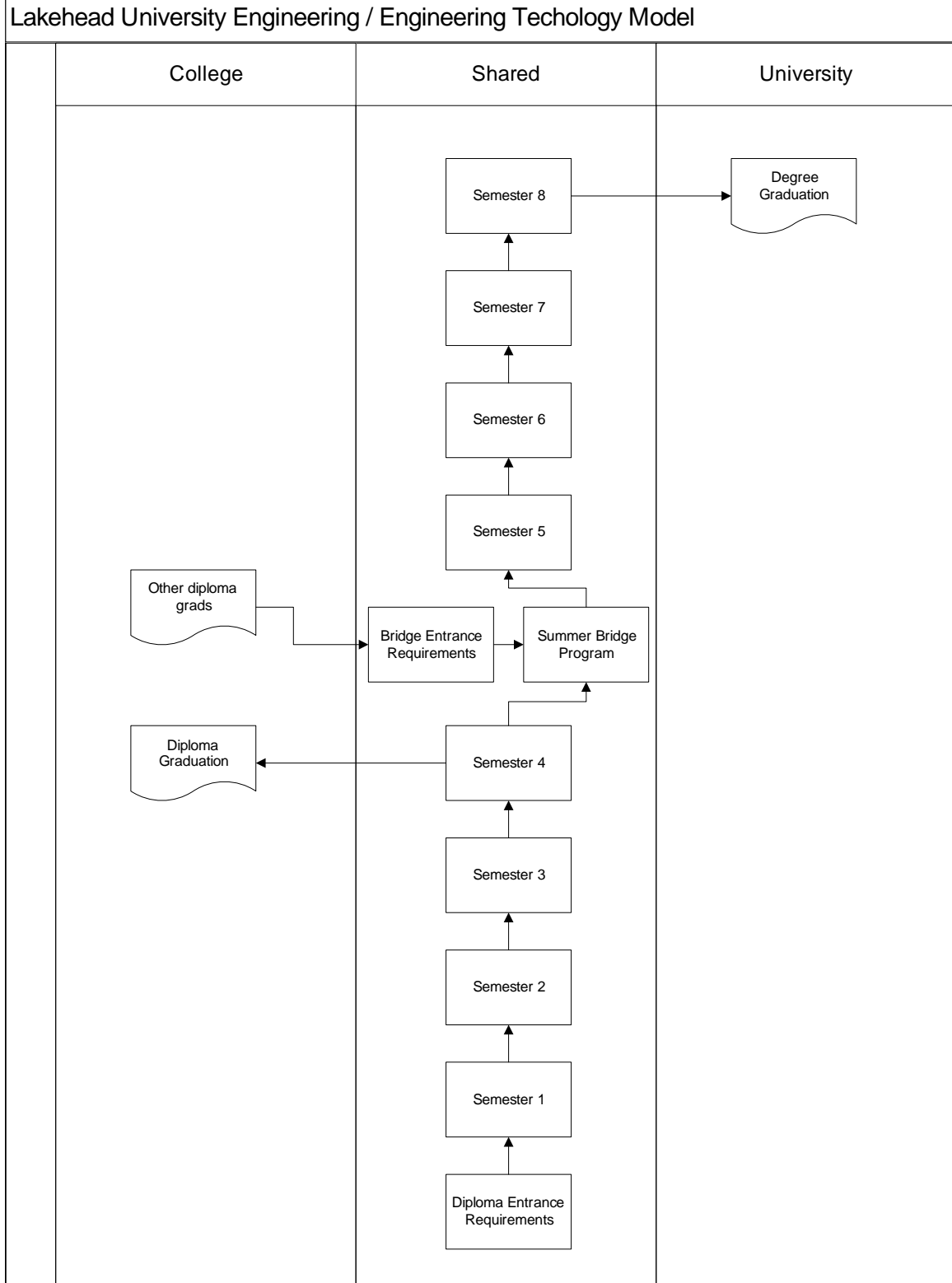
Appendix C: Possible Program Models



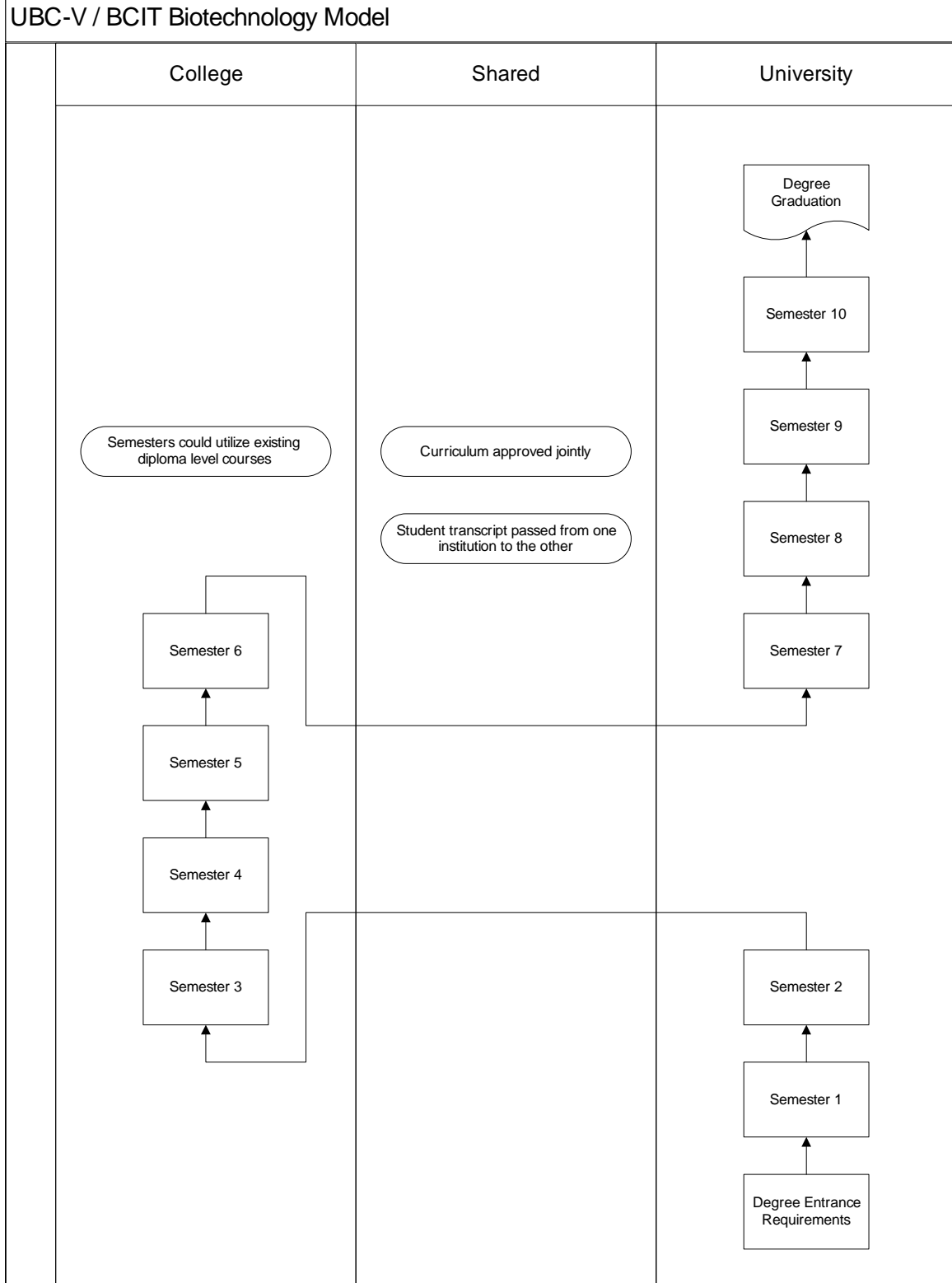
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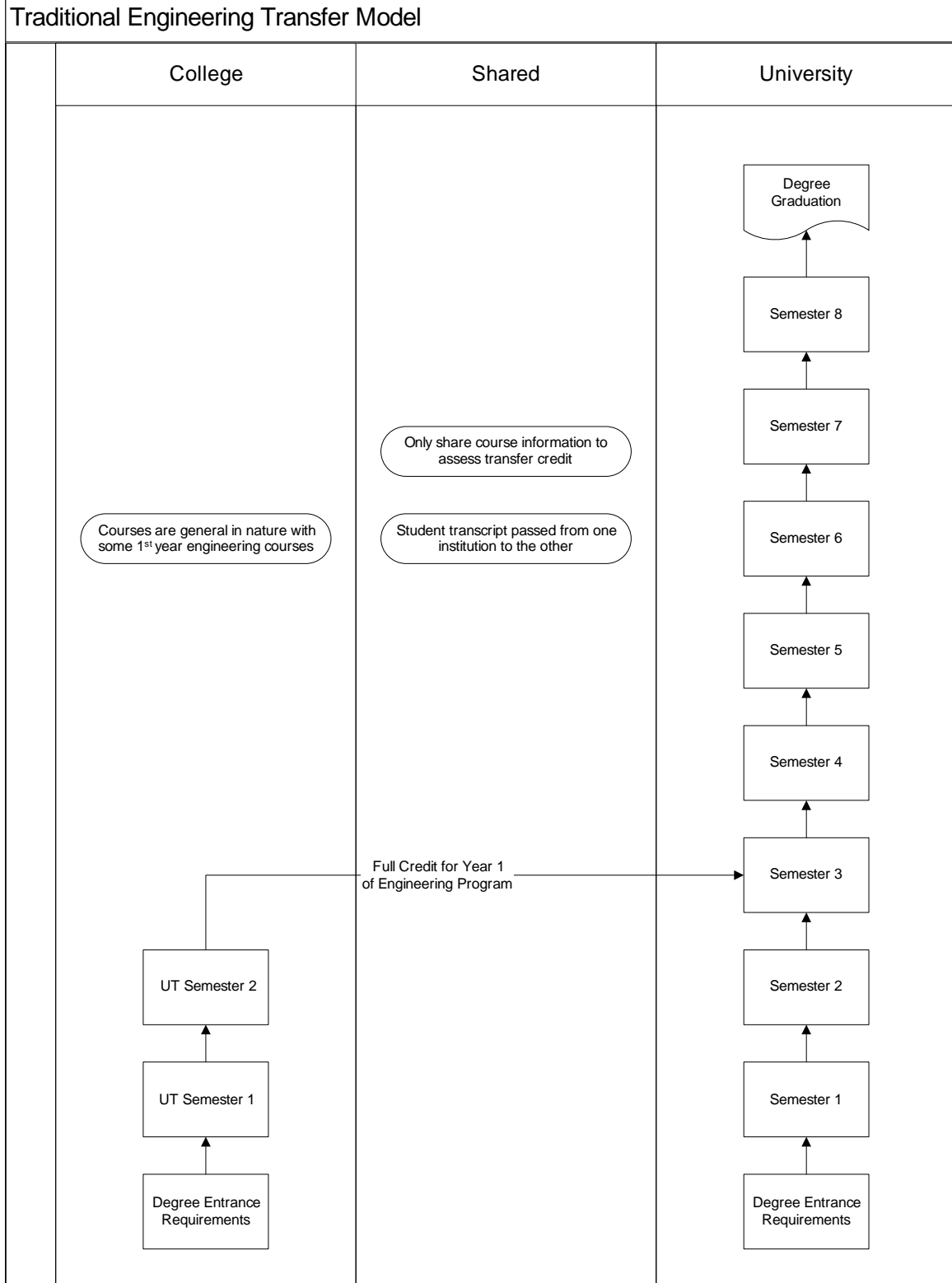
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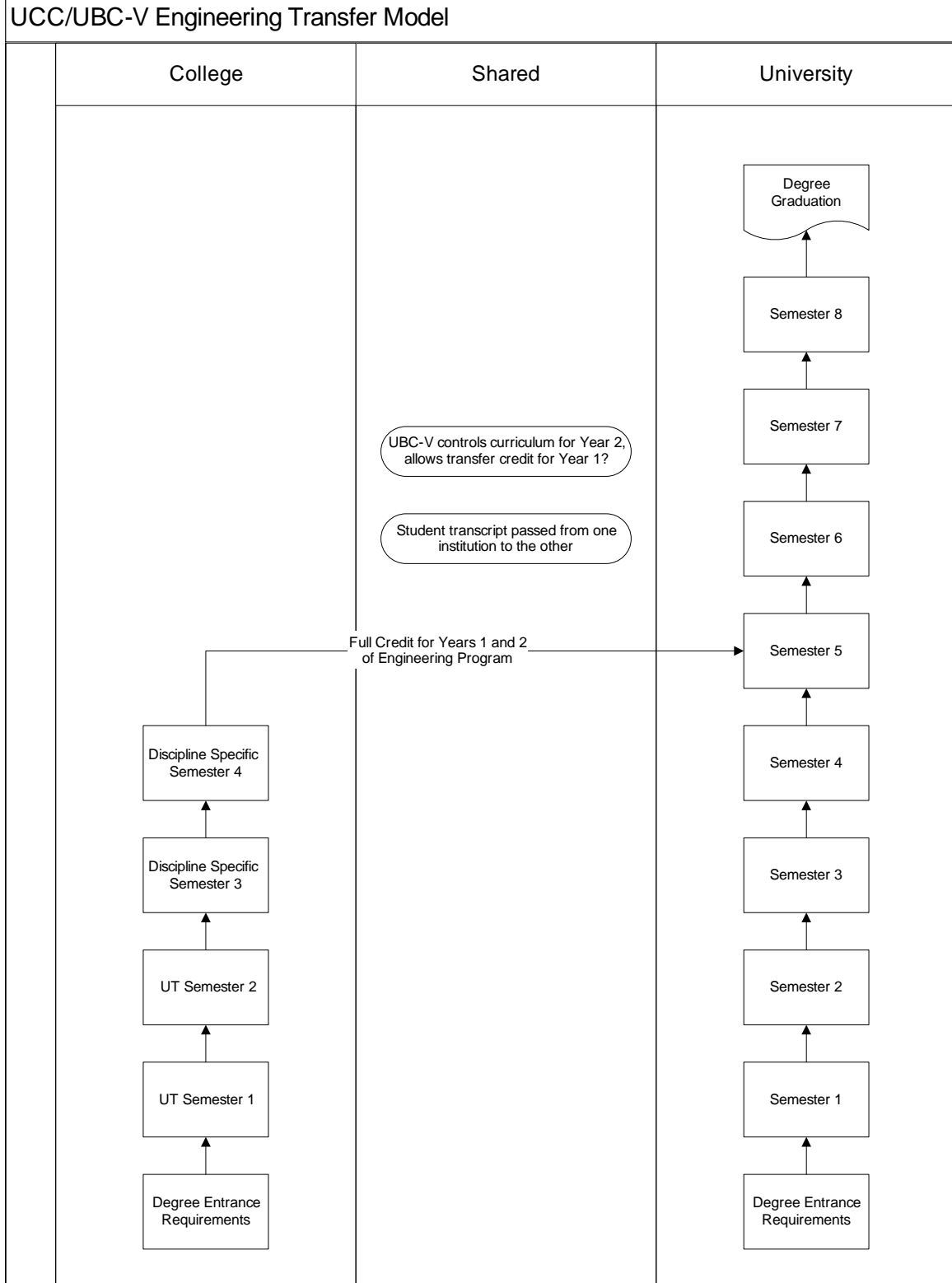
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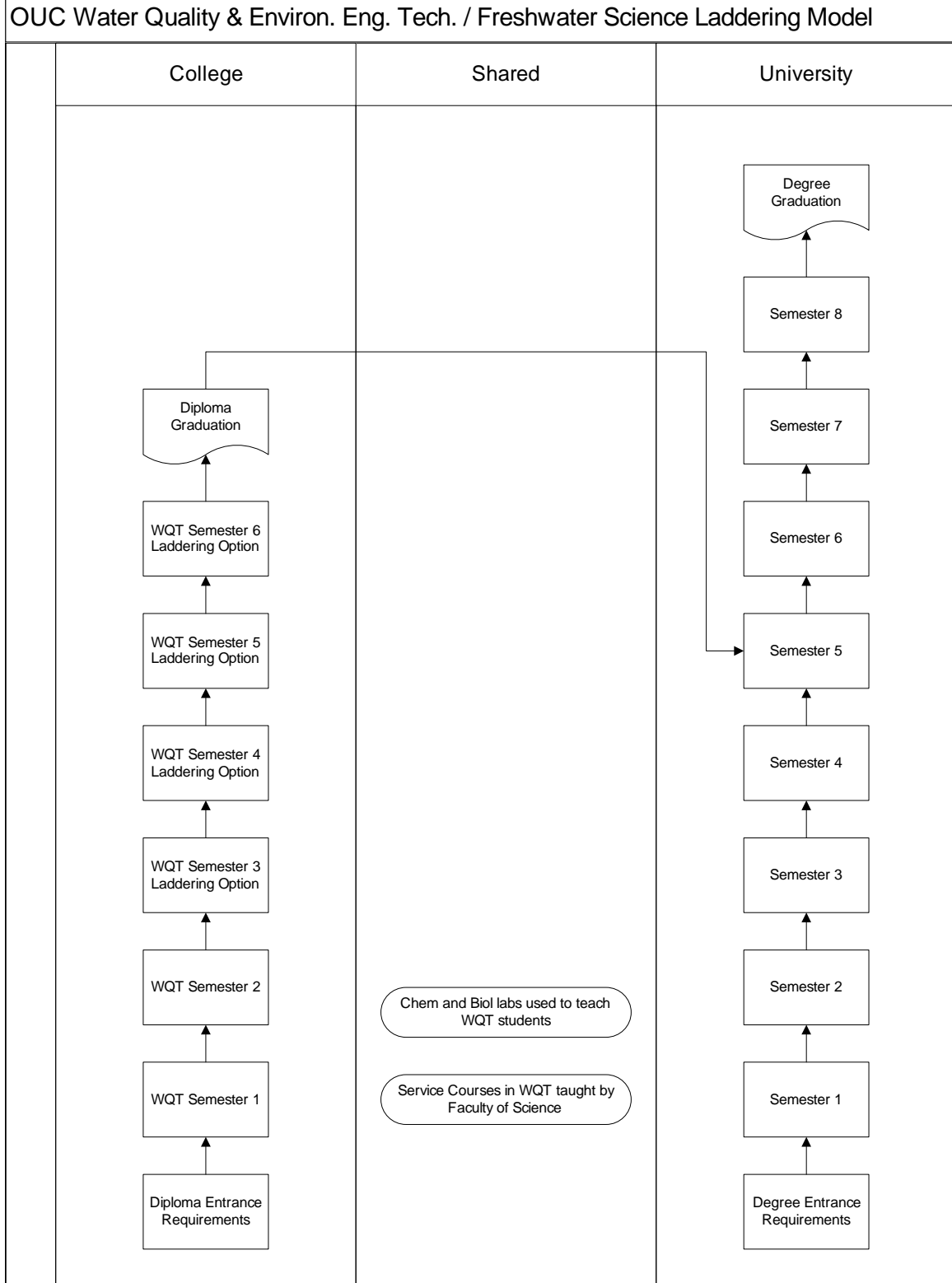
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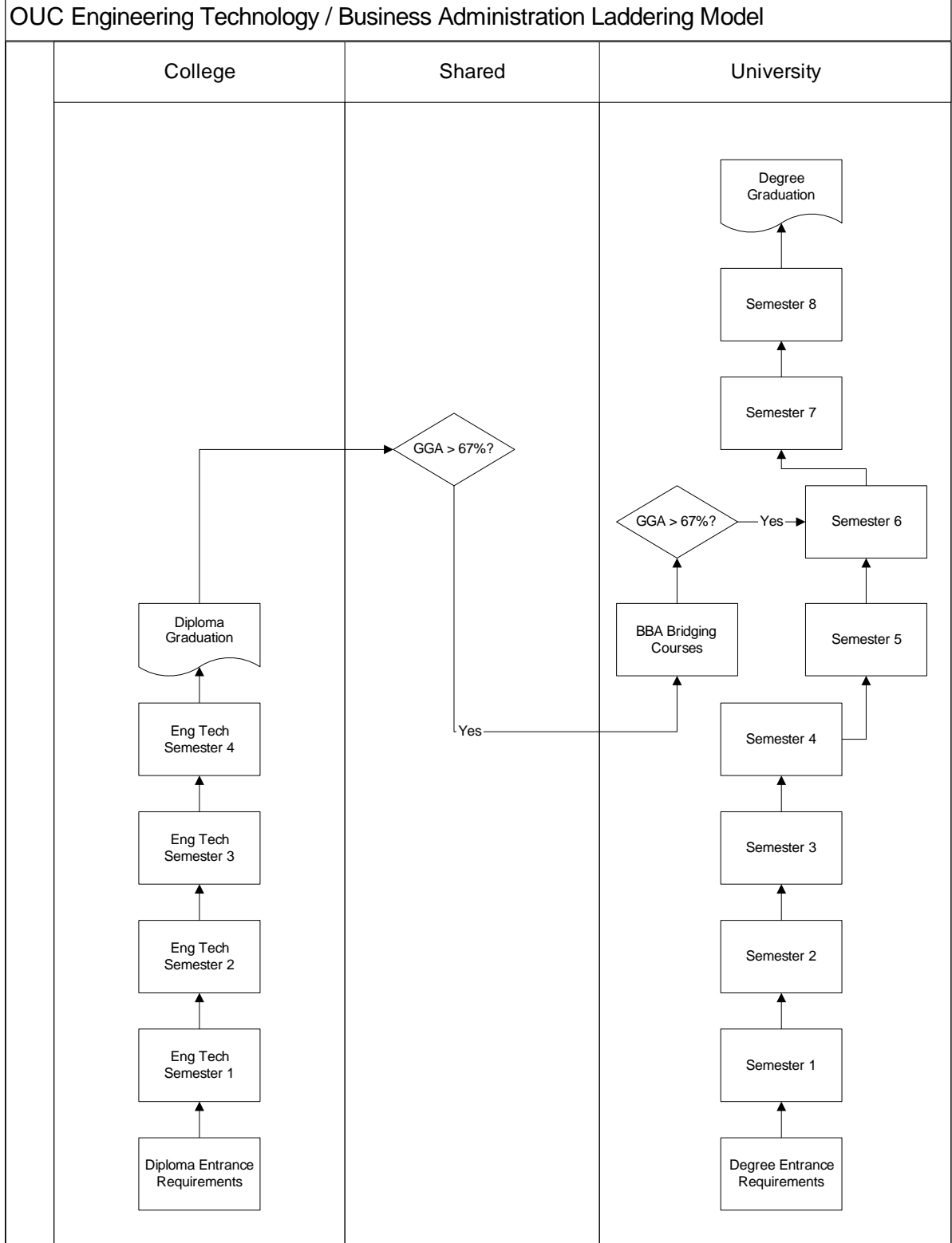
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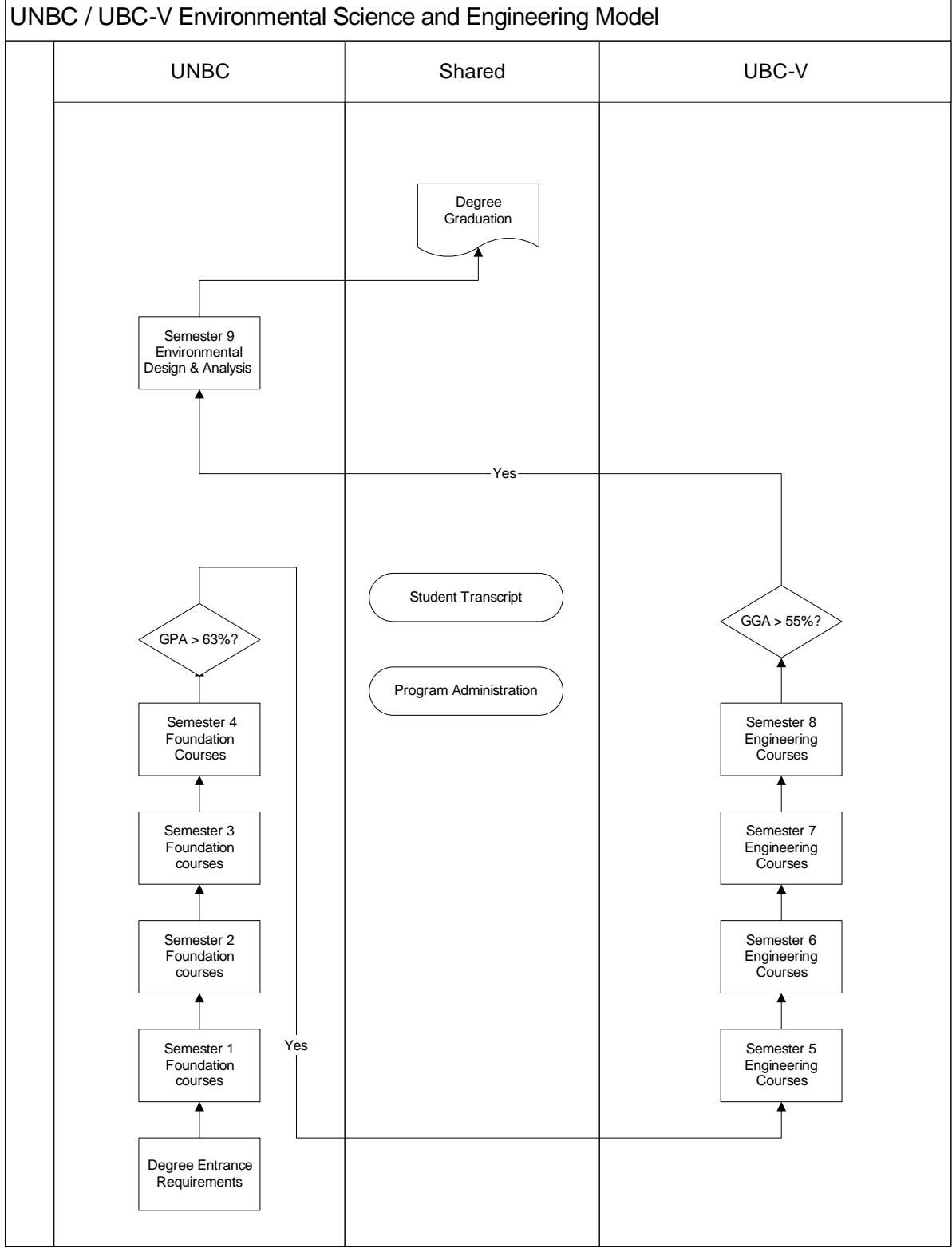
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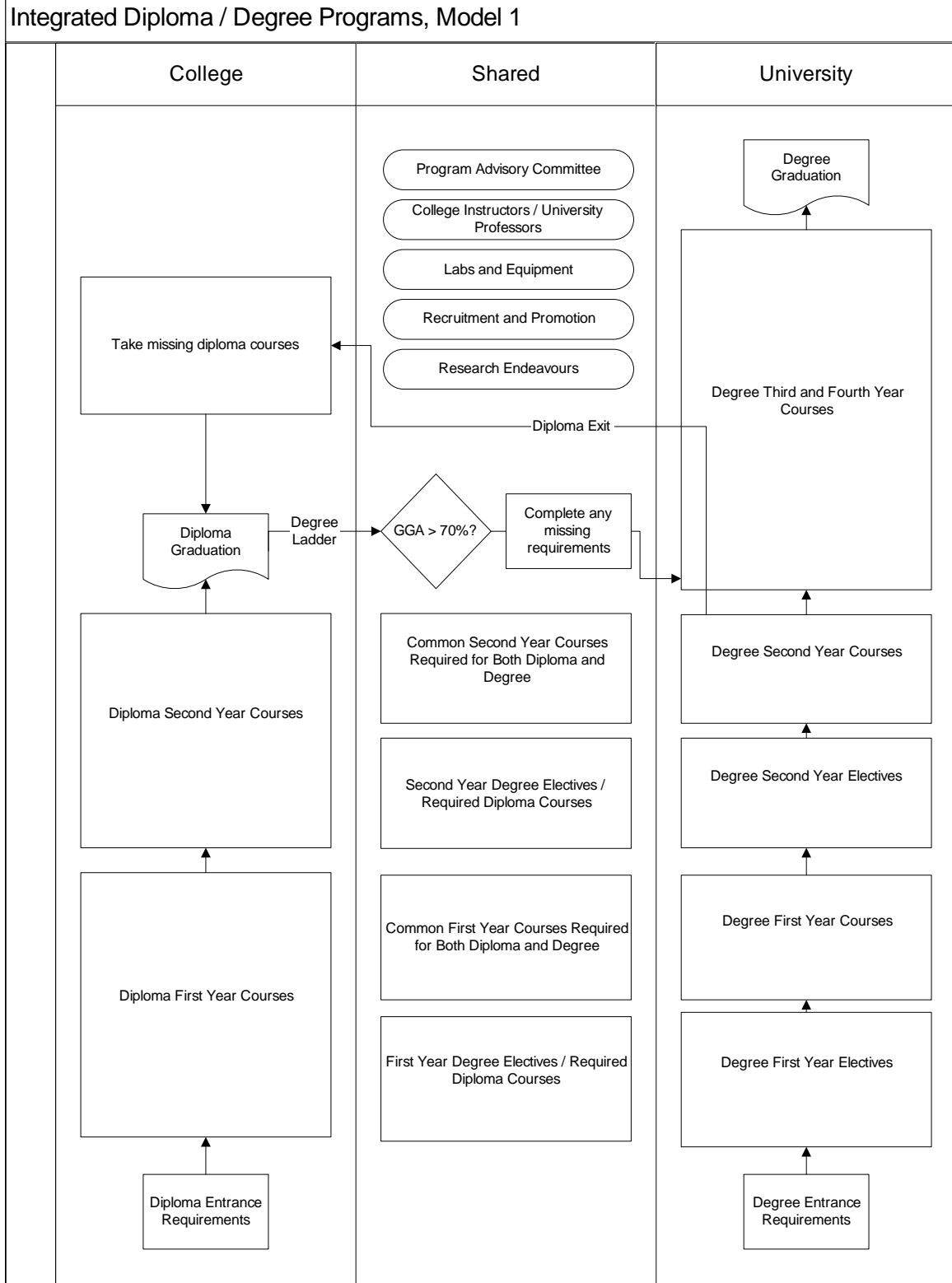
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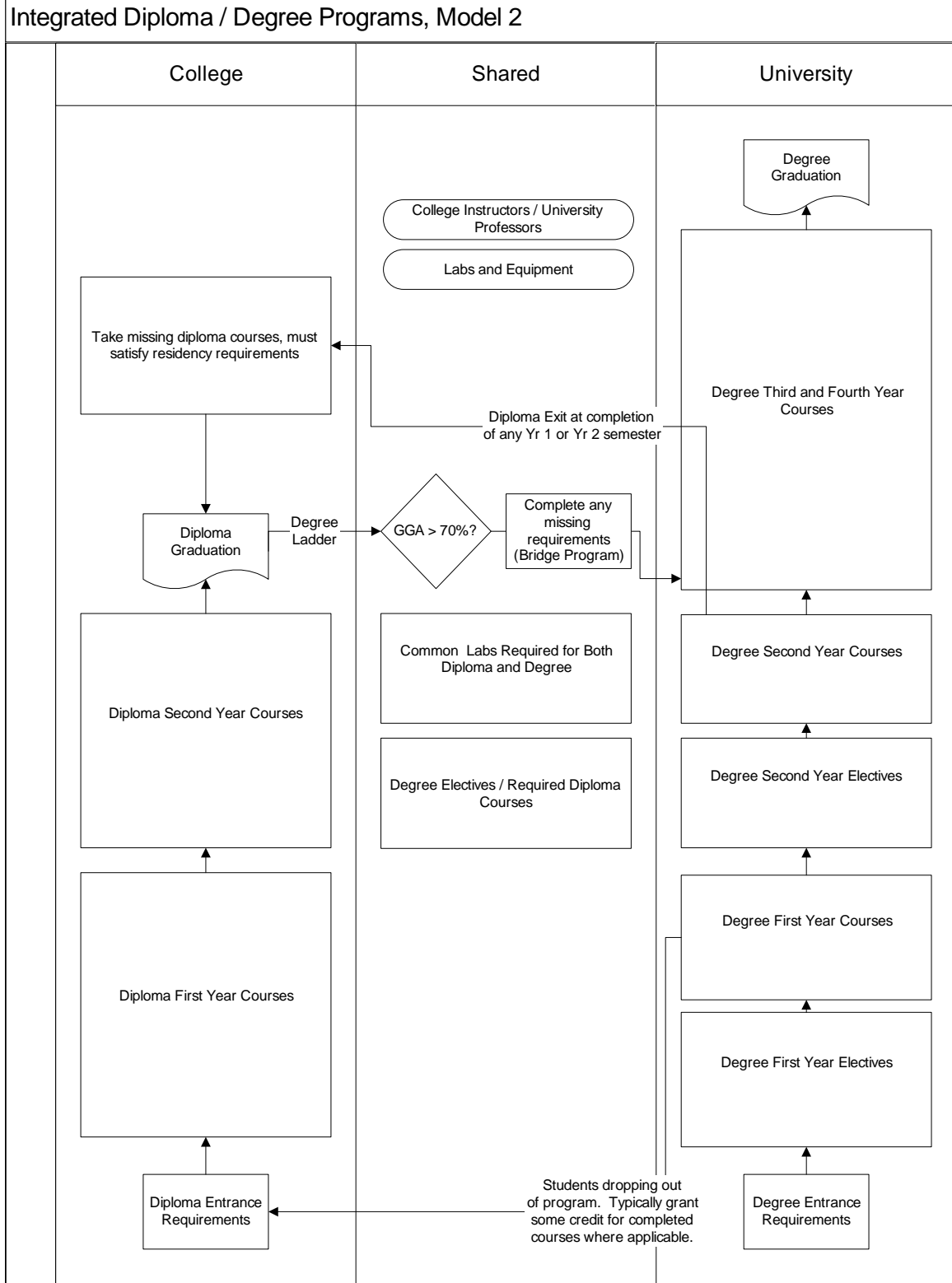
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Appendix D: Engineering Transfer Program at OC/UBC-O

In the late seventies (1976 to 1978) members of Okanagan College's Science and Civil Engineering Technology Departments spent many months articulating an Applied Science Program with UBC. After years of work, the Program finally appeared in the 1979-1980 Okanagan College Calendar. The program was popular with students and those who completed the program and transferred to UBC were successful. Articulation was later established with U. Vic. and Simon Fraser.

In the initial articulation, one of the requirements was that a Professional Engineer teach some of the Physics courses. To satisfy this requirement, a P.Eng taught the statics portion of the Physics courses. Sadly, this was the only formal contact with an engineer students would receive while at OUC. There was little guidance and promotion of engineering career choices for students by OUC as a result.

Throughout the years changes were made to the program, in part to comply with changes made at UBC. The changes were as follows:

1. A three-week surveying course was added (Cien 130) in 1980. This was an additional option for engineering students and tended to be a better course than offered through UBC (OUC had better facilities, equipment and expertise in this area). This was a popular course with the engineering students and also allowed members of the general public to take a 3 credit introductory surveying course.
2. The requirement of having a P.Eng involved in the program was not adhered to once articulation with UBC was approved. Thus students could take the program at OUC and never come into contact with an engineer!
3. The program originally contained two drafting courses (Civil 110 and Civil 120). The drafting course was changed from two 3-hour courses to one 5-hour course (Cien 146) in 1985.
4. The surveying course was made full-fee by OUC as a cost saving measure in 1983 and disappeared due to lack of enrolment (the course could be taken at significantly less expense through UBC).
5. When UBC changed from a 4-year program to an optional 5-year program in 1985, the first two years were then made available at OUC. The full two-year program appeared last in the 1994-1995 Calendar.
6. In 1995, Cien 146 was not offered allowing only one year credit towards transferring to UBC, U. Vic. and Simon Fraser.
7. In the 1998 –1999 Calendar, the Applied Science (Engineering Program) is still listed with notes on transferring to UBC, U. Vic., and Simon Fraser, with the requirement of making up the missing Engineering Graphics curriculum.

A distinct weakness with the program was the lack of a coordinator. OUC did not actively promote the program or oversee students to help them with career counseling.

CURRENT STATUS

The first year of general science courses is still available at OUC, but the engineering focus has been removed.

Current Calendar Description (pg. 67, 2003/04)

Applied Science (Engineering Program)

OUC offers one year of science course credit towards the completion of a degree in engineering (applied science) at three of the provincial universities: the University of British Columbia, the University of Victoria and Simon Fraser University.

Students interested in completing a Engineering degree at these universities must apply for admission to the Bachelor of Science program. See admission requirements on page 55. For further details on engineering requirements contact the Faculty of Science office or the respective university.

The following is a recommended program outline.

Fall Semester			hr/wk
CHEM	111	General Chemistry I	6
CoSc	111	Computer Programming I	4
ENGL	100	University Writing (or ENGL 150)	3
MATH	112	Calculus I	4
PHYS	111	General Physics I	6
Winter Semester			hr/wk
CHEM	121	General Chemistry II	6
CoSc	121	Computer Programming II	4
MATH	221	Introduction to Linear Algebra	4
MATH	122	Calculus II	4
PHYS	121	General Physics II	6

1994/05 Calendar Description (pp. 62, 63)

Applied Science (Engineering Programs)

Okanagan University College offers the first year of the UBC Applied Science degree program and the pre-engineering year and first year of the five year option. This program is transferable to the Faculty of applied science, University of British Columbia. The requirements for an applied science degree may normally be completed within four years by suitably qualified students. However, Engineering Physics is an exception and requires five years.

The Faculty of Applied Science at UBC offers programs of study in the following areas of engineering: bio-resources, chemical, civil, electrical, geological, mechanical, metals and materials, mining and mineral process engineering and engineering physics.

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To complete an engineering degree in four years a student must have completed, with high standing, secondary school courses in mathematics and the sciences. Under this option, a student may take the first year of engineering at Okanagan University College and then transfer to UBC for the final three years.

Students who wish to avail themselves of a broader range of electives, or who do not meet the higher entrance requirements of the four-year degree program, may elect to take one year of science followed by one year of engineering courses at Okanagan University College and then transfer to UBC for the final three years.

Students who satisfy the admission requirements of the four-year program are advised to pursue the four-year degree in preference to the science transfer option (five year) program.

Transfer Requirements

After one year: students who have completed one year of engineering at Okanagan University College are eligible to be considered for admission to second year engineering at UBC, provided they have obtained an overall CAG of at least 65.00%.

After two years: students who have completed two years at Okanagan University College under the science transfer option, are eligible to apply for admission to second year engineering at UBC provided they have obtained an overall CAG of 65.00%. The overall CAG is calculated using all attempts including failures for courses. It should be understood, however, that attainment of a CAG of 65.00% does not guarantee admission to the Faculty of Applied Science at UBC.

Applied Science – Four Year Program

First year Applied Science (Engineering) – courses taken at Okanagan University College

Requirements for Admission

B.C. secondary school graduation or equivalent, with an overall GPA of 3.0 with a minimum standing of “B” in each of the following required courses: mathematics 11 and 12 (or equivalent), chemistry 11 and 12, physics 11 and 12, and English 11 and 12. Enriched mathematics 12 and geometry 12 are strongly recommended.

Program Outline

Fall Semester			Hr/wk
CiEn	146	Engineering Graphics	5
CHEM	111	General Chemistry I	7
ENGL	111	Composition and Literature I	3
MATH	112	Calculus I	4
MATH	115	Linear Algebra I	2
PHYS	111	General Physics I	6
PHYS	226	Engineering Statics	2
Total			29

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Winter Semester			Hr/wk
CHEM	121	General Chemistry II	7
CoSc	111	Intro to Structured Programming	4
ENGL	121	Composition and Literature II	3
MATH	122	Calculus II	4
MATH	125	Linear Algebra with Differential Equations	2
PHYS	121	General Physics II	6
PHYS	127	Waves and Wave Phenomenon	2
Total			28

Second, third and fourth years will be completed at the University of British Columbia

Applied Science – Five Year Program

First Year – Pre-Engineering – completed at Okanagan University College

Requirements for Admission

B.C. secondary school graduation or equivalent. An overall minimum average grade of “C+” or a GPA of 2.5 is strongly recommended. Algebra 12 (or equivalent) is required.

Program Outline

Fall Semester			Hr/wk
CHEM	111	General Chemistry I	7
or			
CHEM	112	Introduction to Chemistry I	7
CoSc	111	Introduction to Structured Programming	4
ENGL	111	Composition and Literature I	3
MATH	112	Calculus I	4
MATH	115	Linear Algebra I	2
PHYS	111	General Physics I	6
or			
PHYS	112	Principles and Concepts of Physics I	7
Winter Semester			Hr/wk
CHEM	121	General Chemistry II	7
or			
CHEM	122	Introduction to Chemistry II	7
CoSc	121	Advanced Programming Applications	4
ENGL	121	Composition and Literature II	3
MATH	122	Calculus II	4
PHYS	121	General Physics II	6
or			
PHYS	122*	Principles and Concepts	

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of Physics II

7

*PHYS 112 and 122 with grades of 72.00% (“B) or better are acceptable alternatives to PHYS 111 and 121 respectively.

Second Year – Engineering Science Transfer – course taken at Okanagan University College

Prerequisites

To enter engineering at Okanagan University College as a science transfer, students must achieve a grade of 60.00% or better in all courses completed in the pre-engineering year except English and obtain a CAG of 69.00% or better in all mathematics and all science courses. Students with marginally lower grades will be considered on an individual basis.

While students may be admitted to Okanagan University College’s Year II Engineering – Science Transfer Program without ENGL 111 and 121, students must complete ENGL 100 at UBC before obtaining a degree. Without ENGL 111 and 121, students could apply for admission to UBC, but they would transfer to UBC with an English “deficiency”.

Program Outline

Fall Semester			Hr/wk
CiEn	146	Engineering Graphics	5
MATH	212	Calculus III	3
MATH	221	Linear Algebra II	4
PHYS	226	Engineering Statics	2
Elective*			

Winter Semester			Hr/wk
MATH	222	Calculus IV	3
MATH	225	Differential Equations I	3
PHYS	212	Classical Mechanics	4
PHYS	127	Waves and Wave Phenomenon	2
Elective*			

*Students should familiarize themselves with UBC’s policy on complimentary studies courses and choose their electives accordingly. Information is available through the Counseling Office.

Second, third, and fourth year Applied Science courses are taken at the University of British Columbia.

NOTE: Courses with **BLUE** highlighting no longer in 2003/04 OUC Calendar
 Courses with **YELLOW** highlighting have different name/and or hrs/week in 2003/04 OUC Calendar

Proposal #2

Internetworking and Telecommunications Concentration within the Computer Science Program

Recommendation

That the University of British Columbia – Okanagan (UBC-O) create a joint **Internetworking and Telecommunications Concentration** within the Computer Science Program with courses provided in partnership with the New Okanagan College (OC), which could be expanded to include post-graduate studies by 2010.

Summary

Ready for phased-in implementation commencing September 2005, this joint initiative recognizes the opportunity to focus on applied-discipline training for Computer Science students. It also fosters collaborative interaction with OC that will strengthen undergraduate education and create a unique teaching environment within the Department of Computer Science at UBC-O.

The proposed **Internetworking and Telecommunications Concentration** of the 4-year Computer Science undergraduate degree program enhances the traditional education of the students by including 27 (of 120) credits earned through applied courses provided by the Department of Network and Telecommunications Engineering Technology (NTEn) at OC.

Graduates of this program concentration define and develop the infrastructure for distributing information on a local and global scale. They design, implement, maintain and manage network applications and systems, effectively addressing performance, security and cost issues.

Graduates of this program concentration have a solid theoretical foundation in Computer Science as well as extensive networking experience. They have the education required to develop new Information Technology solutions, analyze the strengths and the limitations of technology and follow the industry's continuing evolution.

Graduates of this program would have the opportunity to enter in the graduate studies program of the Computer Science department at UBCO.

Highlights

- Uniquely combines OC's strength in providing practical, hands-on internetworking and telecommunications training with UBC-O's strength in leading edge computer science teaching and research.
- Built upon existing programs at OUC to provide new educational opportunities for students.
- Ready for phased-in implementation commencing September 2005.
- Loosely follows the model used to create the very successful joint UBC/BCIT Bachelor of Science in Biotechnology program.
- Provides a core set of skills required for all levels of employment in a typical information technology company.
- Develops adaptable students with a strong foundation in topics that are relevant to the changing world of computing science
- Provides students with practical training in the skills and techniques of the core areas of internetworking and telecommunications

Future Growth Potential

The framework of this initiative could be expanded in the future to include other concentrations in Computer Science UBCO, including but not limited to:

- Lab Science
- Process Automation and Control
- Robotics
- Databases
- Software Engineering
- Organizational Computing

Program Details

Program Name: **Computer Science (Internetworking and Telecommunications)**
 Faculty: TBD (**Department of Computer Science**)

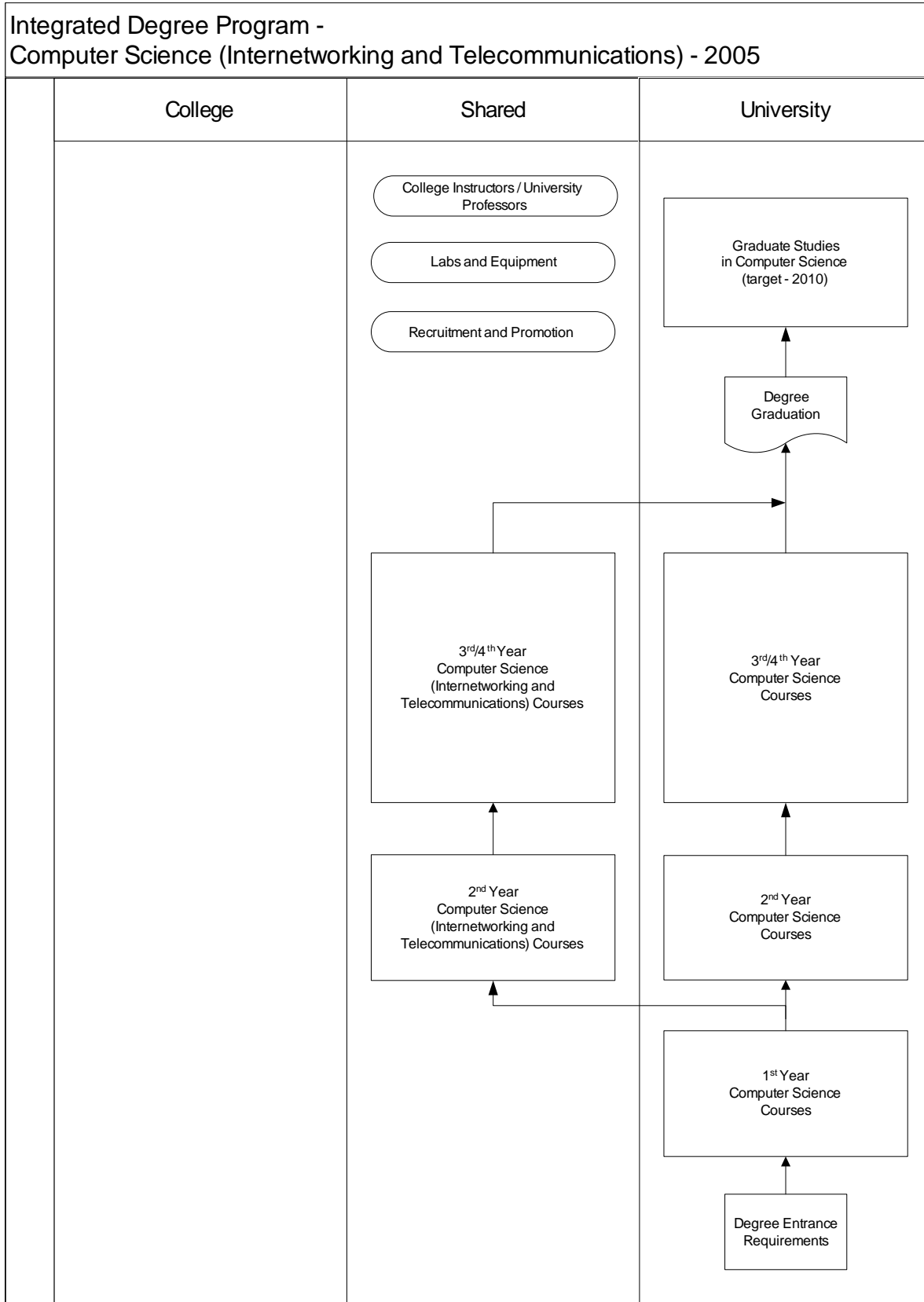
Description	4-year Computer Science undergraduate degree program concentration. This program enhances the traditional education of the Computer Science student by providing a stream of applied courses with emphasis on the specific career fields of internetworking and telecommunications. A possible course listing is provided at Appendix A of this document.
Rationale	<ol style="list-style-type: none"> 1) The Okanagan Partnership has identified need for applied computing programs at UBCO and OC 2) A core Government promise to include Information Technology education and research at UBCO can be uniquely satisfied 3) OUC has existing resources that can be utilized under UBCO and OC to facilitate the establishment of this program 4) A “lead-the-fleet” example of UBCO/OC inter-digitization can be demonstrated by combining members from current OUC departments of Computer Science and Network and Telecommunications Technology to create a distinct program
Resources Required (estimate only; full business plan required)	<p>Assumptions:</p> <ul style="list-style-type: none"> • 1st year in place starting 2005 • 2nd year start date: 2006, 3rd year: 2007, 4th year 2008 • 20 students maximum start year one of the program (single lecture section; single lab section) <p>Additional Staff:</p> <ul style="list-style-type: none"> • 1 FTE NTEn faculty (at OC) in each of 2006, 2007 <p>Physical Space:</p> <ul style="list-style-type: none"> • Existing and proposed NTEn lab and classroom space at OC will be sufficient <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • Existing and proposed NTEn equipment at OC will be sufficient
Earliest Implementation Date	Phased in approach starting Sept 2005
Priority	High

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Program Name: **Graduate Studies in Computer Science**
 Faculty: **TBD (Department of Computer Science)**

Description	Graduate program leading to, M. Sc., and Ph.D. degrees in computer science
Rationale	<ol style="list-style-type: none"> 1) The Okanagan Partnership has identified need for applied computing programs at UBCO and OC 2) A core Government promise to include Information Technology education and research at UBCO can be uniquely satisfied 3) A centre of expertise can be created to promote, develop and utilize the ORAN research assets within the Okanagan Valley 4) OUC has existing resources and faculty that can be utilized under UBCO to facilitate the establishment of this program 5) Networking is an area that could be emphasized as distinct from UBC Vancouver Computer Science department
Resources Required (estimate only; full business plan required)	<p>Assumptions:</p> <ul style="list-style-type: none"> • Honours program developed for 2005 • First intake of students at UBCO for 2007. Students could come from both concentrations of the undergraduate program. <p>Additional Staff:</p> <ul style="list-style-type: none"> • Strategic hiring of key individuals will facilitate growth of graduate programming. For example, a computer science faculty member hired should be a senior researcher as recommended by the Research Task Force and the Computer Science university circle. Hiring should start in 2005 in order for the program to be ready by 2007. • Graduate course cross-listing between Math, Computer Science and Physics could result in significant savings and a fast program implementation <p>Physical Space:</p> <ul style="list-style-type: none"> • Lab and offices: TBD. <p>Physical Infrastructure:</p> <ul style="list-style-type: none"> • TBD
Earliest Implementation Date	Sept 2007/2008 as proposed by the computer science university circle
Priority	High

Program Flow



Appendix A: Possible Model of Computer Science Inter- networking and Telecommunications Courses

1st Year – 30 credits

Common

Math	6 credits
Engl	6 credits
Phys	6 credits
CoSc111	Computer Programming I (3 credits)
CoSc121	Computer Programming II (3 credits)
NTEn	Computer Components and Peripherals (3 credits)
NTEn	Networks and Telecommunications I (3 credits)

2nd Year – 30 credits

Common

Math	6 credits
Stat	3 credits
Chem	6 credits
CoSc221	Introduction to Discrete Structures (3 credits)
CoSc222	Computer Data Structures (3 credits)

CoSc Concentration

CoSc211	Machine Architecture (3 credits)
CoSc231	Principles of Computer Science (3 credits)
Electives	3 credits

NTEn Concentration

NTEn	Digital Circuits and Microprocessors (3 credits)
NTEn	Routing and Switching I (3 credits)
Electives	3 credits

3rd/4th Year – 60 credits

Common

Phil 331	3 credits
CoSc304	Introduction to Database Management Systems (3 credits)
CoSc310	Software Engineering (3 credits)
CoSc305	Project Management (3 credits)
CoSc315	Introduction to Operating Systems (3 credits)
Cosc232	Introduction to Security (3 credits)

CoSc Concentration

CoSc	Software Engineering Project (6 credits)
CoSc320	Analysis of Algorithms (3 credits)
CoSc302, or	Numerical Computation for Algebraic Problems
CoSc303, or	Numerical Approximation and Discretization
CoSc405	Modeling and Simulation (3 credits)
Electives	30 credits

NTEn Concentration

NTEn	Network Engineering Project (6 credits)
NTEn	Routing and Switching II (3 credits)
NTEn	Internetwork Security I (3 credits)
NTEn	Messaging and Telephony (3 credits)
Electives	27 credits