ONCAT Project 2015-12

Creating Low Affinity Pathways

Final Report

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EXECUTIVE SUMMARY

PURPOSE OF PROJECT

Since the inception of the Ontario Council on Articulation and Transfer, over 1200 pathways have been listed on ONTranfser.ca, and many are formed between high affinity programs. The Ontario college student profile is, however, changing. Today, an increasing number of college students are non-direct applicants and 44% of these students have completed some form of prior postsecondary education (PSE). In response, colleges in Ontario are exploring ways to create pathways that meet diversified student demands. With the system placing most of its focus on high affinity pathways development, there exists a low affinity pathways void. Since a majority of students who continue their education at diploma or degree level pursue a completely different field, colleges and universities alike should seek out this call to action in identifying what means exist to articulate minimization of learning redundancies between two programs of low curricular affinity. Targeting low affinity pathways between high enrolment, high employment competition programs against low enrolment, low employment competition programs seems like a logical place to start this work.

In addressing the current paucity of pathways between different fields, this project explores the creation of system-wide low affinity pathways based on programs at Centennial College. Contained within this report is an explanation of how the project was undertaken, what programs were investigated and the results of such, limitations discovered before or during this process, pathways to be developed as a result of this work, and future considerations.

METHODOLOGY

This project has been designed to support outcomes-based curriculum affinity assessment between programs from different disciplines. There were three different stages to the project: 1) program-program identification, 2) curriculum mapping, and 3) low affinity articulation.

First, overenroled and underenroled programs were identified by analyzing Fall 2015 data from Centennial's Corporate Planning and Institutional Research (CPIR) team records, AISmartR reports, and the Banner student information system. Underenroled programs were limited to programs within the School of Business (SB) and School of Engineering Technology and Applied

Science (SETAS), based on skilled worker shortages and Ontario College Application Service applicant data.

Then, programs were narrowed down by admission requirements, curriculum affinity, and career prospects. Programs requiring a PSE credential for admission, having 0% curriculum affinity, and resulting in no prospective career convergence were excluded. Finally, program learning outcomes (PLOs) were mapped to confirm the pursuit of potential pathways.

Based on the above process, Law Clerk to Office Administration (Executive) or Office Administration (Health Services), and Architectural Technology to Energy Systems Engineering Technology or Mechanical Engineering Technology were identified as programs eligible for building pathways.

To identify both overlaps and gaps in program curriculum, researchers mapped the outcomes of the sending program's courses in semester one and two against the receiving program's. By comparing all the course learning outcomes (CLOs) of the sending program to the course-by-course CLOs of the receiving program, it was possible to identify combinations of CLOs that could be used to meet course requirements. According to Centennial College's Transfer Credit Procedures policy, 80% affinity between CLOs results in granting credit; therefore, this criterion was used to recommend the granting of credit at the end of this mapping process.

RESULTS

Through mapping program-to-program CLOs, the following pathways were created for students who have finished Semester 2 of:

- Law Clerk to

1) Office Administration (Executive): full credit for up to six courses, self-directed learning and credit equivalency after successful completion of self-directed learning for four
2) Office Administration (Health Services): full credit for up to six courses, self-directed learning and credit equivalency after successful completion of self-directed learning for four

- Architectural Technology to

1) Energy Systems Engineering Technology: full credit for up to four courses, self-directed learning and credit equivalency after successful completion of self-directed learning for one
2) Mechanical Engineering Technology – Industrial: full credit for up to four courses, self-directed learning and credit equivalency after successful completion of self-directed learning for one
3) Mechanical Engineering Technology – Design: full credit for up to four courses, self-directed learning and credit equivalency after successful completion of self-directed learning for one

LIMITATIONS

Though this report was prepared through careful examination and analysis of data, the researchers are aware of its shortcomings:

- Potential low affinity pathways were without any complete PLO matches, therefore elements of performance were excluded from consideration in order to preserve the possibility of creating any new system-wide pathways.

- EMSI data was limited by breakdown of job prospects for instructional programs. While the CIP website offers up to a tertiary level of breakdowns (e.g., 52.04*02* for Executive assistant/executive secretary), EMSI only provides data up to the secondary level (e.g., 52.04 for Business operations support and assistant services). Consequently, queried jobs had to be edited to match more specific career prospects.

- Due to restraints on time and resources, researchers were unable to survey demand for potential low affinity pathways. Without this, student satisfaction and utilization can only be speculated.

CONCLUSIONS

With an increasing number of students returning to PSE, there is an ever-growing need for pathways built between low affinity fields. This project addresses that need by creating the

pathways from Law Clerk to Office Administration (Executive) or Office Administration (Health Services), and Architectural Technology to Energy Systems Engineering Technology or Mechanical Engineering Technology. Centennial's SB, SETAS and the researchers' pathways team will collaborate to create and implement new model routes for these pathways within the coming school year.

The process of building these pathways resulted in valuable lessons learned and reflections that could help facilitate the development of more daring, creative pathways as well as the undertaking of other related projects in the future.

The valuable lessons learned during the process of this research were 1) that various educators within Centennial could have different perceptions of program job prospects, and 2) that some college staff have concerns regarding the pathways mandate; beliefs that this agenda can lead to other colleges "stealing" their students. Though the authors of this report take no opinion on the aforementioned concern, it is important to note this feedback received from multiple staff involved.

Also, the project resulted in two recommendations for best practices: 1) Curriculum training for subject matter experts (SMEs) to avoid confusion regarding outcome mapping vs. week-by-week achievement mapping, and 2) Maintaining current, relevant, and measurable PLOs and CLOs that reflect the most recent practices and technologies in a measurable manner.

Over the course of this project, researchers discovered potential topics for further research — 1) exploring dual diploma pathways or new advanced diploma and graduate certificate combinations for future projects to offer programs with added value to students, and 2) exploring the educational goals and employability expectations of students entering programs with low (sometimes even negative) job prospects.

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INTRODUCTION

Ontario postsecondary education (PSE) pathways development has been a boon for lifelong learning. Since the inception of the Ontario Council on Articulation and Transfer, over 1200 pathways have been listed on ONTranfser.ca (Ontario Council on Articulation and Transfer, 2015), and many are formed between high affinity programs. These high-affinity pathways are to support mobility along an academic trajectory that, assumedly, corresponds with vocational advancement.

The Ontario college student profile is, however, changing. Today, 65.3% of college students are non-direct applicants—a 4 percentage point increase from a decade ago—and 44% of these students have completed some form of prior PSE. And, over half of graduates will continue to college to gain an additional certificate or diploma (Colleges Ontario, 2015). As more students enrol in college with prior PSE credits and/or life experience, colleges in Ontario are exploring ways to create pathways that meet diversified student demands.

With the system placing most of its focus on high affinity pathways development, there exists a low affinity pathways void. Since a majority of students who continue their education at diploma or degree level pursue a completely different field (Wheelahan, Childs, Yang, Lavigne, Brijmohan, & Moodie, 2015), colleges and universities alike should seek out this call to action in identifying what means exist to articulate minimization of learning redundancies between two programs of low curricular affinity. Targeting low affinity pathways between high enrolment, high employment competition programs against low enrolment, low employment competition programs seems like a logical place to start this work.

In addressing the current paucity of pathways between different fields, this project explores the creation of system-wide low affinity pathways based on programs at Centennial College. Contained within this report is an explanation of how the project was undertaken, what programs were investigated and the results of such, limitations discovered before or during this process, pathways to be developed as a result of this work and future considerations.

METHODOLOGY

This project has been designed to support outcomes-based curriculum affinity assessment between programs from different disciplines. There were three different stages to the project: 1) program-program identification, 2) curriculum mapping, and 3) low affinity articulation.

Data and colleague experiential knowledge from various sources was used by the researchers to connect high enrolment, high employment competition programs with low enrolment business and engineering technology programs that yield high employment prospects. The latter programs were selected based on skilled worker shortages and Ontario College Application Service applicant data.

Programs qualifying for this project were identified based on administrative data (i.e., enrolment numbers, student attrition, and curriculum/course delivery class sizes) and job prospects. Administrative data was gathered through both Centennial's Corporate Planning and Institutional Research (CPIR) team records, AISmartR reports, and the Banner student information system.

For job prospecting, Economic Modeling Specialists International (EMSI) data was used. EMSI was fitting for this project since it collects and synthesizes labour market data from a variety of sources: Canadian Business Patterns (CBP), National Household Survey 2011, Census 2006, Census 2001, Survey of Employment, Payrolls and Hours (SEPH), Labour Force Survey (LFS), Canadian Occupational Projection System (COPS), CANSIM, and Postsecondary Student Information System (PSIS).

Data from EMSI included detailed reports on job prospects by program and occupation. All gathered data was supplemented by experiential knowledge acquired from administration and support staff regarding enrolment trends and Centennial graduate success.

Faculty subject matter experts (SMEs) were consulted during the evaluation of program learning outcomes (PLOs) and course learning outcomes (CLOs).

Potential pathways were then identified by narrowing down the programs by admission requirements, learning outcomes, and career prospects. Programs that require a diploma or degree for admission, have no affinity between learning outcomes, and have no overlap in

career prospects were excluded. With the remaining programs, an in-depth comparison of PLOs (created by Schools, meeting MTCU vocational learning outcomes) and CLOs was conducted to build pathways.

IDENTIFYING OVERENROLED AND UNDERENROLED PROGRAMS

Based on Fall 2015 records from Centennial CPIR, AISmartR reports, and Banner, the researchers identified currently high enrolment, high employment competition programs that qualify for consideration in articulating with low enrolment, low employment competition programs.

High enrolment programs were rated from highest to lowest enrolment. First, the difference between CAAT II numbers and 1) number of class seats built per program semester, 2) number of seats within registration blocks, and 3) number of students registered in at least one course falling under their program semesters one and two was calculated. The average of these differences was used to arrive at whether a program is overenroled or underenroled. Mindful of concerns about the possible underutilization of newly developed pathways, researchers excluded any program with fewer than three students overenroled. The researchers then gathered data reports from EMSI. Job prospects were identified by narrowing down EMSI data by location (Ontario), program, target occupations, and projected job growth for 2016-2022 (Appendix 1). Listing all 522 occupations by lowest to highest job growth, job growth for each quartile was calculated:

Table 1. Average job growth for all occupations (Ontario) by quartile

	Quartile			
	0-25%	26-50%	51-75%	76-100%
Job growth	-3.7%	2.0%	5.7%	8.6%

Any program with lower than 2% projected job growth (the median for all occupations in the province) was categorized as low prospect. Accordingly, the following overenroled programs were identified as having low job prospects, and therefore eligible for further analysis:

Table 2. Programs with low job prospects

Program Code	Program Name	Job Prospects
2804	Law Clerk	-1.10%
6450	Music Industry Arts & Perform.	-4.50%
5110	Massage Therapy	-3.20%
6402	Journalism	0.90%
3115	Architectural Technology Co-op	-1.50%

IDENTIFYING UNDERENROLED PROGRAMS WITH HIGH JOB PROSPECTS

Underenroled programs within the School of Business (SB) and School of Engineering Technology and Applied Science (SETAS) that meet the scope of this project were identified based on 2015 fall admissions data from Centennial CPIR as well as EMSI data.

Programs were first sorted by highest to lowest underenrolment, using the same procedure outlined in Identifying Overenroled Programs with Low Job Prospects. To allow for the revision of model routes to build new pathways, any non-diploma programs or programs with fewer than two intakes (i.e. only one start date per school year) per school year were excluded from this project. Building pathways leading to programs with only one annual start date would result in students waiting two semesters to register for missed courses. EMSI data was then narrowed down by location (Ontario), program, target occupations, and projected job growth for 2016-2022 to display relevant job prospects (Appendix 2). With average job growth for all occupations in Ontario at 3% for all jobs combined (EMSI, 2015), any program with higher than 3% projected job growth was categorized as high prospect.

The following underenroled programs in SB and SETAS were identified as having high job prospects, and therefore eligible for further analysis:

Table 3. Programs with high job prospects

Program Code	Program Name	Job Prospects
2603	SoB - Office Admin - Medical	4.60%
2606	SoB - Office Admin - Executive	4.10%
2419	SoB - International Business Co-op	3.20%
2416	SoB - Bus. Admin. Leadership & Mgmt.	3.30%
3119	SETAS - SFTWR Eng Techy-Inter Ga Co-op	4.10%
3407	SETAS - Biomedical Engineering Tech	5.60%
3703	SETAS - Mech Eng Technology - Design	6.90%
3417	SETAS - Biomedical Eng Techy Co-op	5.60%
3714	SETAS - Mech Eng Technology-Ind. Co-op	6.90%
3109	SETAS - Software Eng Tech-Interactive	4.10%
3756	SETAS - Energy Syst. Engin. Technology	6.20%
3508	SETAS - Health Informatics Technology	5.30%
3704	SETAS - Mech Eng Technology - Ind.	6.90%
3538	SETAS - Health Inform. Techy FT Co-op	5.30%

IDENTIFYING POTENTIAL PATHWAYS

Three factors were considered when narrowing down the overenroled and underenroled programs to identify potential pathways:

1) Program admission requirements: programs requiring a PSE credential were excluded
2) Program learning outcomes: programs with 0% curriculum affinity were excluded

3) Similarities in program career prospects: programs with no prospective career convergence were excluded

FACTOR 1. PROGRAM ADMISSION REQUIREMENTS

The following programs were excluded since they are fast-track, requiring a college diploma or university degree in the same or related discipline for admission:

- Biotechnology (Fast-Track) (3621)
- Biotechnology - Advanced (Co-op) (Fast-Track) (3632)
- Health Informatics Technology (Co-op) (Fast-Track) (3538)
- Software Engineering Technology (Fast-Track) (3429)

FACTOR 2. PROGRAM LEARNING OUTCOMES

A comparison of PLOs resulted in the exclusion of the following overenroled programs with no affinity with underenroled programs as candidates for potential pathways:

- Music Industry Arts and Performance (6450)
- Massage Therapy (5110)
- Journalism (6402)

Also, the following underenroled programs with no PLO affinity with overenroled programs were excluded from potential pathways:

- Business Administration – International Business (Co-op) (2419)
- Business Administration - Leadership and Management (Co-op) (2416)
- Software Engineering Technology – Interactive Gaming (Co-op)(3119)
- Biomedical Engineering Technology (3407)
- Biomedical Engineering Technology (Co-op) (3417)
- Software Engineering Technology – Interactive Gaming (3109)
- Health Informatics Technology (3508)

FACTOR 3. CAREER PROSPECTS

The following programs remained after narrowing down potential matches by Factor 1 and 2:

Table 4. Programs remaining after elimination by Factor 1 and 2

School	Department	Program	Enrolment
SoB	Law Clerk	Law Clerk (2804)	Over
SoB	Office Admin	Office Administration (Executive) (2606)	Under
SoB	Office Admin	Office Administration (Health Services) (2603)	Under
SETAS	ABES*	Architectural Technology (Co-op) (3115)	Over
SETAS	AMAT**	Energy Systems Engineering Technology (3756)	Under
SETAS	AMAT	Mechanical Engineering Technology – Industrial (Co-op) (3714)	Under
SETAS	AMAT	Mechanical Engineering Technology – Industrial (3704)	Under
SETAS	AMAT	Mechanical Engineering Technology – Design (3703)	Under

*ABES: Applied Biological and Environmental Sciences

** AMAT: Advanced Manufacturing and Automation Technology

The overenroled Law Clerk (2804) program was identified as potentially connecting to the underenroled Office Administration (Executive) (2606) or Office Administration (Health Services) (2603) programs. The programs have career opportunities that involve overlapping clerical duties supporting office professionals. In terms of current hourly median wage, legal secretaries are earning $19.74 while office/administrative clerks, assistants, and secretaries are earning $19.03 (EMSI, 2015).

The overenroled Architectural Technology (Co-op) (3115) program was a potential match with the overenroled Energy Systems Engineering Technology (3756), Mechanical Engineering Technology – Industrial (Co-op) (3714), Mechanical Engineering Technology – Industrial (3704), or Mechanical Engineering Technology – Design (3703) programs. All aforementioned five programs are accredited by the Canadian Technology Accreditation Board (CTAB). In terms of skills and work environment, Architectural Technology graduates would utilize CAD skills in the workplace, just like Mechanical Engineering Technology graduates; Mechanical Engineering Technology graduates have the potential to work in architectural, engineering, manufacturing, and related services, creating a slight overlap with Architectural Technology graduates. Current hourly median wages are $30.01 for mechanical engineering technologists and $28.72 for energy systems engineering technologists, making their skills more lucrative than those of architectural technologists at $22.96.

At this stage, both SB and SETAS were notified of potential programs for pathways. The data received a go-ahead from chairs and deans.

IN-DEPTH COMPARISON OF PLOS

A comparison of PLOs was conducted (Appendix 3) between the programs remaining after the evaluation of Factor 3 to confirm the pursuit of potential pathways.

The PLOs of Law Clerk were compared to those of Office Administration (Executive) (2606) as well as Office Administration (Health Services) (2603); Architectural Technology's PLOs were compared to those of Energy Systems Engineering Technology (3756), Mechanical Engineering Technology – Industrial (Co-op) (3714), Mechanical Engineering Technology – Industrial (3704), and Mechanical Engineering Technology – Design (3703).*

The following table shows the number of partial and potential PLO matches between the analyzed programs:

Table 5. Partial and potential PLO matches between programs

	Office Administration (Executive)		Office Administration (Health Services)	
	# of PLOs	Partial and Potential Matches	# of PLOs	Partial and Potential Matches
Law Clerk	13	13	10	10

	Energy Systems Engineering Technology		Mechanical Engineering Technology*	
	# of PLOs	Partial and Potential Matches	# of PLOs	Partial and Potential Matches
A. Technology	11	4	13	6

* All Mechanical Engineering Technology program variations here share the same MTCU programs standards and therefore have the same PLOs within Centennial

MAPPING PROGRAM-TO-PROGRAM COURSE LEARNING OUTCOMES

Based on the potential pathways identified in the previous section, the outcomes of each program's courses (meeting the PLO requirements shared by programs across Ontario public colleges) in semester one and two were mapped against each other (Appendix 4). Overlapping general education electives (GNED) and communication courses (COMM) were given credit.

Using model route courses (Appendix 5), all CLOs of Law Clerk were compared to course-by-course CLOs of Office Administration (Executive) (2606) as well as Office Administration (Health Services) (2603). This was to see if any combination of CLOs from Law Clerk could be used to meet the course requirements of Office Administration (Executive) or Office Administration (Health Services). According to Centennial College's Transfer Credit Procedures policy, 80% affinity between CLOs results in granting credit; therefore, this criterion was used to recommend the granting of credit at the end of this mapping process.

The same procedure was repeated for Architectural Technology's CLOs analyzed against those of Energy Systems Engineering Technology (3756), Mechanical Engineering Technology – Industrial (Co-op) (3714), Mechanical Engineering Technology – Industrial (3704), and Mechanical Engineering Technology – Design (3703).**

After recognizing the common learning of PLOs branching over CLOs, the next step was to further assure these could qualify as system-wide pathways. This was done through utilizing Centennial's Banner Transfer Course Articulation Form and the Transfer Credit Check Form was used to identify current program-specific equivalent courses (e.g., Seneca's LDP 311 Introduction to Legal Documentation Production is equivalent to Centennial's OAGN 116 Word Processing Applications) among Ontario colleges. The granting of GNED and COMM credit equivalencies would depend on each college's program structure, since some program model routes include neither in Semester 1 or 2.

** All Mechanical Engineering Technology programs here share the same course combinations, and therefore the same CLOs for semester one and two.

LAW CLERK TO OFFICE ADMINISTRATION (EXECUTIVE)

Table 6. CLO mapping of Law Clerk and Office Administration (Executive)

LC to OA Exec							
OA Exec Course	# of CLOs	√	P	?	% of √ out of CLOs	% of √ + P out of CLOs	Comments
OAGN 115	4	3	1	0	75.00%	100.00%	Give credit
OAGN 116	5	3	1	0	60.00%	80.00%	Give credit
COMM 160/161							Credit through evaluation
COMM 170/171							Credit through

							evaluation
GNED							Credit through evaluation
GNED							Credit through evaluation
OAGN 118	5	2	2	0	40.00%	80.00%	Slight knowledge gap
OAGN 113	6	2	1	0	33.33%	50.00%	Slight knowledge gap
OAGN 119	4	1	2	0	25.00%	75.00%	Slight knowledge gap
OAGN 124	6	1	5	0	16.67%	100.00%	Slight knowledge gap
OAGN 125	10	1	3	1	10.00%	40.00%	No match
OAGN 123	4	0	1	0	0.00%	25.00%	No match

LAW CLERK TO OFFICE ADMINISTRATION (HEALTH SERVICES)

Table 7. CLO mapping of Law Clerk and Office Administration (Health)

LC to OA Health							
OA Health Course	# of CLOs	√	P	?	% of √ out of CLOs	% of √ + P out of CLOs	Comments
OAGN 115	4	3	1	0	75.00%	100.00%	Give credit
OAGN 116	5	3	1	0	60.00%	80.00%	Give credit
COMM 160/161							Credit through evaluation
COMM 170/171							Credit through evaluation
GNED							Credit through evaluation
GNED							Credit through evaluation
OAGN 118	5	2	2	0	40.00%	80.00%	Slight knowledge gap
OAGN 113	6	2	1	0	33.33%	50.00%	Slight knowledge gap
OAGN 124	6	1	5	0	16.67%	100.00%	Slight knowledge gap
OAGN 127	6	1	3	0	16.67%	66.67%	Slight knowledge gap
OAGN 125	10	1	3	1	10.00%	40.00%	No match
OAGN 123	4	0	1	0	0.00%	25.00%	No match

ARCHITECTURAL TECHNOLOGY TO ENERGY SYSTEMS ENGINEERING TECHNOLOGY

Table 8. CLO mapping of Architectural Technology and Energy Systems Engineering Technology

A Tech to M Eng								
M Eng Course	# of CLOs	√	P	?	% of √ out of CLOs	% of √ + P out of CLOs	% of ? out of CLOs	Comments
MT 121	6	6	0	0	100.00%	100.00%	0.00%	Give credit
COMM 170/171								Credit through evaluation
GNED 500								Credit through evaluation
COMM 160/161								Credit through evaluation
MATH 170	8	5	1	0	62.50%	75.00%	0.00%	Slight knowledge gap
MT 106	7	0	0	4	0.00%	0.00%	57.14%	No match
MATH 180	7	0	0	4	0.00%	0.00%	57.14%	No match
MT 102	4	0	0	2	0.00%	0.00%	50.00%	No match
PHYS 100	9	0	0	4	0.00%	0.00%	44.44%	No match
GNED 212	5	0	0	0	0.00%	0.00%	0.00%	No match
MT 103	7	0	0	0	0.00%	0.00%	0.00%	No match
MT 153	6	0	0	0	0.00%	0.00%	0.00%	No match
MT 237	7	0	0	0	0.00%	0.00%	0.00%	No match
MT 256	9	0	0	0	0.00%	0.00%	0.00%	No match

ARCHITECTURAL TECHNOLOGY TO MECHANICAL ENGINEERING TECHNOLOGY

Table 9. CLO mapping of Architectural Technology and Mechanical Engineering Technology

A Tech to Energy S								
Energy S Course	# of CLOs	√	P	?	% of √ out of CLOs	% of √ + P out of CLOs	% of ? out of CLOs	Comments
MT 121	6	6	0	0	100.00%	100.00%	0.00%	Give credit
COMM 170/171								Credit through evaluation
GNED 500								Credit through evaluation
COMM 160/161								Credit through evaluation
MATH 170	8	5	1	0	62.50%	75.00%	0.00%	Slight knowledge gap
ROBO 115	11	0	0	7	0.00%	0.00%	63.64%	No match
MATH 180	7	0	0	4	0.00%	0.00%	57.14%	No match

PHYS 100	9	0	0	4	0.00%	0.00%	44.44%	No match
ROBO 234	5	0	0	0	0.00%	0.00%	0.00%	No match
ESET 122	6	0	0	0	0.00%	0.00%	0.00%	No match
ESET 121	10	0	0	0	0.00%	0.00%	0.00%	No match
ROBO 112	8	0	0	0	0.00%	0.00%	0.00%	No match
ESET 111	7	0	0	0	0.00%	0.00%	0.00%	No match

RESULTS

Through mapping program-to-program overarching PLOs and underlying CLOs, the following pathways were created:

- Law Clerk to
  - Office Administration (Executive) (2606)
  - Office Administration (Health Services) (2603)
- Architectural Technology to
  - Energy Systems Engineering Technology (3756)
  - Mechanical Engineering Technology – Industrial (Co-op) (3714)
  - Mechanical Engineering Technology – Industrial (3704)
  - Mechanical Engineering Technology – Design (3703)

These pathways include self-directed learning to be completed during the term before the receiving program's Semester 3. For self-directed learning, SME(s) for each course will put together a D2L online learning package that addresses the gaps in knowledge pertaining to the CLOs that were only partially met. At the discretion of the SME(s), some of these courses' learning gaps will be combined into one learning package (e.g., OAGN 118 Transcription Techniques 1 and OAGN 119 Transcription Techniques 2). Learning packages will consist of a combination of some of the following instructional content and assessment methods: readings, presentations, lectures, multimedia, short response questions, exercises, and quizzes. An assigned instructor will provide a score and feedback for the assessments. Upon completing the online learning packet's assessments at an average of C- or higher (60%+), the student will receive equivalency for the course(s) covered by self-directed learning.

LAW CLERK TO OFFICE ADMINISTRATION (EXECUTIVE)

Students who have finished Law Clerk semester one and two entering semester three of Office Administration (Executive) (2606) will be exempted from taking:

- OAGN 115 Introduction to Word Processing
- OAGN 116 Word Processing Applications
- COMM 160/161 College Communications 1
- COMM 170/171 College Communications 2
- GNED General Education Elective
- GNED General Education Elective

They will participate in self-directed learning for:

- OAGN 113 Microcomputers 1
- OAGN 118 Transcription Techniques 1
- OAGN 119 Transcription Techniques 2
- OAGN 124 Financial Procedures

Based on this self-directed learning, students will participate in a Prior Learning Assessment and Recognition assessment and upon being assigned a grade, will be exempted from taking the above courses.

Students will take the full version of the following courses:

- OAGN 123 Microcomputers 2
- OAGN 125 Office Procedures and Communications

LAW CLERK TO OFFICE ADMINISTRATION (HEALTH SERVICES)

Students who have finished Law Clerk semester one and two entering semester three of Office Administration (Health Services) (2603) will be exempted from taking:

- OAGN 115 Introduction to Word Processing
- OAGN 116 Word Processing Applications
- COMM 160/161 College Communications 1

- COMM 170/171 College Communications 2
- GNED General Education Elective
- GNED General Education Elective

They will participate in self-directed learning for:

- OAGN 113 Microcomputers 1
- OAGN 118 Transcription Techniques 1
- OAGN 124 Financial Procedures
- OAGN 127 Machine Transcription

Based on this self-directed learning, students will receive credit equivalency after successful completion and will be exempt from taking the above courses.

Students will take the full version of the following courses:

- OAGN 123 Microcomputers 2
- OAGN 125 Office Procedures and Communications

ARCHITECTURAL TECHNOLOGY TO ENERGY SYSTEMS ENGINEERING TECHNOLOGY

Students who have finished Architectural Technology semester one and two entering semester three of Energy Systems Engineering Technology (3756) will be exempted from taking:

- MT 121 Applied Statics
- COMM 160/161 College Communications 1
- COMM 170/171 College Communications 2
- GNED 500 Global Citizenship: From Social Analysis to Social Action

They will participate in self-directed learning for:

- MATH 170 Technology Mathematics 2

Based on this self-directed learning, students will receive credit equivalency after successful completion and will be exempt from taking the above courses.

Students will take the full version of the following courses:

- MATH 180 Technology Mathematics 3
- PHYS 100 Physics
- ROBO 112 Electric Circuits
- ROBO 115 Computer Aided Drafting
- ROBO 234 Electronic Devices
- ESET 111 Energy, Environment and Society
- ESET 121 Fabrication and Installation
- ESET 122 Chemistry Applications and Climate

ARCHITECTURAL TECHNOLOGY TO MECHANICAL ENGINEERING TECHNOLOGY

Students who have finished Architectural Technology semester one and two entering semester three of Mechanical Engineering Technology (3714, 3704, and 3703) will be exempted from taking:

- MT 121 Applied Statics
- COMM 160/161 College Communications 1
- COMM 170/171 College Communications 2
- GNED 500 Global Citizenship: From Social Analysis to Social Action

They will participate in self-directed learning for:

- MATH 170 Technology Mathematics 2

Based on this self-directed learning, students will receive credit equivalency after successful completion and will be exempt from taking the above courses.

Students will take the full version of the following courses:

- MATH 180 Technology Mathematics 3
- PHYS 100 Physics
- MT 102 Properties of Materials
- MT 103 Machine Shop
- MT 106 AutoCAD/Blueprint Reading
- MT 153 Mechanical Drafting (Inventor)

- MT 237 Manufacturing Processes
- MT 256 Applied Electricity
- GNED 212 Ethics in Technology and the Environment

LIMITATIONS

Though this report was prepared through careful examination and analysis of data, the researchers are aware of its shortcomings.

First, while program PLOs and CLOs were closely met, elements of performance were excluded from consideration when creating *low* affinity pathways. This is because potential pathways identified through Mapping Program-to-Program Course Learning Outcomes were already without any complete PLO or CLO matches. Striving to meet 80% or more of the elements of performance (a standard Centennial practice) at that stage would have eliminated the possibility of creating any new pathways.

Also, EMSI data was limited by breakdown of job prospects for instructional programs. Programs data was displayed according to CIP Canada codes (e.g., 52 for Business, management, marketing and related support services). While the CIP website offers up to a tertiary level of breakdowns (e.g., 52.04*02* for Executive assistant/executive secretary), EMSI only provides data up to the secondary level (e.g., 52.04 for Business operations support and assistant services).

Consequently, queried jobs had to be edited to match more specific career prospects. For instance, the initial query for 52.04 contained shippers, receivers, and advertising managers and had to be edited to accurately reflect relevant jobs (e.g., Secretaries (except legal and medical), Executive assistants, General office clerks, etc.) for recent graduates of the Office Administration (Executive) program. The same procedure was followed for all other evaluated programs and job prospects.

Another limitation is that due to restraints on time and resources, researchers were unable to survey demand for potential low affinity pathways. Without this, student satisfaction and utilization can only be speculated.

CONCLUSION

Many current pathway agreements aim to connect college students to diplomas or degrees within the same field of study. But since over half of the students going back for additional postsecondary education choose a different field of study, there is an ever-growing need for pathways built between low affinity fields.

This project addresses that need by creating the following pathways:

- Law Clerk to Office Administration (Executive) or Office Administration (Health Services)
- Architectural Technology to Energy Systems Engineering Technology or Mechanical Engineering Technology

Centennial's SB, SETAS and the researchers' pathways team will collaborate to create and implement new model routes for these pathways within the coming school year.

Though matching programs are still within the same schools (SB and SETAS) because of the project's aim to connect programs with similar career prospects, the process of building these pathways resulted in valuable lessons learned and reflections that could help facilitate the development of more daring, creative pathways as well as the undertaking of other related projects in the future.

LESSONS LEARNED

Two valuable lessons were learned during the process of this research.

One lesson is that various educators within Centennial could have different perceptions of program job prospects. Some stakeholders have anecdotally said that, contrary to EMSI 2016-2022 forecasts, their program graduates have great job prospects. Others have identified programs with EMSI-defined high employment prospects as having low job prospects.

The second lesson is that some college staff have concerns regarding the pathways mandate; beliefs that this agenda can lead to other colleges "stealing" their students. It is true that, in

highly competitive markets like the Greater Toronto Area, pathways proliferation are creating opportunities for students to change college mid-stream. This in turn places additional pressure on colleges to perform—something that the authors of this report take no opinion on. Still, it is important to note this feedback received from multiple staff involved.

REFLECTIONS UPON BEST PRACTICES AND FUTURE CONSIDERATIONS

During the course of this project, researchers arrived at some reflections regarding best practices and considerations for future projects.

BEST PRACTICES 1. CURRICULUM TRAINING FOR SUBJECT MATTER EXPERTS (SME)

Often, SMEs are not curriculum experts. This results in confusion when evaluating matching outcomes, since some SMEs would strive to match specific week-by-week achievements (e.g., using formulas to calculate interest in Excel) instead of higher-level learning outcomes (e.g., preparing spreadsheets by entering formulas and functions in Excel). Such instances highlighted the need to provide curriculum training to SMEs participating in similar future projects.

BEST PRACTICES 2. MAINTAINING CURRENT, RELEVANT, AND MEASURABLE PLOS AND CLOS

Mapping PLOs and CLOs resulted in the discovery of some outdated and/or vague outcomes. For instance, one course PLO is phrased as “Manage a personal computer.” Even taking the elements of performance into account, this could mean such a wide variety of things that more specificity is necessary. Program curriculums could be improved by a more frequent review of PLOs and CLOs in response to the most recent practices and technologies in a measurable manner.

FUTURE CONSIDERATIONS

The search for potential pathways resulted in the consideration of program connections such as Journalism to International Business, Massage Therapy to Office Administration, and Music Industry Arts and Performance to Business Management. Though these were not mapped because there were no overlapping PLOs, there remains the possibility of exploring dual diploma pathways or new advanced diploma and graduate certificate combinations for future projects to offer programs with added value to students.

In addition, reflecting upon the goal of this project to provide pathways to students in overenroled programs with low job prospects, researchers began to wonder why students initially choose to enrol in such programs. There is a widespread assumption that college programs are more focused on vocational skills, and therefore immediate employment, than university programs are. Even MTCU College Program Standards are set through vocationally specific learning outcomes and essential employability skills. Despite this, many students continue to enrol in programs that face relatively high competition in the job market. An interesting question for future research would be the educational goals and employability expectations of students entering programs with low (sometimes even negative) job prospects.

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APPENDICES

APPENDIX 1. OVERENROLED PROGRAMS AND JOB PROSPECTS

Programs not considered for pathways: non-diploma programs

Overenroled programs with low (<2%) job prospects in Ontario

Program Code	Program Name	Job Prospects
3822	Electrical Engineering Techn	2.6%
6438	Publish.-Book, Mag., Electron.	
51	Police Foundations	3.2%
9252	Bridging to UN - INTL Level 1	
3419	Software Eng Technology Co-op	3.5%
2804	Law Clerk	-1.1%
1812	Culinary Skills- Chef Training	
1832	Culture & Heritage Site Manage	
8214	MP-Truck & Coach Technician	2.7%
6460	Dance Performance	7.3%
6450	Music Industry Arts & Perform.	-4.5%
1203	Social Service Worker	6.9%
5110	Massage Therapy	-3.2%
2809	Business - Int'l Business	3.4%
2507	Business Operations Management	3.3%
9320	Fitness and Health Promotion	4.6%
3612	Biotechnology Advanced Co-op	5.6%
3404	Computer Sys Technician - Net	6.8%
1213	Workplace Wellness & Health	
6402	Journalism	0.9%
2483	Business - Finance	2.3%
3518	Health Informatics Tech Co-op	5.3%
1824	Tourism and Travel	5.4%
3601	Biotechnology	5.6%
2719	Bus Admin-Human Resource Co-op	5.6%
2860	Human Resources Management	
3115	Architectural Technology Co-op	-1.5%
6420	Graphic Design	2.1%
2409	International Business	3.2%
2405	Business Admin - Accounting	2.5%
4221	Environmental Technician	4.8%
4232	Environmental Technology Co-op	4.8%

3755	Energy Syst. Engin. Technician	6.2%
3405	Computer Sys Technology - Net	6.8%
0101	Computer Comm Networks Co-op	6.8%
3701	Mech Eng Technician - Design	6.9%
0617	Public Relations Management	
2701	Office Administration-General	
9310	Health Foundations	
2805	Business - Marketing	
6616	General Arts & Science - EAP	

APPENDIX 2. UNDERENROLED PROGRAMS AND JOB PROSPECTS (SOB AND SETAS)

Programs not considered for pathways: non-diploma programs or fewer than two intakes per school year

Underenroled programs with high (>3%) job prospects in Ontario

Program Code	Program Name (SoB)	Job Prospects
2844	Strategic Management - Account	
2709	Business Admin-Human Resources	
2470	Court Support Services	
2415	Bus Admin - Accounting Co-op	2.50%
2603	Office Admin - Medical	4.60%
2606	Office Admin - Executive	4.10%
2460	Fashion Business & Management	
2528	Project Management	
2419	International Business Co-op	3.20%
2870	Paralegal	
2416	Bus. Admin. Leadership & Mgmt.	3.30%
2843	Financial Planning	
2803	Business	
2846	Marketing - Sales & Acct. Mgt.	
2403	Business Admin - Marketing	
2506	Business - Operations	-0.70%
2801	Business - Accounting	
2517	Business Operations Mgmt.Co-op	-0.60%
2508	Bus. Admin. - Entrepreneurship	
2122	Business Foundations	
2125	Pre-Business	

Program Code	Program Name (SETAS)	Job Prospects
3119	SFTWR Eng Techy-Inter Ga Co-op	4.1%
3105	Architectural Technology	-1.5%
3407	Biomedical Engineering Tech	5.6%
3101	Architectural Technician	-1.5%
3703	Mech Eng Technology - Design	6.9%
3218	Computer Repair & Maintenance	
3602	Biotechnology Advanced	
4201	Environmental Technician	
3417	Biomedical Eng Techy Co-op	5.6%
3631	Food Science Technology FT	0%
4202	Environmental Technology	
3002	Technology Foundations - ICET	
3714	Mech Eng Technology-Ind. Co-op	6.9%
3621	Biotechnology FT	5.6%
3109	Software Eng Tech-Interactive	4.1%
4212	Environmental Technology Co-op	
3506	Medical Laboratory Technician	
3756	Energy Syst. Engin. Technology	6.2%
3632	Biotechnology Advanced FT Coop	5.6%
3508	Health Informatics Technology	5.3%
4222	Environmental Technology	
3704	Mech Eng Technology - Ind.	6.9%
3538	Health Inform. Techy FT Co-op	5.3%
3429	Software Eng Technology FT	4.1%
4116	Auto & Robotics Tech Co-op	1.6
3232	Electronic Eng Techy FT Co-op	0.9
3222	Elect Eng Technology FT	0.9
3205	Electronics Eng. Technician	0.9
3135	Architectural Techy FT Co-op	
3125	Architectural Technology FT	

APPENDIX 3. COMPARISON OF PROGRAM LEARNING OUTCOMES (PLOS)

- P = Partial Match, ? = Potential Match

LAW CLERK TO OFFICE ADMINISTRATION (EXECUTIVE)

	Office Admin Exec - PLOs												
	Apply scheduling, task coordination, and organizational skills to facilitate the completion of tasks and to meet deadlines in the workplace.	Assess, establish, and maintain data management systems to ensure organized electronic and paper records for the workplace.	Coordinate the receiving, analyzing, distributing, and responding to electronic and paper communications to facilitate the flow of information in the workplace.	Produce accurate financial records for the workplace within a specified time frame by compiling information and using appropriate software.	Produce accurate business correspondence by a specified deadline using available computer technology.	Use effective interpersonal skills in the workplace to assist the completion of individual and team tasks, to ensure effective customer service, and to promote the image of the organization.	Research, develop, and present a report substantiating the selection of resources or services for the workplace using written and oral presentation techniques and appropriate technology.	Troubleshoot and show initiative in the production of accurate, organized business documents within a specified time rame.	Provide technical support and training related to computer software to others in the workplace as required.	Organize meetings, conferences, special events, and travel including the preparation of related documentation.	Use the Internet and its tools in a business setting to enhance communication and business opportunities.	Manage a personal computer.	Demonstrate administrative skills to enhance the effective operation of the workplace.
Law Clerk - PLOs													
Support the needs of clients and legal professionals through the use of accurate terminology and professional communication strategies, both orally and in writing.			P			?					P		
Complete all work within routine and unexpected time lines and limitation periods within the legal environment.	P				P			P					
Use current and relevant electronic and print resources, within the legal environment, to conduct legal research, to assist with file and evidentiary management, to facilitate communication and generate legal documentation, complying with current regulations and procedures.		P	P		P		P	P	P	P	P	P	
Research and summarize the presenting legal issues, applying knowledge of substantive law, to support the legal team.													
Apply rules of procedure to support best legal practices.													
Conduct oneself professionally in adherence to the guidelines of the Law Society of Upper Canada.													
Carry out clerical and administrative duties for the operation of a variety of legal environments.		P		?						P		P	P
Outline strategies for ongoing professional development to ensure continuing competence as a Law Clerk.													
Act equitably and justly with diverse populations*.													
Provide support for legal professionals in courts and administrative tribunals within the legal system.													

	Office Admin Health - PLOs									
	Apply scheduling, task coordination, and organizational skills to facilitate the completion of tasks and to meet deadlines in the medical environment.	Establish and maintain data management systems to organize electronic and paper records for the medical environment.	Coordinate the organizing, processing, and responding to electronic and paper communications to facilitate the flow of information in the medical environment.	Produce accurate financial and billing records for the medical environment within a specified time frame by compiling information and using appropriate software.	Produce accurate medical correspondence and reports by a specific deadline using available computer technology as well as by applying recording, editing, and language skills.	Use effective interpersonal skills in the medical environment to assist the completion of individual and team tasks, to ensure effective client service, and to promote the image of the organization.	Troubleshoot and show initiative in the creation and production of accurate, organized medical documents within a specified time frame.	Provide technical support and training related to computer software to others in the medical environment as required.	Use the Internet and its tools in a medical environment to enhance communication and business opportunities.	Demonstrate administrative skills to enhance the effective operation of the workplace.
Law Clerk - PLOs										
Support the needs of clients and legal professionals through the use of accurate terminology and professional communication strategies, both orally and in writing.			P		?	?			P	
Complete all work within routine and unexpected time lines and limitation periods within the legal environment.	P						P			
Use current and relevant electronic and print resources, within the legal environment, to conduct legal research, to assist with file and evidentiary management, to facilitate communication and generate legal documentation, complying with current regulations and procedures.		P	P		P		P	P	P	
Research and summarize the presenting legal issues, applying knowledge of substantive law, to support the legal team.										
Apply rules of procedure to support best legal practices.										
Conduct oneself professionally in adherence to the guidelines of the Law Society of Upper Canada.										
Carry out clerical and administrative duties for the operation of a variety of legal environments.		P		?	P		P			P
Outline strategies for ongoing professional development to ensure continuing competence as a Law Clerk.										
Act equitably and justly with diverse populations*.										
Provide support for legal professionals in courts and administrative tribunals within the legal system.										

	Energy Tech - PLOs										
	Analyze and solve complex technical problems through the application of the theoretical principles of renewable and clean energy systems and technologies.	Analyze electrical and/or mechanical components, processes and systems through the application of engineering principles to construct various types of energy systems.	Analyze and prepare graphics and other technical documents to appropriate engineering and architectural standards using industry-specific software and procedures.	Use a variety of troubleshooting techniques and test equipment to identify problems with electrical and/or mechanical components of conventional, renewable and clean energy technologies.	Assemble and troubleshoot working prototypes of sustainable energy systems and subsystems to meet job requirements, functional specifications and relevant standards; and integrate renewable and clean energy technology into the system design.	Adhere to the legal, regulatory and health and safety codes and guidelines.	Contribute to the financial and technical planning and implementation of sustainable construction and development projects.	Practice principles and ethics associated with environmental management issues.	Apply principles of networking, instrumentation and other related technologies to monitor and control energy systems in residential or small-scale industrial or commercial facilities.	Apply strategies, practices and techniques to manage and optimize the generation, capture, storage, integration and distribution of renewable (e.g. wind, solar, geothermal etc.) and clean energy (e.g. nuclear) using conventional and emerging technologies such as smart metres and smart grids.	Analyze, assemble and retrofit existing conventional systems applying green energy management techniques for efficient and clean energy generation and distribution.
A Tech - PLOs*											
Obtain, analyze, prepare, and revise specifications* and other project documents used in design* and construction.			P								
Prepare estimates of time, costs, and quantity, and participate in the tendering process.							P				
Solve technical problems related to building projects through the application of principles of building science* and mathematics.				P	P						
Contribute to the design* of architectural projects.			?								
Contribute to the analysis, planning, and preparation of site planning documents.			P								
Participate in sustainable design* and building practices.					P						
Assist in the planning, scheduling, and monitoring of building projects.							?				

* Architectural Technology PLOs with no Energy Systems Engineering Technology PLO matches are omitted from this table due to scaling limitations.

	Mech Tech - PLOs												
	Monitor compliance with current legislation, standards, regulations and guidelines.	Plan, co-ordinate, implement and evaluate quality control and quality assurance procedures to meet organizational standards and requirements	Monitor and encourage compliance with current health and safety legislation, as well as organizational practices and procedures.	Develop and apply sustainability* best practices in workplaces	Use current and emerging technologies* to implement mechanical engineering projects.	Analyze and solve complex mechanical problems by applying mathematics and fundamentals of mechanical engineering.	Prepare, analyze, evaluate and modify mechanical engineering drawings and other related technical documents.	Design and analyze mechanical components, processes and systems by applying fundamentals of mechanical engineering.	Design, manufacture and maintain mechanical components according to required specifications.	Establish and verify the specifications of materials, processes and operations for the design and production of mechanical components.	Plan, implement and evaluate projects by applying project management principles.	Develop strategies for ongoing personal and professional development to enhance work performance.	Apply business principles to design and engineering practices.
A Tech – PLOs*													
Prepare, read, interpret, and revise drawings, and other graphical representations used in building projects.							P						
Obtain, analyze, prepare, and revise specifications* and other project documents used in design* and construction.							P						
Solve technical problems related to building projects through the application of principles of building science* and mathematics.						?							
Contribute to the design* of architectural projects.							P						
Contribute to the analysis, planning, and preparation of site planning documents.											?		
Participate in sustainable design* and building practices.				P									
Assist in the planning, scheduling, and monitoring of building projects.	?		?								?		

* Architectural Technology PLOs with no Mechanical Engineering Technology PLO matches are omitted from this table due to scaling limitations.

APPENDIX 4. MAPPING PROGRAM-TO-PROGRAM COURSE LEARNING OUTCOMES (CLOS)

- Course code: ProgramName(abbreviated)-Semester-Course (e.g., Law Clerk Semester 1 LAWS105 would be “LawC1-LAWS105”)
- √ = match, P = partial match, ? = potential match
- Identical courses (e.g., COMM 160/161 to COMM 160/161) and general education electives (GNED) were not mapped.
- Courses OAGN 113, OAGN 115, OAGN 118, OAGN 124, OAGN 116, OAGN 123, and OAGN 125 that overlap between programs Office Administration (Executive) (2606) and Office Administration (Health Services) (2603) have been mapped only once against Law Clerk.
- Courses PHYS 100, MATH 170, MT 121, and MATH 180 that overlap between programs Energy Systems Engineering Technology (3756), Mechanical Engineering Technology (3714, 3704, 3703) have been mapped only once against Architectural Technology.
- Courses from Law Clerk or Architectural Technology with no matching CLOs are omitted from tables in this section due to scaling limitations.

LAW CLERK TO OFFICE ADMINISTRATION (EXECUTIVE) COURSES

Law Clerk to Office Admin - Executive/Health OAGN113	OAEx1-OAGN113-Produce and manage electronic files and folders using Windows	OAEx1-OAGN113-Create effective file management systems for academic course folders and files	OAEx1-OAGN113-Develop a PowerPoint presentation using Microsoft Office PowerPoint 2013	OAEx1-OAGN113-Enhance a PowerPoint presentation using SmartArt Graphics, charts, tables, and animation	OAEx1-OAGN113-Describe the key features and functions of Outlook 2013	OAEx1-OAGN113-Produce accurate and professional E-mails using My Centennial and Microsoft Outlook 2013
LawC1-LAWS105-the ability to touch keyboard at a minimum rate of 30 words per minute (gross) with 98% accuracy.						
LawC1-LAWS105-knowledge of basic microcomputer concepts, such as the Windows operating systems, file management, e-mail and the Internet.	√	√				P
LawC1-LAWS105-knowledge of the legal office environment including general procedures and practices in the legal office, procedures for opening and maintaining client records, and the applicable legal terminology for these procedures						
LawC1-LAWS105-the ability to prepare legal correspondence using word processing software and appropriate precedents while applying proofreading, editing and critical thinking skills.						
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.						

LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.	√	√				
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.						
LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.						
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.	√	√				

Law Clerk to Office Admin - Executive/Health OAGN115	OAEx1-OAGN115-Show the ability to touch keyboard at a minimum rate of 30 words per minute (gross) with 98% accuracy.	OAEx1-OAGN115-Apply word processing commands and tools to format documents.	OAEx1-OAGN115-Produce memos and letters using word processing software.	OAEx1-OAGN115-Create tables using word processing software to present data in documents.
LawC1-LAWS105-the ability to touch keyboard at a minimum rate of 30 words per minute (gross) with 98% accuracy.	√			
LawC1-LAWS105-knowledge of basic microcomputer concepts, such as the Windows operating systems, file management, e-mail and the Internet.			√	
LawC1-LAWS105-knowledge of the legal office environment including general procedures and practices in the legal office, procedures for opening and maintaining client records, and the applicable legal terminology for these procedures				
LawC1-LAWS105-the ability to prepare legal correspondence using word processing software and appropriate precedents while applying proofreading, editing and critical thinking skills.		√	√	
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.				

LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.		P	P		
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.				P	
LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.		P	P		
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.					

Law Clerk to Office Admin - Executive/Health OAGN118	OAEx1-OAGN118-Use appropriate business communication reference books	OAEx1-OAGN118-Proofread common business documents (print and electronic) for errors in spelling, grammar, punctuation and syntax	OAEx1-OAGN118-Apply correct spelling, grammar, and punctuation in common print and electronic business documents	OAEx1-OAGN118-Edit business documents and email messages for complete information, accuracy of facts, consistency in style and format, and correct word usage	OAEx1-OAGN118-Communicate (speak, listen, read) effectively in a business setting
LawC1-LAWS105-the ability to touch keyboard at a minimum rate of 30 words per minute (gross) with 98% accuracy.					
LawC1-LAWS105-knowledge of basic microcomputer concepts, such as the Windows operating systems, file management, e-mail and the Internet.				P	
LawC1-LAWS105-knowledge of the legal office environment including general procedures and practices in the legal office, procedures for opening and maintaining client records, and the applicable legal terminology for these procedures					
LawC1-LAWS105-the ability to prepare legal correspondence using word processing software and appropriate precedents while applying proofreading, editing and critical thinking skills.		P	P	P	P

LawC1-LAWS114-Distinguish among various courts and modes of civil procedures. Identify and analyze typical structural components associated with Notices of Action and Statements of Claim. Read, recall and apply rules, general procedures and timing related to pleading Notices of Action and Statements of Claim.					
LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Intent to Defend and Statements of Defence. Read, recall and apply rules, general procedures and timing related to pleading Notices of Intent to Defend and Statements of Defence.					
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to pleading and service of typical litigation documents.					
LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Motion and Affidavits in support. Read, recall and apply rules, general procedures and timing related to motions.					
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to default proceedings.					
LawC1-LAWS114-Distinguish among counter-claims, cross-claims, third and fourth party claims.					
LawC1-LAWS114-Recall appropriate behaviors during discovery procedures					P
LawC1-LAWS114-Read, recall and apply several privileges as these apply to discovery procedures.					
LawC1-LAWS114-Read and analyse, together with group members and/or independently, given, precedent, litigation documents recording a civil action and/or motion.					P
LawC1-LAWS114-Read and analyze, together with group members and/or independently, given, precedent, litigation case(s) and/or case scenario(s) giving rise to a civil action and/or motion.					P
LawC1-LAWS114-Prepare, together with group members, document(s) related to civil litigation.					P
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.					

LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.				P	P	
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.						
LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.		√	√	P	P	
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.						

Law Clerk to Office Admin - Executive/Health OAGN124	OAEx1-OAGN124-Apply the percentage formula to business applications manually or by using Excel.	OAEx1-OAGN124-Apply rates of change to a variety of applications.	OAEx1-OAGN124-Calculate interest on credit cards	OAEx1-OAGN124-Calculate taxable income for individuals.	OAEx1-OAGN124-Perform portion and basic amount comparisons to solve marketing problems.	OAEx1-OAGN124-Perform trend calculations by application of rates of change.
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.						
LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.						
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.	√	P	P	P	P	P
LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.						
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.						

Law Clerk to Office Admin - Executive/Health OAGN116	OAEx1-OAGN116-Show the ability to touch keyboard at a minimum rate of 40 words per minute (gross) with 98% accuracy.	OAEx1-OAGN116-Apply word processing commands and tools to format documents.	OAEx1-OAGN116-Produce business documents in a mailable form to intermediate production-level standards using word processing software.	OAEx1-OAGN116-Prepare documents using tables and graphics to present data.	OAEx1-OAGN116-Use word processing tools to format various components and styles of reports.
LawC1-LAWS105-the ability to touch keyboard at a minimum rate of 30 words per minute (gross) with 98% accuracy.					
LawC1-LAWS105-knowledge of basic microcomputer concepts, such as the Windows operating systems, file management, e-mail and the Internet.					
LawC1-LAWS105-knowledge of the legal office environment including general procedures and practices in the legal office, procedures for opening and maintaining client records, and the applicable legal terminology for these procedures					
LawC1-LAWS105-the ability to prepare legal correspondence using word processing software and appropriate precedents while applying proofreading, editing and critical thinking skills.		P	P		P
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.	√				
LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.		√	P		P
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.					
LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.		√	√		P
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.					

Law Clerk to Office Admin - Executive/Health OAGN123	OAEx1-OAGN123-Plan, create and test spreadsheets for a variety of business needs; i.e. cash flow analysis, budgeting, cost estimating, inventory management and financial reporting.	OAEx1-OAGN123-Analyse and interpret data for problem solving and decision-making processes.	OAEx1-OAGN123-Create and apply graphical representations of data for business presentations.	OAEx1-OAGN123-Employ reports for analysis, problem solving and decision-making.
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.				
LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.				
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.	P			
LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.				
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.				

Law Clerk to Office Admin - Executive/Health OAGN125	OAEx1-OAGN125-Explain the impact of effective communication skills on the success of any organization.	OAEx1-OAGN125-Apply techniques of effective listening.	OAEx1-OAGN125-Communicate appropriately with any level of co-worker, client, customer, etc.	OAEx1-OAGN125-Engage in meetings.	OAEx1-OAGN125-Use professional telephone techniques.	OAEx1-OAGN125-Respond to all requests in the workplace in a timely and professional manner.	OAEx1-OAGN125-Assist in resolving customer/client problems.	OAEx1-OAGN125-Describe and perform basic office procedures to support the activities of a business.	OAEx1-OAGN125-Understand and apply human relations principles to maintain effective business relationships.	OAEx1-OAGN125-Apply organizational and time management skills to enhance productivity.
LawC1-LAWS114-Distinguish among various courts and modes of civil procedures. Identify and analyze typical structural components associated with Notices of Action and Statements of Claim. Read, recall and apply rules, general procedures and timing related to pleading Notices of Action and Statements of Claim.										

LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Intent to Defend and Statements of Defence. Read, recall and apply rules, general procedures and timing related to pleading Notices of Intent to Defend and Statements of Defence.										P
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to pleading and service of typical litigation documents.						?				P
LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Motion and Affidavits in support. Read, recall and apply rules, general procedures and timing related to motions.										P
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to default proceedings.						?				P
LawC1-LAWS114-Distinguish among counter-claims, cross-claims, third and fourth party claims.										
LawC1-LAWS114-Recall appropriate behaviors during discovery procedures		√	P							
LawC1-LAWS114-Read, recall and apply several privileges as these apply to discovery procedures.										
LawC1-LAWS114-Read and analyse, together with group members and/or independently, given, precedent, litigation documents recording a civil action and/or motion.		√	P							
LawC1-LAWS114-Read and analyze, together with group members and/or independently, given, precedent, litigation case(s) and/or case scenario(s) giving rise to a civil action and/or motion.		√	P							
LawC1-LAWS114-Prepare, together with group members, document(s) related to civil litigation.		√	P							
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.										
LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.				P						
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.										

LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.				P						
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.										

Law Clerk to Office Admin - Executive OAGN119	OAEx1-OAGN119-Demonstrate an understanding of the application of correct sentence structure, parts of speech, pronoun, verb, adjective, adverbs, prepositions, conjunctions, word usage and punctuation to business documentation	OAEx1-OAGN119-Research and effectively summarize articles for a presentation and develop an effective and accurate PowerPoint presentation of summarized material	OAEx1-OAGN119-Provide constructive peer criticism of presentations	OAEx1-OAGN119-Apply proofreading editing, grammar and spelling skills and utilize critical thinking and time management skills in the production of documentation and presentation
LawC1-LAWS105-the ability to touch keyboard at a minimum rate of 30 words per minute (gross) with 98% accuracy.				
LawC1-LAWS105-knowledge of basic microcomputer concepts, such as the Windows operating systems, file management, e-mail and the Internet.				
LawC1-LAWS105-knowledge of the legal office environment including general procedures and practices in the legal office, procedures for opening and maintaining client records, and the applicable legal terminology for these procedures				
LawC1-LAWS105-the ability to prepare legal correspondence using word processing software and appropriate precedents while applying proofreading, editing and critical thinking skills.	P			P
LawC1-LAWS114-Distinguish among various courts and modes of civil procedures. Identify and analyze typical structural components associated with Notices of Action and Statements of Claim. Read, recall and apply rules, general procedures and timing related to pleading Notices of Action and Statements of Claim.				

LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Intent to Defend and Statements of Defence. Read, recall and apply rules, general procedures and timing related to pleading Notices of Intent to Defend and Statements of Defence.				
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to pleading and service of typical litigation documents.				
LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Motion and Affidavits in support. Read, recall and apply rules, general procedures and timing related to motions.				
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to default proceedings.				
LawC1-LAWS114-Distinguish among counter-claims, cross-claims, third and fourth party claims.				
LawC1-LAWS114-Recall appropriate behaviors during discovery procedures				
LawC1-LAWS114-Read, recall and apply several privileges as these apply to discovery procedures.				
LawC1-LAWS114-Read and analyse, together with group members and/or independently, given, precedent, litigation documents recording a civil action and/or motion.		P		
LawC1-LAWS114-Read and analyze, together with group members and/or independently, given, precedent, litigation case(s) and/or case scenario(s) giving rise to a civil action and/or motion.		P		
LawC1-LAWS114-Prepare, together with group members, document(s) related to civil litigation.				
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.				
LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.				
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.				

LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.	√			P		
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.						

LAW CLERK TO OFFICE ADMINISTRATION (HEALTH SERVICES) COURSES

Law Clerk to Office Admin - Health OAGN127	OAHealth1-OAGN127-Transcribe handwritten, verbal, and digital audio files of dictated business documents and apply spelling and advanced rules of: grammar, punctuation, capitalization, expression of numbers, abbreviations, plurals, possessives, compound words, word usage	OAHealth1-OAGN127-Produce accurate, final-form documents within specific deadlines.	OAHealth1-OAGN127-Define and implement business vocabulary.	OAHealth1-OAGN127-Interpret and accurately follow verbal and written instructions.	OAHealth1-OAGN127-Determine suitable format for documents, using appropriate word processing features.	OAHealth1-OAGN127-Prioritize transcription assignments and meet deadlines.
LawC1-LAWS105-the ability to touch keyboard at a minimum rate of 30 words per minute (gross) with 98% accuracy.						
LawC1-LAWS105-knowledge of basic microcomputer concepts, such as the Windows operating systems, file management, e-mail and the Internet.						
LawC1-LAWS105-knowledge of the legal office environment including general procedures and practices in the legal office, procedures for opening and maintaining client records, and the applicable legal terminology for these procedures						
LawC1-LAWS105-the ability to prepare legal correspondence using word processing software and appropriate precedents while applying proofreading, editing and critical thinking skills.	P					

LawC1-LAWS114-Distinguish among various courts and modes of civil procedures. Identify and analyze typical structural components associated with Notices of Action and Statements of Claim. Read, recall and apply rules, general procedures and timing related to pleading Notices of Action and Statements of Claim.						
LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Intent to Defend and Statements of Defence. Read, recall and apply rules, general procedures and timing related to pleading Notices of Intent to Defend and Statements of Defence.						
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to pleading and service of typical litigation documents.		P		P		
LawC1-LAWS114-Identify and analyze typical structural components associated with Notices of Motion and Affidavits in support. Read, recall and apply rules, general procedures and timing related to motions.		P		P		
LawC1-LAWS114-Read, recall and apply rules, general procedures and timing related to default proceedings.		P		P		
LawC1-LAWS114-Distinguish among counter-claims, cross-claims, third and fourth party claims.						
LawC1-LAWS114-Recall appropriate behaviors during discovery procedures						
LawC1-LAWS114-Read, recall and apply several privileges as these apply to discovery procedures.				P		
LawC1-LAWS114-Read and analyse, together with group members and/or independently, given, precedent, litigation documents recording a civil action and/or motion.						
LawC1-LAWS114-Read and analyze, together with group members and/or independently, given, precedent, litigation case(s) and/or case scenario(s) giving rise to a civil action and/or motion.						
LawC1-LAWS114-Prepare, together with group members, document(s) related to civil litigation.						
LawC1-LAWS310-Demonstrate a minimum keyboarding speed of 40 wpm in order to pass the course.					?	

LawC1-LAWS310-Prepare legal correspondence, memoranda of law, basic legal and civil litigation documents using word processing and legal office specific software and appropriate precedents in a computer networked environment.					P	
LawC1-LAWS310-Prepared spreadsheets including entering, editing and copying cell entries, formulas and functions, including absolute and relative cell references, and applied formatting.						
LawC1-LAWS310-Applied proofreading, editing, grammar and spelling skills; worked independently; and applied critical thinking skills in the production of neat and accurate legal documents and correspondence.	P				√	
LawC1-LAWS310-Organized and maintained legal client files in a professional manner.						

ARCHITECTURAL TECHNOLOGY TO ENERGY SYSTEMS ENGINEERING TECHNOLOGY COURSES

- Omitted maps for ESET 111, ROBO 112, ESET 121, ESET 122, and ROBO 234 which have no overlap.

Architectural Technology toEnergy Systems Engineering Technology / Mechanical Engineering Technology PHYS100	ESys1-PHYS100-Use units and unit conversions as they relate to physical quantities involved in problem-solving.	ESys1-PHYS100-Perform operations involving vector quantities.	ESys1-PHYS100-Solve basic problems in linear and multidimensional motion with constant acceleration.	ESys1-PHYS100-Explain Newton's Laws and the effects of force on motion.	ESys1-PHYS100-Solve systems involving common forces in nature.	ESys1-PHYS100-Calculate torque, tension and compressive forces.	ESys1-PHYS100-Discuss conservation of energy in the conversion between potential and kinetic energy.	ESys1-PHYS100-Solve basic problems involving rotational motion.	ESys1-PHYS100-Apply principles of rotation transfer to solving gear and pulley connected by belt systems.
Arch1-MATH111-Perform arithmetic operations with real numbers, including those in engineering notation.									
Arch1-MATH111-Apply appropriate mathematical laws and principles to perform fundamental algebraic operations and solve linear equations.									
Arch1-MATH111-Handle calculations in British units	?								
Arch1-MATH111-Make geometric constructions and solve problems involving triangles, circles and sectors.									
Arch1-MATH111-Solve for area and perimeter of composite figures.									
Arch1-MATH111-Use an appropriate scientific calculator to facilitate arithmetic and trigonometric computations.									

Arch1-MATH111-Perform fundamental operations/calculations involving the trigonometric and inverse trigonometric functions using the degree system of angular measure.									
Arch1-MATH111-Apply knowledge of vectors to vector addition problems		?							
Arch1-ARAP124-Identify the correct physical dimension and corresponding units in both imperial and metric systems.	?								
Arch1-ARAP124-Understand and solve basic static problems using force vectors and moments: Newton's laws, mathematical and graphical techniques of vectors.		?		?	?				
Arch1-ARAP124-Use free body diagrams and conditions of equilibrium to perform operations involving concurrent and coplanar vectors.		?							
Arch1-ARAP124-Calculate cross sectional properties of structural members: center of gravity, moment of inertia, radius of gyration.									
Arch1-ARAP124-Calculate end reactions in beams based on the external forces.					?				
Arch1-MATH112-Rearrange linear, quadratic and cubic formulae									
Arch1-MATH112-Perform operations on vectors both graphically and with trigonometry; resolve vectors.		?							
Arch1-MATH112-Apply the sine and cosine rules to solve oblique triangles in applied situations.									
Arch1-MATH112-Calculate surface areas and volumes of prisms, pyramids and spheres.									
Arch1-MATH112-Solve quadratic and cubic equations as they relate to areas and volumes.									
Arch1-MATH112-Identify, define and describe conic sections									
Arch1-MATH112-Identify and calculate slopes of edges and faces in solids.									
Arch1-MATM122-Prepare building envelope designs and details for various building types.									
Arch1-MATM122-Select materials and assembly methods for different parts of a building envelope.									
Arch1-MATM122-Compare different materials responding to design requirements and identify materials compatible with structural system requirements.									
Arch1-MATM122-Identify different structural systems and the forces impacting building structures.					?				
Arch1-MATM122-Describe scenarios where coordination may be necessary with different disciplines during the design and construction phases of a project.									
Arch1-MATM122-Identify the different types of building operating systems.									

Architectural Technology to Energy Systems Engineering Technology / Mechanical Engineering Technology MATH170	ESys1-MATH170-perform operations/calculations involving trigonometric and inverse trigonometric functions using both the degree and radian systems of angular measure.	ESys1-MATH170-solve oblique triangles using the Sine law and Cosine law.	ESys1-MATH170-graph trigonometric functions	ESys1-MATH170-apply a variety of techniques for factoring algebraic expressions	ESys1-MATH170-perform operations with algebraic fractions	ESys1-MATH170-solve quadratic equations using various methods and applied problems involving quadratics	ESys1-MATH170-graph parabolas using the vertex and intercepts	ESys1-MATH170-use an appropriate scientific calculator to perform all required computations
Arch1-MATH111-Apply appropriate mathematical laws and principles to perform fundamental algebraic operations and solve linear equations.				√				
Arch1-MATH111-Handle calculations in British units								P
Arch1-MATH111-Make geometric constructions and solve problems involving triangles, circles and sectors.		?						
Arch1-MATH111-Solve for area and perimeter of composite figures.								
Arch1-MATH111-Use an appropriate scientific calculator to facilitate arithmetic and trigonometric computations.			?					P
Arch1-MATH111-Perform fundamental operations/calculations involving the trigonometric and inverse trigonometric functions using the degree system of angular measure.	√		?					P
Arch1-MATH111-Apply knowledge of vectors to vector addition problems								
Arch1-ARAP124-Identify the correct physical dimension and corresponding units in both imperial and metric systems.								
Arch1-ARAP124-Understand and solve basic static problems using force vectors and moments: Newton's laws, mathematical and graphical techniques of vectors.								
Arch1-ARAP124-Use free body diagrams and conditions of equilibrium to perform operations involving concurrent and coplanar vectors.								
Arch1-ARAP124-Calculate cross sectional properties of structural members: center of gravity, moment of inertia, radius of gyration.								P
Arch1-ARAP124-Calculate end reactions in beams based on the external forces.								P
Arch1-MATH112-Rearrange linear, quadratic and cubic formulae						√		
Arch1-MATH112-Perform operations on vectors both graphically and with trigonometry; resolve vectors.	√		√					
Arch1-MATH112-Apply the sine and cosine rules to solve oblique triangles in applied situations.		√						
Arch1-MATH112-Calculate surface areas and volumes of prisms, pyramids and spheres.								P
Arch1-MATH112-Solve quadratic and cubic equations as they relate to areas and volumes.						√		

Arch1-MATH112-Identify, define and describe conic sections								
Arch1-MATH112-Identify and calculate slopes of edges and faces in solids.								P

Architectural Technology to Energy Systems Engineering Technology / Mechanical Engineering Technology MT121	ESys1-MT121-Define scalar and vector quantities	ESys1-MT121-Resolve vectors and determine resultants of vectors	ESys1-MT121-Define and calculate moments and couples	ESys1-MT121-Draw free body diagrams and apply the equilibrium equations	ESys1-MT121-Define friction force and apply the laws of friction	ESys1-MT121-Define and determine centroid, center of gravity, and moment of inertia
Arch1-MATH111-Perform arithmetic operations with real numbers, including those in engineering notation.						
Arch1-MATH111-Apply appropriate mathematical laws and principles to perform fundamental algebraic operations and solve linear equations.						
Arch1-MATH111-Handle calculations in British units						
Arch1-MATH111-Make geometric constructions and solve problems involving triangles, circles and sectors.						
Arch1-MATH111-Solve for area and perimeter of composite figures.						
Arch1-MATH111-Use an appropriate scientific calculator to facilitate arithmetic and trigonometric computations.						
Arch1-MATH111-Perform fundamental operations/calculations involving the trigonometric and inverse trigonometric functions using the degree system of angular measure.						
Arch1-MATH111-Apply knowledge of vectors to vector addition problems	√	√				
Arch1-ARAP124-Identify the correct physical dimension and corresponding units in both imperial and metric systems.						
Arch1-ARAP124-Understand and solve basic static problems using force vectors and moments: Newton's laws, mathematical and graphical techniques of vectors.	√	√	√		√	
Arch1-ARAP124-Use free body diagrams and conditions of equilibrium to perform operations involving concurrent and coplanar vectors.	√	√		√		
Arch1-ARAP124-Calculate cross sectional properties of structural members: center of gravity, moment of inertia, radius of gyration.			√			√
Arch1-ARAP124-Calculate end reactions in beams based on the external forces.					P	
Arch1-MATH112-Rearrange linear, quadratic and cubic formulae						
Arch1-MATH112-Perform operations on vectors both graphically and with trigonometry; resolve vectors.	√	√				
Arch1-MATH112-Apply the sine and cosine rules to solve oblique triangles in applied situations.						
Arch1-MATH112-Calculate surface areas and volumes of prisms, pyramids and spheres.						

Arch1-MATH112-Solve quadratic and cubic equations as they relate to areas and volumes.							
Arch1-MATH112-Identify, define and describe conic sections							
Arch1-MATH112-Identify and calculate slopes of edges and faces in solids.							
Arch1-MATM122-Prepare building envelope designs and details for various building types.							
Arch1-MATM122-Select materials and assembly methods for different parts of a building envelope.							
Arch1-MATM122-Compare different materials responding to design requirements and identify materials compatible with structural system requirements.							
Arch1-MATM122-Identify different structural systems and the forces impacting building structures.					P		
Arch1-MATM122-Describe scenarios where coordination may be necessary with different disciplines during the design and construction phases of a project.							
Arch1-MATM122-Identify the different types of building operating systems.							

Architectural Technology to Energy Systems Engineering Technology / Mechanical Engineering Technology MATH180	ESys1-MATH180-Perform algebraic operations with exponents and radicals	ESys1-MATH180-Perform mathematical operations with complex numbers in rectangular and polar form.	ESys1-MATH180-Solve exponential, logarithmic, radical and trigonometric equations with a variety of algebraic methods	ESys1-MATH180-Perform operation with matrices	ESys1-MATH180-Apply matrices to solve a system of linear equations	ESys1-MATH180-Simplify trigonometric expressions and prove trigonometric identities	ESys1-MATH180-Use an appropriate scientific calculator to perform all required computations.
Arch1-MATH111-Perform arithmetic operations with real numbers, including those in engineering notation.							
Arch1-MATH111-Apply appropriate mathematical laws and principles to perform fundamental algebraic operations and solve linear equations.	?		?				
Arch1-MATH111-Handle calculations in British units							?
Arch1-MATH111-Make geometric constructions and solve problems involving triangles, circles and sectors.							
Arch1-MATH111-Solve for area and perimeter of composite figures.							
Arch1-MATH111-Use an appropriate scientific calculator to facilitate arithmetic and trigonometric computations.			?			?	?
Arch1-MATH111-Perform fundamental operations/calculations involving the trigonometric and inverse trigonometric functions using the degree system of angular measure.			?			?	?
Arch1-MATH111-Apply knowledge of vectors to vector addition problems							
Arch1-ARAP124-Identify the correct physical dimension and corresponding units in both imperial and metric systems.							

Arch1-ARAP124-Understand and solve basic static problems using force vectors and moments: Newton's laws, mathematical and graphical techniques of vectors.							
Arch1-ARAP124-Use free body diagrams and conditions of equilibrium to perform operations involving concurrent and coplanar vectors.							
Arch1-ARAP124-Calculate cross sectional properties of structural members: center of gravity, moment of inertia, radius of gyration.							?
Arch1-ARAP124-Calculate end reactions in beams based on the external forces.							?
Arch1-MATH112-Rearrange linear, quadratic and cubic formulae							
Arch1-MATH112-Perform operations on vectors both graphically and with trigonometry; resolve vectors.			?			?	
Arch1-MATH112-Apply the sine and cosine rules to solve oblique triangles in applied situations.			?			?	
Arch1-MATH112-Calculate surface areas and volumes of prisms, pyramids and spheres.							?
Arch1-MATH112-Solve quadratic and cubic equations as they relate to areas and volumes.							
Arch1-MATH112-Identify, define and describe conic sections							
Arch1-MATH112-Identify and calculate slopes of edges and faces in solids.							?

Architectural Technology to Energy Systems Engineering Technology ROBO115	ESys1-ROBO115-Comprehend some of the fundamental graphic language concepts of mechanical engineering drafting (CSA standards).	ESys1-ROBO115-Properly utilize the AutoCAD graphic interface and command/menu system.	ESys1-ROBO115-Access standard drawing templates and set-up the drawing environment and scale.	ESys1-ROBO115-Effectively use the fundamental drawing commands of the AutoCAD software.	ESys1-ROBO115-Employ the AutoCAD software to prepare precise and fully annotated multi-view two-dimensional orthographic engineering drawings & graphics, including full and partial sections, all of which properly adhere to CSA.	ESys1-ROBO115-Use the fundamental commands in the INVENTOR software to develop precise 3D solid models.	ESys1-ROBO115-Use the database from any 3D solid model to create proper detail, sectional drawings and exploded views.	ESys1-ROBO115-Use the database resulting from any 3D assembly to create proper General Assembly (GA) and working drawings (as per CSA Standards).	ESys1-ROBO115-Organize and manage (ie: save and retrieve) drawing files.	ESys1-ROBO115-Manage the use of time and other resources to complete projects.	ESys1-ROBO115-Take responsibility for one's own actions, decisions, and consequences.
Arch1-ARCH101-Organize architectural design relationships and detailing for residential design and construction including sustainable design and construction features.											

Arch1-ARCH101-Develop basic freehand drawing skills to be better able to understand construction details prepared by a supervisor in an office.											
Arch1-ARCH101-Prepare a partial set of residential design and construction drawings using computer aided drafting skills.	?				?						
Arch1-ARCH101-Apply and comply with relevant portions of the current Ontario Building Code as required for a building permit application.											
Arch1-ARCH101-Draw architectural details for a wood frame residential building clad in masonry veneer and siding.											
Arch1-ARCH101-Review and implement barrier-free design elements for a residential project.											
Arch1-ARCH102-Gain an understanding of current 2D AutoCad drafting and printing commands using short-cut commands, menus and icons.	?	?		?							
Arch1-ARCH102-Use appropriate drafting commands with respect to lineweight, dimensioning, hatching and scale.	?	?		?							
Arch1-ARCH102-Draw partial construction plans, sections, details and elevations for a sample residence using basic 2D CAD commands and plotting styles in Paper space.		?		?	?						
Arch1-ARCH102-Produce measure drawing sketches, plans and elevations of a small residential space.					?						
Arch1-ARCH121-Prepare architectural design and construction detailing associated with industrial buildings.											
Arch1-ARCH121-Develop intermediate freehand drawing skills by preparing sketch designs and construction details											
Arch1-ARCH121-Prepare a partial set of industrial design and construction drawings using computer aided drafting skills	?				?						
Arch1-ARCH121-Achieve compliance for building permit applications by applying relevant portions of the current Ontario Building Code											
Arch1-ARCH121-Draw architectural details for a masonry and steel framed structure					?						
Arch1-ARCH121-Determine structural requirements for a masonry and steel industrial building using pre-design structural tables											
Arch1-ARCH121-Review and implement sustainable architecture and barrier-free design elements for an industrial building											

ARCHITECTURAL TECHNOLOGY TO MECHANICAL ENGINEERING TECHNOLOGY COURSES

- Omitted maps for MT 103, GNED 212, MT 153, MT 237, and MT 256 which have no overlap.

Architectural Technology to Mechanical Engineering Technology	MEng1-MT102-Compare the mechanical and physical properties of various engineering materials including metals, polymers, composite materials, and ceramics.	MEng1-MT102-Recognize the types of tests used to obtain mechanical properties of materials.	MEng1-MT102-Understand how mechanical and physical properties are related to internal structure.	MEng1-MT102-Recognize how engineering applications are related to mechanical properties
Arch1-MATM101-Examine materials and methods related to residential construction.	?	?		
Arch1-MATM101-Distinguish the sequence of construction.				
Arch1-MATM101-Relate critical documentation to building design and residential construction.				
Arch1-MATM101-Incorporate sustainable construction materials, methods and techniques.				
Arch1-MATM101-Construct a house model to reinforce comprehension of wood framing system.				
Arch1-MATM122-Prepare building envelope designs and details for various building types.				
Arch1-MATM122-Select materials and assembly methods for different parts of a building envelope.	?	?		
Arch1-MATM122-Compare different materials responding to design requirements and identify materials compatible with structural system requirements.	?	?		
Arch1-MATM122-Identify different structural systems and the forces impacting building structures.				
Arch1-MATM122-Describe scenarios where coordination may be necessary with different disciplines during the design and construction phases of a project.				
Arch1-MATM122-Identify the different types of building operating systems.				

Architectural Technology to Mechanical Engineering Technology MT106	MEng1-MT106-Develop and sketch standard orthographic views for basic parts and distinguish between first and third angle projection drawings.	MEng1-MT106-Apply correct drafting practices for dimensioning and sectioning of mechanical components.	MEng1-MT106-Identify various threaded fasteners and other standard machine components.	MEng1-MT106-Demonstrate an understanding of standard drafting symbology & annotation and GD&T(Geometric Dimensioning & Symbology).	MEng1-MT106-Interpret and prepare precise, fully annotated and dimensioned mechanical engineering drawings/graphics which conform to current CSA standards.	MEng1-MT106-Execute the AutoCAD software to prepare precise,fully annotated multi-view two-dimensional orthographic engineering drawings & graphics that comply with current CSA and industry standards.	MEng1-MT106-Organize, manage, save and retrieve drawing files.
Arch1-ARCH101-Organize architectural design relationships and detailing for residential design and construction including sustainable design and construction features.							
Arch1-ARCH101-Develop basic freehand drawing skills to be better able to understand construction details prepared by a supervisor in an office.							
Arch1-ARCH101-Prepare a partial set of residential design and construction drawings using computer aided drafting skills.		?		?			
Arch1-ARCH101-Apply and comply with relevant portions of the current Ontario Building Code as required for a building permit application.							
Arch1-ARCH101-Draw architectural details for a wood frame residential building clad in masonry veneer and siding.							
Arch1-ARCH101-Review and implement barrier-free design elements for a residential project.							
Arch1-ARCH102-Gain an understanding of current 2D AutoCad drafting and printing commands using short-cut commands, menus and icons.		?		?			
Arch1-ARCH102-Use appropriate drafting commands with respect to lineweight, dimensioning, hatching and scale.		?		?			
Arch1-ARCH102-Draw partial construction plans, sections, details and elevations for a sample residence using basic 2D CAD commands and plotting styles in Paper space.							
Arch1-ARCH102-Produce measure drawing sketches, plans and elevations of a small residential space.	?						
Arch1-ARCH121-Prepare architectural design and construction detailing associated with industrial buildings.							
Arch1-ARCH121-Develop intermediate freehand drawing skills by preparing sketch designs and construction details	?						
Arch1-ARCH121-Prepare a partial set of industrial design and construction drawings using computer aided drafting skills		?		?			

Arch1-ARCH121-Achieve compliance for building permit applications by applying relevant portions of the current Ontario Building Code							
Arch1-ARCH121-Draw architectural details for a masonry and steel framed structure							
Arch1-ARCH121-Determine structural requirements for a masonry and steel industrial building using pre-design structural tables							
Arch1-ARCH121-Review and implement sustainable architecture and barrier-free design elements for an industrial building							

APPENDIX 5. MODEL ROUTES

- Model routes were provided by program coordinators and administrative assistants.

LAW CLERK

Semester 1	Semester 2
COMM 160/161	COMM 170/171
GNED	LAWS 112
GNED	LAWS 114
LAWS 105	LAWS 115
LAWS 111	LAWS 310
LAWS 221	

OFFICE ADMINISTRATION (EXECUTIVE)

Semester 1	Semester 2
COMM 160/161	COMM 170/171
GNED	OAGN 116
OAGN 113	OAGN 119
OAGN 115	OAGN 123
OAGN 118	OAGN 125
OAGN 124	

OFFICE ADMINISTRATION (HEALTH SERVICES)

Semester 1	Semester 2
COMM 160/161	COMM 170/171
GNED	OAGN 116
OAGN 113	OAGN 123
OAGN 115	OAGN 125
OAGN 118	OAGN 127
OAGN 124	

ARCHITECTURAL TECHNOLOGY

Semester 1	Semester 2
ARCH 101	ARAP 124
ARCH 102	ARAP 121
COMM 170/171	ENVR 123
ENVR 101	GNED 500
GNED	MATH 112
MATH 111	MATM 122
MATH 101	

ENERGY SYSTEMS ENGINEERING TECHNOLOGY

Semester 1	Semester 2
ESET 111	ESET 121
ROBO 112	ESET 122
ROBO 115	MT 121
PHYS 100	ROBO 234
MATH 170	MATH 180
COMM 160/161	GNED 500
	COMM 170/171

MECHANICAL ENGINEERING TECHNOLOGY

- The model routes for Mechanical Engineering Technology – Industrial (Co-op) (3714), Mechanical Engineering Technology – Industrial (3704), Mechanical Engineering Technology – Design (3703) are identical for semester one and two.

Semester 1	Semester 2
MT 102	MT 121
MT 103	MT 153
MT 106	MT 237
PHYS 100	MT 256
MATH 170	MATH 180
GNED 212	GNED 500
COMM 160/161	COMM 170/171