Architectural Design Drafting Technician & Technologist

Final report

A Provincially Initiated Curriculum (PIC) Project

For the

Ministry of Advanced Education

Administered through

Centre for Curriculum, transfer and Technology (C2T2)

The BC Ministry of Advanced Education funded this Provincially Initiated Curriculum (PIC) project.

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Introduction to the final report

This report completes the Provincial Initiated Curriculum project for the Architectural Design Drafting Technician & Technologist program. Not all of the ambitious goals have been attained due to many changes over the life of this project.

While many international events occurred, the local significant events included the change of government with attendant change in direction for the Ministry of Advanced Education. This resulted is many major budget challenges for member institutions and a subsequent focus to downsizing and program reviews. The major effect on this project from these events is the withdrawal of BCIT from participation in this project. Where BCIT was intended to be a major contributor to the project, the resultant material does not reflect the newly announced Applied Bachelor of Architecture degree at BCIT.

The budget changes at member institutions also meant that participant's attention was directed to internal reviews and program survival and less time was available for review of this material.

The developer's health also effected this project completion; a yard accident to my hand and following surgery and recovery time has delayed the completion of the project.

Outside changes to the pricing and availability of on-line course management tools has also resulted in less interest in that aspect of the original project. A number of PSE institutions have requested more time to evaluate the on-line course tools and as a result that part of this project remains a future task. Some comments about the usefulness of on-line presentation can be found in the observations section at the end of the report.

The major accomplishment of the project was the identification of unique skills for the Architectural Design Drafting skill set, and the organization of streams of courses to present these skills. Three areas have been identified that provide unique skills over and above those in existing complementary Technician programs. For development of these competencies, particular attention was made to the existing program at the University College of the Cariboo. The Engineering Design Drafting (EDDT) program at UCC serves as a basis for developing the different courses for the Architectural Design Drafting Technician. A comparison is made to show the overlap and the differences of the two programs.

Following the comparison of the two programs, the course outlines for new courses have been developed with accompanying learning objectives. Reference is made to one course that is offered from the Project Management Institute that offers certification for completion of their course. Learning objectives for this course are not included in this package but are available directly from PMI at www.pmi.org

Presentation of the new courses is in a "stream" format with the names, goals and objectives provided in a comprehensive format. Each participating member institution may break up these into smaller courses with different course numbers. The intent is to provide a list of competencies and learning outcomes that encompass the Architectural Design Drafting standards from CTHRB and not do dictate course names.

Goals

The initial objectives of the project, when started, encompassed many areas. These objectives are outlined below:

- Increase laddering opportunities between drafting programs since the current one-year Architectural Drafting Technician program will ladder to the new Architectural Drafting Technologist program.
- Ensure core competencies reflect changes in required skills as a result of advances in technology
- Develop an articulation agreement between those PSE institutions that currently offer Architectural Drafting Technician programs.
- Establish an articulation agreement between those PSE institutions that plan to offer the new Architectural Drafting Technologist program.
- Ensure that the Architectural Drafting Technician and Technologist programs address the accreditation standards of the Canadian Technology Accreditation Board (CTAB) and the Canadian Technology Human Resources Board (CTHRB).
- Develop the Architectural Drafting Technician and Technologist programs in an on-line delivery format

As completed, the project has identified the laddering situation and the various entries, leaving opportunities that are available.

The competencies have imbedded in them the necessity of updating skills and course material as the technology advances. Where indicated, the specific technology assumes the latest version of hardware/ software. We have attempted to stay away from any particular name brand software, but have tended to work with the techniques, skills and knowledge underlying the use of the software. In some instances when used as examples of the specific software techniques, name brand software is used but not restrict course developers to using only that software. No particular endorsement of specific software is assumed or intended.

Modeled on the Memorandum of Understanding (MoU) that was developed for the Drafting Common Core project, a memorandum is included that will be presented at the next meeting of the BC Drafting Technology Articulation Committee. This is anticipated in May 2003. This will allow the members to examine and comment on the final form of this project. Any adjustments, changes or additions will be posted to the web site for the project: http://www.bcdac.net/bc-dtac/ADDTT.htm

The Canadian Technology Human Resources Board proposed standards for the ADDT were checked for the various competencies used in the development of the proposed courses. The overlap with the EDDT program and the assumption that some of the existing courses from the EDDT could be adapted/used outright for the ADDT program are consistent with the other standards from CTHRB. The EDDT program is currently accredited with the ASTTBC, the local contact for CTAB and CTHRB. A chart indicating the areas is posted on the web site, and portions are contained within this report.

In informal discussion with members of BCDTAC, it was determined that the provision of on-line samples for evaluation of the different delivery methods was not necessary for the evaluation of the course outlines. Because of this change in interest, and the effects of licensing costs, the complete delivery of on-line material is not seen as a priority at this time.

Course names

In examining the existing course structure at various institutions, a number of different naming conventions and course numbering systems are seen. Rather than attempt to fit in to any one of them, the course names are proposed with the understanding that local adoption may require different names. The intent is to provide a compendium of skills and knowledge rather than package them under a creative name.

Within BC there are some legal requirements with the use of the name "Architect" and the term "Architectural" that reside with the AIBC. At UCC the existing course names are titled with "Building Design" to recognize the ownership of the term "Architectural." It can be anticipated that this program, title and awards may well have to be changed to something like "Building Design Drafting Technician" to comply with provincial legislation.

The courses proposed herein are selected to compliment the existing programs in the province. Where unique areas have been identified, new courses are proposed. Where existing courses have been identified as covering substantial number of competencies within the CTHRB standards, they are recommended for adoption in this program as well.

Course outlines

The course outlines provided here are simplified from the format used in various institutions. Missing are various internal required checks and credit requirements.

I have made a number of comments about the transferability of credits on the ADDT&T web site. Please see http://www.bcdac.net/bc-dtac/reports/articulation/Articulation.htm

Observations and comments about internal curriculum changes highlights the move to smaller "units" tied to set credits within the institutions. For example, at Kwantlen there are courses with 19 credits attached to one 6-month course; DRAF 1360 – Structural Drafting or DRAF 1330 – Electrical Drafting are examples. There is an effort to move to a maximum of 3 credits per course, and thus create a program of courses that covers the same previous "large" course content. Using the Kwantlen example, the Structural Drafting will be re-worked into a series of 6 courses of 3 credits each and expanding other courses to pick up the "floating credit."

Canadian Technology Standards

The Canadian Technology Human Resources Board (CTHRB) maintains and has published a number of standards that apply to the Drafting area. Of interest are the 3 referenced in this report. The **Architectural Technician**, **Building Construction technician** and the proposed **Architectural Design Drafting Technician**.

The Architectural Technician and the Building Construction Technician are accepted standards and reprints of the standards are included as appendices. Architectural Design

Drafting Technician is a proposed standard awaiting validation; it can be viewed on the CTHRB web site, and is also included as an appendix.

As part of the analysis, a comparison was made between the three standards; this is presented as an additional appendix with the unique areas of the ADDT standard highlighted. Suggestions for competencies in the proposed new courses are also identified.

The proposed standards cover the first portion of the Technician requirements. Technologists' qualifications are not indicated in the Architectural Design Drafting standard. Many of the technologist competencies from the Architectural Technician overlap those for an ADD Technologist. The proposed courses (below) lead into the Technologist standards by introducing areas like Project Management at an early stage to use these skills in the later courses and projects.

Therefore, the proposed courses do not follow a "first year; second year" mapping to the Technician standards and then Technologists standards. The skills taught are recommended for employment and usefulness at the early exit level, and establish a foundation for the higher level studies.

Learning outcomes

Articulation Agreement – Memorandum of understanding

To facilitate the articulation between PSE institutions in BC with respect to the Architectural Design Drafting Technician program, the Memorandum of Understanding (below, and attached as an appendix) will be presented to the BC Drafting Technology Articulation Committee (BC-DTAC).

This body has previously developed the Provincial Drafting Program: Common Core and provided articulation through a similar memorandum of understanding. That memorandum serves as a model for this draft.

Memorandum of Understanding
Architectural Design Drafting Technician Program
Province of British Columbia

The institutions that endorse this Memorandum of Understanding for the Architectural Design Drafting Technician Program hereby recognizes the following:

1. that the Architectural Design Drafting Technician Program provides a system-wide means of standardization that is controlled by participating institutions through the Provincial Drafting Technology Articulation Committee;
2. that the Architectural Design Drafting Technician Program, as outlined in Appendix B, is based on a set of competencies, which from time to time are revised by Canadian Technology Human Resources Board

3. that students who have completed the Provincial Drafting Technician Program: Common Core from a signatory institution have completed the drafting prerequisites for entry to the Architectural Design Drafting Technician Program; they may need to meet other requirements at your institution.
4. that the Architectural Design Drafting Technician Program represents a basis for a Provincial Standard for advanced drafting training; and
5. that all students who enter into the Architectural Design Drafting Technician Program will be advised of the existence and location of other advanced or specialty drafting technician programs, and whom they should contact to get more information about those other programs.

Program Details

Entrance Standards:
All students who apply for transfer between institutions must meet the academic entrance requirements of the institution to which they apply. However, all institutions will seek to realize equivalence in their entrance requirements for the Drafting Technician Program: Common Core.

Accessibility:
All students who transfer into an institution that offers an advanced/specialty drafting program, will be treated in the same manner regardless of where they completed the Drafting Technician Program: Common Core.

Liaison:
The signatories (or their designate) to this agreement will meet on a regular basis to ensure that this agreement remains relevant. The most appropriate avenue for ensuring that the Architectural Design Drafting Technician Program remains relevant is through participation in the Provincial Drafting Technology Articulation Committee meetings.

Duration of Agreement:
This agreement remains valid and in effect between all the signatories until or unless it is terminated by those signatories, in writing.

The Provincial Drafting Technology Articulation Committee hosts the web site for the Common Core as well as other committee related items. BC-DTAC has also provided web space for the development of this project, and will continue to provide space for the ongoing development of the ADD Technical program material.

Differences between this and existing programs

As indicated above, there are many areas where the CTHRB standards provide overlap amongst the various Technician and Technologist competencies. Where the standards highlight unique areas there are opportunities to provide specific learning outcomes. This report provides course names, sequencing and learning outcomes for the identified

opportunities in the Architectural Design Drafting specialty. There remain a number of courses that will be required to satisfy any institutions Curriculum Committee review for a Technician program.

To complete a full program offering, existing courses at an institution that already offers a Technician program can be used to fulfill the required competencies. For an institution that does not currently provide a Technician program, these courses would also need to be added to the calendar.

Adaptation of existing courses

There are a number of courses already used in the province that fulfill many criteria that overlaps with other Technician level programs.

For example:

From UCC these courses could be adapted to use in the program:

EDDT 120 – Building Services Technology
EDDT 125 – Electrical Design
EDDT 150 – Statics and Strength of Materials
EDDT 162 – Materials and Applications 1 – Specifications
EDDT 250 – Structural Analysis
EDDT 262 – Materials and Applications 2 – Estimating

Similarly from NIC:

DRT 140 – Material of Construction
DRT 120 – Topographical and Civil Drafting
DRT 160 – Practical Surveying

OR from UCFV

DRTE 4 - ARCH B
DRTE 5 – Strength of Material
DRTE 6 – Surveying

Many institutes already have courses in:

- Technical Communications courses that cover the office and business needs such as job applications, resumes, memos, meeting minutes, reports, letter of transmittal, request for information, etc.
- Basic math and physics

While this report does not provide the learning outcomes for these “overlap” courses, many exist and can serve as models for the development of courses. For example, English departments may already offer “technical communication” or “Technical Writing” courses for applied science and applied technology departments.

Many of the courses identified above as potential for this overlap area might well serve as models for other institutions. While not part of the memorandum of understanding, sharing of the course material for these overlap courses is complementary to the intent of the articulation agreement. Adoption of existing courses may provide the incentive for on-line presentation and evaluation of course material. Faculty at an institution currently offering an overlap course might be able to provide the presentation and course experience to a wider audience within the province without the expense of a local institution to develop, train and present additional courses other than the unique ones presented below.

The potential of "sharing the load" for development, presentation and maintenance of the complete course offerings should be explored in more detail. There is some expectation that on-line delivery and evaluation can reduce the total expenditures for developing and delivering a program like ADD Technician. However, the evaluation of this expense is outside the scope of this project, and is provided as a suggestion for further investigation.

Access existing online course "packages"

Professional bodies, such as the Project Management Institute (PMI), the American Society for Heating, Refrigerating and Air conditioning Engineers (ASHRAE), the American Design Drafting Association (ADDA), and others, provide on-line upgrade and training courses for members and practitioners. Many of the associations have access agreements for educational institutions use in the classroom. Where possible, access to the on-line courses, or at least the course material, should be encouraged.

The associations have a vested interest in maintaining a "best practices" approach in the course offerings, and also have the time, expertise and interest in keeping up to date in the techniques and material of the professions. Reduced costs for access from Colleges and University Colleges, or even in some cases, free access are available. Where offered on a province wide basis, there is additional barging power for access and development around these courses.

Similar on-line courses are available from the professional journals, such as Canadian Architect and Architectural Record. These courses are offered as part of the professional upgrade requirements of both Canadian and the US professional association. Where the governing bodies for these professions have found value in the upgrade requirements, we should also access these valuable resources. Not only will this keep the programs up to date with the technology, it established the importance of lifelong learning

Bridging and laddering

The Provincial Drafting program: Common Core, exists as a prerequisite for the proposed program. Where this has been implemented it provides a satisfactory entry point. This may be supplemented with other course requirements for each institution.

The completion of an equivalent to the Common Core, from high school or from work experience also serves as a logical entry to the program. This may also be ascertained from prior learning assessment (PLA).

The structure of the program should be such that completion of one year (a 9 or 10 month term) will prepare the student for entry level positions in the industry. In fact this is already the case for many of the existing programs. The structure also lends itself to a co-

operative learning environment with a work term scheduled between the “first” and “second” year courses.

Students who have completed the Common Core and other drafting certificate requirements would be able to join the “First” year term with PLA and advanced credit on some courses – this should be left up to each institution for implementation. In some cases students may be able to catch up on missed courses over the work term and join the “second” year courses with returning students. Implementation of this would remain at the discretion of each institution.

New Streams

Overview – 3 streams

The collection, analysis and preparation of this project generated three distinct streams of skill sets that have driven the development of the new courses. These streams can be identified as: ***Design support through presentations***; ***Design support through Design development***; ***Design tools support***.

Design Support through presentation

Supporting the design professional and clients by presenting, in an easily access format, the appropriate design choices, or level of development is a primary responsibility of the design draftsperson. This requires the efficient generation of appropriate graphic information. This might be in photographic quality renderings, animated "walkthroughs" or quick sketches, physical models or detailed technical drawings and graphs. The choice, production and display of the appropriate level of detail become the driving responsibility with the other "streams" supporting this process.

The imagery may require extensive examination of alternatives, and the analysis of many alternatives mechanical, support systems and construction processes. In this fashion Design Development supports the presentation of the alternatives, or the result of various compromises. In practice, the ADD Technician will need to generate all options and provide guidance on design decisions. If the "devil is in the details" then the ADD Technician will be very devilish indeed.

Design support through Design Development

Providing information and analysis in appropriate ways to allow detailed design decisions and examination of alternatives fro any design situation. Provides the data, decision process and documentation for design decisions and supports the presentation of these alternatives.

To effectively present alternatives, an understanding of the various systems, structural, mechanical, HVAC, electrical, etc. is required. In particular, depth of knowledge in any one, or all areas, is not required, however how they interrelate and operate is an overriding objective. The awareness of how the various systems interact and compete for resources in the design and construction process is

Design Tools support

The modern design office requires a very large component of digital systems. While the specification and appearance of the "computer boxes" might be similar, there are many different uses for these tools. Where the traditional design office used large amounts of paper, both for design development and finished drawings, they also used many other forms, reports, letters and tracking methods.

The modern equivalent also takes on many tasks and forms. From the daily e-mail, client tracking and contact reporting through the complete design process, computers are used in many ways. A de facto standard for office applications is the Microsoft Office suite. While not the only one extant, it is the one used as comparison for all other office tools.

Aside from the design application software, such as Autodesk AutoCAD, Architectural Studio, Architectural Desktop, Inventor or Bentley System's Microstation, , the use of digital imagery applications, from Adobe Photoshop, to Web publishing tools support the complete design office.

The intent of this stream is to allow provide in-house control, design and maintenance of the tools used in the office. A comparison to traditional design offices would be the drafter adjusting his/her own drafting table and machine. In today's use, the tool is more complex and not all support tasks are left to the end user.

In many offices, these tasks were described as the CAD Systems Manager.

Three main areas are considered for this support task: *computer hardware, operating systems and network components*; *design applications*; and *created tools* unique to the office.

Computer hardware, operating system and network issues involve the selection, installation and adaptation to the office environment, the security and operational settings, and regular maintenance activities. This includes the selection of Internet connection and managing any off-site servers.

While not intended as a computer systems course, knowledge here is to allow selection of options to maximize the effectiveness of the design office and it's unique requirements for computer performance. Anticipating the team approach to designing a new installation the ADD Technician would provide guidance and decisions on standards, specs and settings from the office viewpoint. For daily operations, the addition of new or replacement systems, upgrades and daily tasks would be the duties of the ADD Technician.

Design application support involves the installation, support, customization and maintenance of the various application tools used in the design office. Where the installation may be intense at the startup of an office, or change over on major upgrades, this area will be most involved in customizing the various applications for use in the design office. Each software suite has it's own methods for customization, however many common tools have evolved to allow migration of skills to other support areas. The use of Visual Basic for Applications (VBA) as a macro language for most Windows operating system applications allows direct customizing of each application. When used with Visual Basic (VB) as a general programming language, many cross platform tools can be created and adapted for use. With the large installed base of Autodesk software, the use of Visual LISP (V-LISP) is a key component to the adaptation of AutoCAD based products.

The role of the ADD Technician is to create, maintain and evolve these tools within the office.

Created tools support the unique applications needed within the office, and with clients, suppliers and contractors. These might provide connection between time sheet reporting to drawing database and client billing systems. Other examples would be to manage client and contractor web sites for progress tracking. In all cases these are unique situations that require knowledge of the office, office procedures and the design process with particular emphasis on the installed systems and tools used within the design office.

What makes it different than existing programs?

In house support of systems that support the design process

As the use of technology increases, and the desire to maintain near real time contact to changes, the role of maintaining the support systems is best served by someone who understands the needs and goals. With budget changes and multitasking work roles in-house design staff will need to understand and control more and more of the technology in-house and connected via internet.

Other institutions focus on the understanding and supervision of construction material and processes, such as the UCC and BCIT programs. Few others focus on the in-house tools to support the design process.

Support in the control and management of the design process office

Understanding the complete design process as a business model helps support the design office by managing the systems and information needed, at the appropriate time, to assist in efficiently completing design tasks. Using standards project management tools and techniques helps to define, track and report project tasks.

Must understand the construction process and materials, enough to understand appropriate design solutions.

Not attempting to create construction supervisors, but to obtain the overview of how the systems work together to work effectively. To evaluate various solutions and the overall effect of how they work together rather than looking at each system independently.

Shift to presentation of ideas, graphically and physically (illustrations, drawings, renderings and models as appropriate.)

We amass and evaluate information quickly using graphics and physical objects. Creating these efficiently can provide the overview and the detailed information to make decisions and to convey design solutions to all team members. Client and outside review are also enhanced when using different graphical tools.

The appropriate level of detail for each form of graphic presentation can now be combined into one design database. Choosing the type of graphic presentation is no longer based on how much time do you have to cerate it but rather what is appropriate to show for the intended purpose.

Must understand and use data, specs, codes and preliminary drawings from all sources, collect and manage all information.

Creation, management and reuse of underlying data are critical to support effective and efficient design.

New courses

Presentation Graphic Techniques

(PGT)

This course examines and develops the principles and techniques of the various forms and use of graphics information presentation used in Architectural design. Examines the appropriateness, audience expectation and level of detail required for each type. Traditional drawings in 2D and 3D and renderings are developed. Other forms of presentation include animation and physical models are also explored.

The intent is to provide tools to be used in future projects and thus this provides exploration in various styles and forms. Common project information is used to provide comparison between techniques.

The forms of graphics presentation include:

Conceptual design – Potential use, advertising potential, preliminary design approval and zoning requests. Realism requirements, audience expectations.

Site analysis - & **Design development** – massing studies, shadow analysis, view analysis, details, lighting studies, landscaping, alternative styles, renovations and reuse.

Design presentation – client presentation, public, juried selection process, in-house development, 2D, 3D, animation and models.

Working drawings – this is the focus of many other courses, and is only examined fro various styles of layout and organization.

Construction/ tender drawings

"As-built" records – measured sketches and drawings, variation analysis, code compliance.

Facility Management uses – HVAC control, lighting control, telephone and data, partition management, layouts and adaptation options.

Course Outline: Presentation Graphic Techniques

Students will create a variety of graphic formats used in the design professions. Sketching, field notes, design notes, graphical analysis, physical models, maps, charts, renderings and simple animations of sites and built forms. Emphasis is placed on techniques, variety of media and appropriate effort for intended goals of the presentation.

LEARNING OBJECTIVES/OUTCOMES

A student who successfully completes the course will have reliably demonstrated the ability to:

- Identify the purpose of a presentation
- Select an appropriate technique and media
- Decide on the level of detail required
- decide on the level of effort appropriate to the goal
- Depict numerical information graphically
- Create sketches, field notes and record preliminary analysis of a site
- Create physical “Massing” models
- Create site modles
- Create maps and charts depicting site information
- Create Public Information posters about design projects
- Create renderings
- Create simple animations

CONTENT

Content will include, but is not restricted to, the following:

- Overview/ review of the design process
  - Types of graphics used in the design process
- techiques used to create various graphics
  - Manual and Digital tools
  - sketching
  - reusing and adapting existing data
- Analysis of a presentation
  - Audience analysis
  - scope of knowledge
  - expectations
  - desired outcome
- Level of detail
  - shortcuts to achieve detail
- Physical models
- Digital models

    - 3D models
- Rendering
    - lights
    - material
    - production
    - compositing
- Animation
    - introduction
    - planning and analysis
    - storyboarding
    - cameras
    - lights
    - movement
    - materials
    - rendering
    - controling the animation
    - production

EMPLOYABILITY SKILLS

A student who successfully completes the course will have reliably demonstrated the following employability skills:

Creative thinking and problem solving skills:

- analysing requirements to determine outcomes
- managing project from conception to delivery of desired graphic product
- creating work breakdown tasks
- estimating time and resources available
- analysing audience requirements
- establishing desired outcomes for audience reaction
- planning complex production projects

Oral Skills:

- communicating with peers

Interpersonal skills:

- negotiating work tasks and completion dates with peers

Teamwork and leadership skills:

- working in teams to achieve production goals
- assigning tasks
- monitoring task completion

Personal management and entrepreneurial skills:

- managing personal time
- deciding on appropriate level of detail needed to achieve desired outcomes

Writing skills:

- creating appropriate naration/ commentary to accompany presentations

Visual literacy:

- creating sketches
- creating effective charts, maps, posters, renderings and animations

Mathematical skills:

- calcualtion of time, storage and production resoruces

Technological skills:

- using manual drawing techniques
- usign computer based modeling applications
- using computer imaging tools
- using computer animation tools
- using digital input tools
- using digital image manipulation applications

Citizenship and global perspective:

- deciding on appropriate outcomes of presentations
- observing the impact of presntation on decision making and influencing opinions
-

LEARNING ACTIVITIES

Activities may include, but are not restricted to, the following:

- on site visits, field trips
- observing and recording impressions of a site – sketching and digital photography
- attending lectures
- watching audio-visual material
- participating in class discussions
- researching topics and presenting reports
- performing on-line tutorials
- building physical models
- creating and manipulating images
- producing renderings
- producing multimedia presentations

Digital Design Systems

(DDS)

Skills and knowledge to design, create, manage and control computer systems and networks for the modern design office. Understand and design network components, including operating system selection, installation and operation to server design, control and security. Cross platform control and administrative tasks are created and managed.

Application installation, customization and backup are developed and managed.

Internet control and security issues are implemented with client and employee access and control for web sites, online published data and e-mail systems.

A key part of this course is the concept of a CAD System Manager – a draftsperson who also understands and implements the underlying technology. Typical responsibilities will include:

- Deciding on hardware and software for department and office
- Deciding on networking strategy
- Deciding on network security
- Implementation of hardware and software from servers to desktop, tablet PC and handheld devices
- Ongoing operational support for day-to-day activities, including daily administrative functions, backup and security.
- Development of administrative and operational support tools at the server, O/s, application and file level.
- Design, development and operation of online publishing, web site design and support.
- Client access to web site operation and security.
- Development of in-house application
- Design and development of application customization.

Course outline: Digital Design Systems

Students create support tools to adapt AutoCAD to match office standards and procedures. This will also include installation options and effects on performance of the computer, both hardware and software. Creating the office standards and implementing them using a variety of tools and techniques including customizing menus and programming using AutoLISP, Visual LISP and Visual BASIC fro Applications.

LEARNING OBJECTIVES/OUTCOMES

A student who successfully completes the course will have reliably demonstrated the ability to:

- analyse office requirements and create standards
- implement procedures for the standards

- implement software tools to utiliaze these standards
- Customize AutoCAD to match requirements
- Customize AutoCAD menus
- Cutomize AutoCAD procedures usign AutoLISP and Visual LISP
- Create Visual BASIC applications inside AutoCAD

CONTENT

Content will include, but is not restricted to, the following:

- Office Standards
  - naming
  - layers
  - plotting
  - blocks
- Security
- Disasters
  - planning
  - prevention
  - preparation
- Procedures other than drafting
  - template generation
  - blocks and details
  - filing and project coordination
  - backup and recovery
  - planning for disasters
  - archiving for future reuse
- Customizing tools to impliment standards
  - menu system
  - commands and macros
  - programming with AutoLISP
  - programming with Visual LISP
  - introduction to Visual BASIC for Applications
-

EMPLOYABILITY SKILLS

A student who successfully completes the course will have reliably demonstrated the following employability skills:

Creative thinking and problem solving skills:

- creating standards
- analysing and creating procedures to implement standards
- creating software tools to implement procedures
- understanding logic systems of programming

Oral Skills:

- asking questions to identify problems
- listing to understand potential solutions

Interpersonal skills:

- inquiring of others to understand their work methods

Teamwork and leadership skills:

- working with others in a team environment
-

Personal management and entrepreneurial skills:

- estimating time and resources
- planing time and resoruces to complete tasks

Writing skills:

- creating aoftware programes
- cereating user and tutorial documentation to support software tools

Reading skill:

- reading to understand technical documents
- reading programming manuals

Visual literacy:

-

Mathematical skills:

- calculating storage requirements
- estimating computer hardware requirements
- establishing benchmarks for testing
- interperting testing results
- stastical calculations

Intercultural skills:

-

Technological skills:

- use of computer hardware and software
- installation of computer hardware and software
- maintanence of computer hardware and software
- customization of computer hardware and software
- documenting changes to computer hardware and software
-

Citizenship and global perspective:

- understadning the effect of technology on the envirnment
- responsibe recycyling of computer components
- awareness of energy use and conservation

LEARNING ACTIVITIES

Activities may include, but are not restricted to, the following:

- attending lectures and taking notes
- particpating in projects
- following on-line tutorials
- researching technology applications

- researching and reporting on software tools and techniques
- participating in class discussions
- installation of computer hardware and software
- preformance testing and evaluation of computer confiurations
- particiapting in simulated proejct teams
- presentation of completed projects

Building System Integration

(BSI)

Building upon the existing standards and organizations that regulate building systems, you will learn how the systems integrate within the built environment for residential, multi-family residential, multi-story residential & commercial, commercial and industrial/ recreational uses.

Perform analysis and calculations for each system and evaluating how they work together you will make decisions to reach design goals for each building type. Integration of different specs, drawings and standards to the whole building is the key task. Learning how to manage and track changes and revisions is the primary goal of the course. Deciding on appropriate choices from a set of available solutions will guide you to understand the trade offs when integrating multi-discipline tasks.

Overview of each building system and typical analysis and calculation tasks are explored. Multiple solutions are possible and ranked with each system/ consultant. Impacts on other systems are analyzed to decide on an efficient solution.

Learning objectives/outcomes

A student who successfully completes the course will have reliably demonstrated the ability to:

- Analyse requirements for various building systems
- Calculate volumes and flow rates to meet requirements
- Select appropriate equipement to meet reqiurements
- Layout equipment and related system components
- Describe operation and performance of the equipement
- Identify interference of various building systems to each other and to the strucure
- Present each building system individualy and combined

CONTENT

Content will include, but is not restricted to, the following (adapted from ASHRAE learning Insititute course descriptions):

- **Introduction and Overview** - Central HVAC systems, system selection, major system types.
- **Basic Design Considerations** - Dimensions and units common to air- conditioning systems, the basics of energy balance, and how simple weather dependent loads are estimated.
- **Concepts of Environmental Comfort** - Physiological and heat transfer considerations for human comfort, descriptions of environmental indices, ASHRAE comfort envelope.
- **Environmental Health and Indoor Air Quality** - air borne pollutants and contaminants, their relation to human health, and the ways in which HVAC systems can be used to maintain and improve indoor air quality.
- **Primary System Components** - purpose, operation, and performance criteria of fuels, furnaces, refrigeration cycles, and cooling towers.
- **Secondary System Components** - purpose, operation, and performance criteria of coils, fans, pumps, filters, ducts, and vents.

- **Central Systems** - Major HVAC system types, applications of a basic central system, selection of system components, heat exchanges and cooling coils.
- **All Air Systems: Single-Path** - Introduction to all-air systems; single-duct, single zone, constant volume systems; single duct, zoned reheat, constant volume systems; single duct, variable air volume systems.
- **All Air Systems: Dual-Path** - Dual path, all-air systems; dual-duct system; three-duct multizone system; dual-duct, variable-air- volume system.
- **Air and Water and All-Water Systems** - Characteristics of air and water systems, air and water induction systems, air and water fan- coil systems, all water systems.
- **Heat Pumps, Unitary systems, and Room Air Conditioners** - Working principles of heat pumps; operation, applications, advantages, and disadvantages of unitary systems and room air conditioners.
- **Energy Conservation and Heat Recovery Programs** - Techniques for improving energy use, importance of energy conservation, description of heat recovery systems.
- **Thermal Storage Applications** - Thermal storage techniques, water tank systems, rock bed systems, ice harvesting systems, ice-on- coil systems, encapsulated ice and other phase change materials (PCMs).
- **System Controls** - Types of control action: two-position(on-off) control action; timed two-position control action; floating control action; proportional, proportional plus integral, and PID controls

For further descriptions, please see ASHRAE Learning Institute web site for course outlines (at http://xp20.ashrae.org/EDUC/college.htm) and more detailed course content.

EMPLOYABILITY SKILLS

A student who successfully completes the course will have reliably demonstrated the following employability skills:

Creative thinking and problem solving skills:

- understanding the requirements of procedures and tracking in the workplace
- applying established procedures to everyday activities in the workplace
- adapting established procedures to accommodate new activities in the workplace
- assimilating the differences between different professional practices
- adopting moral ethics to sustain professional practices

Oral Skills:

- Organizing ideas and communicating them oraly
- Presenting ideas clearly
- speaking in a professional manner

Interpersonal skills:

- respecting other peoples point of view
- listening to understand others point of view
- working with others effectivly

Teamwork and leadership skills:

- adhearing to established procedures
- participating in meetings in a professional manner
- participating in team projects

Personal management and entrepreneurial skills:

- managing personal time
- reporting accuratly
- setting goals and achieving them

Writing skills:

- creating formal reports
- creating formal presentations
- creating informal reports
- creating informal presentations
- creating minutes of meetings
- creating procedures
- Organizing and creating web sites

Reading skill:

- researching, retrieving and reviewing written material from a varity of sources including internet based sources.
- Identifying usefull information from vendors catalogs and web sites
- Interpret specifications and catalog information for performance criteria

Visual literacy:

- creating visual elements to support published reports, minutes and web pages

Mathematical skills:

- perfoming basic computations
- estimating time, space, size and resource requirements
- preparing data for statistical analysis
- verifying computations
- selecting appropriate solutions

Intercultural skills:

- respecting individual differences
- communication well with others

Technological skills:

- working with a varity of computer software applications
- working with internet and web communication systems
- identifying new and emerging technology as it applies to the building industry
-

Citizenship and global perspective:

- Promote the use of technology for the betterment of society
- applying the principles of sustainable development in professional practice
- Supporting competence, equality and diversity in the workplace

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LEARNING ACTIVITIES

Activities may include, but are not restricted to, the following:

- Attending lectures and taking notes
- establishing and maintianing a personl log/ day book
- participating in class discussions
- participating in team based projects

- participating in individual projects
- preforming on-line tutorials on various software applications
- attending and participating in group meetings
- recording minutes of group meetings
- researching and reporting on various topics
- Creating reports and presentations
- participating in office simulation
- following office procedures
- commenting on, and requesting changes to, office procedures

Project Management

(PM)

Understand the principles and practice of modern project management following the concepts in the Project Management Book of Knowledge (PMBOK ®) and the Project Management Institute.

Develop techniques using MS Project software; apply to construction and software development and implementation tasks.

Course outline: Project Management

Students will learn the theory of project management and then enhance these skills by analysing and managing a small project from concept to completion. These skills can be applied to the analysis, creation and management of small and medium scale projects. Using concepts from the *Guide to Project Management Body of Knowledge* (PMBOK), students will develop practical project management techniques and apply them using current software. Students will create CPM, PERT and Gantt charts as part of each project.

LEARNING OBJECTIVES/OUTCOMES

A student who successfully completes the course will have reliably demonstrated the ability to:

- Identify Project Life Cycle and project phases
- Define project scope
- Define activity
- Estimate activity duration
- Analyse activity sequencing
- Produce project schedules
- Estimate costs
- Track project
- Manage project changes

CONTENT

Content will include, but is not restricted to, the following:

- Introduction
  - definitions
  - Constraints
  - Time
  - People
- Projects
  - relationship between the project and the project manager
  - project planning and project scope

- Time Management
- Meetings
  - Types of meetings
  - Various roles in meetings
  - Managing effective meetings
- After the Plan, execution!
  - Initiating a project
  - progress – how to manage it
  - tracking projects
    - charts
    - software
    - reports
  - Estimate versus actual
  - You control the project, it does not control you!
  - Closing activities and projects
- Costs
  - Cost estimating
  - Cost tracking
  - Cost control
- People
  - Planning the organization
  - Team development
- Quality
  - Planning for quality
  - Quality assurance
  - Quality control
-

EMPLOYABILITY SKILLS

A student who successfully completes the course will have reliably demonstrated the following employability skills:

Creative thinking and problem solving skills:

- Analysing problems, developing of hierarchy of steps; developing a sequence of steps, planning implementation

Oral Skills:

- Organizing ideas and communicating them orally
- Observing, receiving and interpreting verbal and non-verbal messages

Interpersonal skills:

- working with others effectively
- Supervising of others
- working under supervision of peers

Teamwork and leadership skills:

- Participating as a member of a team

- Participating as a team leader
- communicating effectively with team members

Personal management and entrepreneurial skills:

- Managing time and resources to accomplish project tasks
- Displaying flexibility and understanding when dealing with others

Writing skills:

- Organizing and communicating ideas, procedures and requirements in formal and informal documents
- Writing reports and recommendations

Reading skill:

- Researching, understanding and interpreting written information for activity development, quality assurance and sequencing

Visual literacy:

- Organizing presenting and managing graphs, charts and timelines to provide immediate understanding of project status

Mathematical skills:

- Performing basic calculations relating to costs, time and running balance

Intercultural skills:

- respecting individuals and their contributions to teams

Technological skills:

- Working with manual and computer techniques
- Adapting computer software to project requirements
- Implementing various computer software tools and techniques

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LEARNING ACTIVITIES

Activities may include, but are not restricted to, the following:

- Attending lectures and taking notes
- Researching written material and summarising contents
- Following on-line tutorials
- Participating in class discussions
- participating in simulated project teams
- Working in a project team
- Presenting a completed project

LEARNING RESOURCES

Required Textbooks, Lab or Shop Manuals, Equipment, etc., such as:

A Guide to the Project Management Body of Knowledge (PMBoK) latest edition, Project Management Institute, Newtown Square, Pennsylvania (CD-ROM ISBN 1-880410-25-7)

Practical Project Management, Ghattas & McKee, Prentice-Hall

MS Project 2000 software, or equivalent

Personal e-mail address that is accessible both in and out of the Lab.

Digital Design Process

(DDP)

This course explains the process used in many offices to facilitate architectural design. This also examines the roles, phases and stages of design, and where different expectations take hold.

Typical office duties and procedures are also examined to develop the variety of reports, documents and responsibilities in the design office.

Legal and ethical responsibilities are highlighted to explain the liability associated with all design documents.

As an overview of the design process, this course also shows how all the remaining courses join together and detail all aspects of Digital Design practice.

Course outline: Digital Design process

Students will be introduced to the design process and the differences used within Engineering and Architectural offices. Students will experience the roles in the modern office, using various procedures; policies and practices used in engineering, architectural and design offices. Students will learn about legal aspects of documents, terminology, laws and copyright.

Drawings created within the office are just one type of document. Students will create many other documents used in the design practice: specifications, contracts, reports, “issued” vs. design documents, change orders, estimates, records, logs and tracking reports. Students will research various codes and standards used in the office.

Students will participate in different types of meetings and assume different roles to experience formal and informal meeting recording and reporting.

Students will examine and discuss professional ethics, professional practice and current office tools and procedures. Students will use of Office software (PRE REQ) to develop and maintain their own procedures for time management, data recording and communication, this includes the electronic communication of project material and web publishing for customer/ client information, project management, advertising/ PR, employee relations.

LEARNING OBJECTIVES/OUTCOMES

A student who successfully completes the course will have reliably demonstrated the ability to:

- Work within a variety of office procedures
- Track work flow and progress
- Estimate work completion
- Establish and maintain records
- read, understand and interpret established codes and standards
- Communicate with supervisors, peers and clients in a professional manner
- Create agenda, minutes and reports on meetings
- file and retrieve project material using established filing systems

- Produce project material in a timely and efficent manner
- understand copyright laws and apply them

CONTENT

Content will include, but is not restricted to, the following:

- Office Procedures
  - overview of offices
  - systems
  - reporting
- Design Process
  - team Work
  - Roles and responsibilities
  - the process:
    - Concept
    - Analysis
    - Design
    - Tendering
    - Construction
    - Substantial Completion
    - Occupancy
- Meetings
  - types of meetings
  - roles and responsibility
  - reporting and documenting meetings
- Laws and Codes
  - Professional conduct and ethics
  - Copyright
  - general business law
  - National Building codes
  - BC Building codes
  - local building codes
  - municpal bylaws
  - Zoning
  - legal documents and their implications
- Documents
  - reports
  - Specification
  - Client communication
  - Drawings and reports
  - document tracking
  - document management
- Personal Management
  - personal time management

    - Logs and daybooks, legal requirements
    - Educational planning
    - goal setting
    - Preformance reviews
- Records & Filling
- Time Management
    - Accountabiility
    - time tracking
    - reporting
- Job Hunting/ Interviewing
    - Portfolio
    - resumes
    - interviewing skills
- Life Long Learning
    - Goal setting
    - Professional associations
    - Journals, magazines and others resources
    - networking
    - Contuning Education planning

EMPLOYABILITY SKILLS

A student who successfully completes the course will have reliably demonstrated the following employability skills:

Creative thinking and problem solving skills:

- understanding the requirements of procedures and tracking in the workplace
- applying established procedures to everyday activities in the workplace
- adapting established procedures to accommodate new activities in the workplace
- assimilating the differences between different professional practices
- adopting moral ethics to sustain professional practices
-

Oral Skills:

- Organizing ideas and communicating them oraly
- Presenting ideas clearly
- speaking in a professional manner

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Teamwork and leadership skills:

- adhearing to established procedures
- participating in meetings in a professional manner

- participating in team projects

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- managing personal time
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- setting goals and achieving them

Writing skills:

- creating formal reports
- creating formal presentations
- creating informal reports
- creating informal presentations
- creating minutes of meetings
- creating procedures
- Organizing and creating web sites

Reading skill:

- researching, retrieving and reviewing written material from a varity of sources including internet based sources.

Visual literacy:

- creating visual elements to support published reports, minutes and web pages

Mathematical skills:

- perfoming basic computations
- estimating time, space, size and resource requirements
- preparing data for statistical analysis
- verifying

Intercultural skills:

- respecting individual differences
- communication well with others

Technological skills:

- working with a varity of computer software applications
- working with internet and web communication systems

Citizenship and global perspective:

- Promote the use of technology for the betterment of society
- applying the principles of sustainable development in professional practice
- Supporting competence, equality and diversity in the workplace

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LEARNING ACTIVITIES

Activities may include, but are not restricted to, the following:

- Attending lectures and taking notes
- establishing and maintianing a personl log/ day book
- participating in class discussions
- participating in team based projects
- participating in individual projects
- preforming on-line tutorials on various software applications
- attending and participating in group meetings

- recording minutes of group meetings
- researching and reporting on various topics
- Creating reports and presentations
- participating in office simulation
- following office procedures
- commenting on, and requesting changes to, office procedures

Course flow

The following diagrams show how the course structure can link together. The vertical line indicates the break between "first" and "Second" year. The arrows indicate the prerequisites, colours indicate various department responsibilities: gold - English/ Technical Writing, blue – math.

These examples use a general numbering scheme to indicate progress only; this does not imply a new, fixed numbering or naming convention. The size of the boxes does not imply similar course time or duration. Some courses, in particular the second year, will require the majority of a term's available class time.

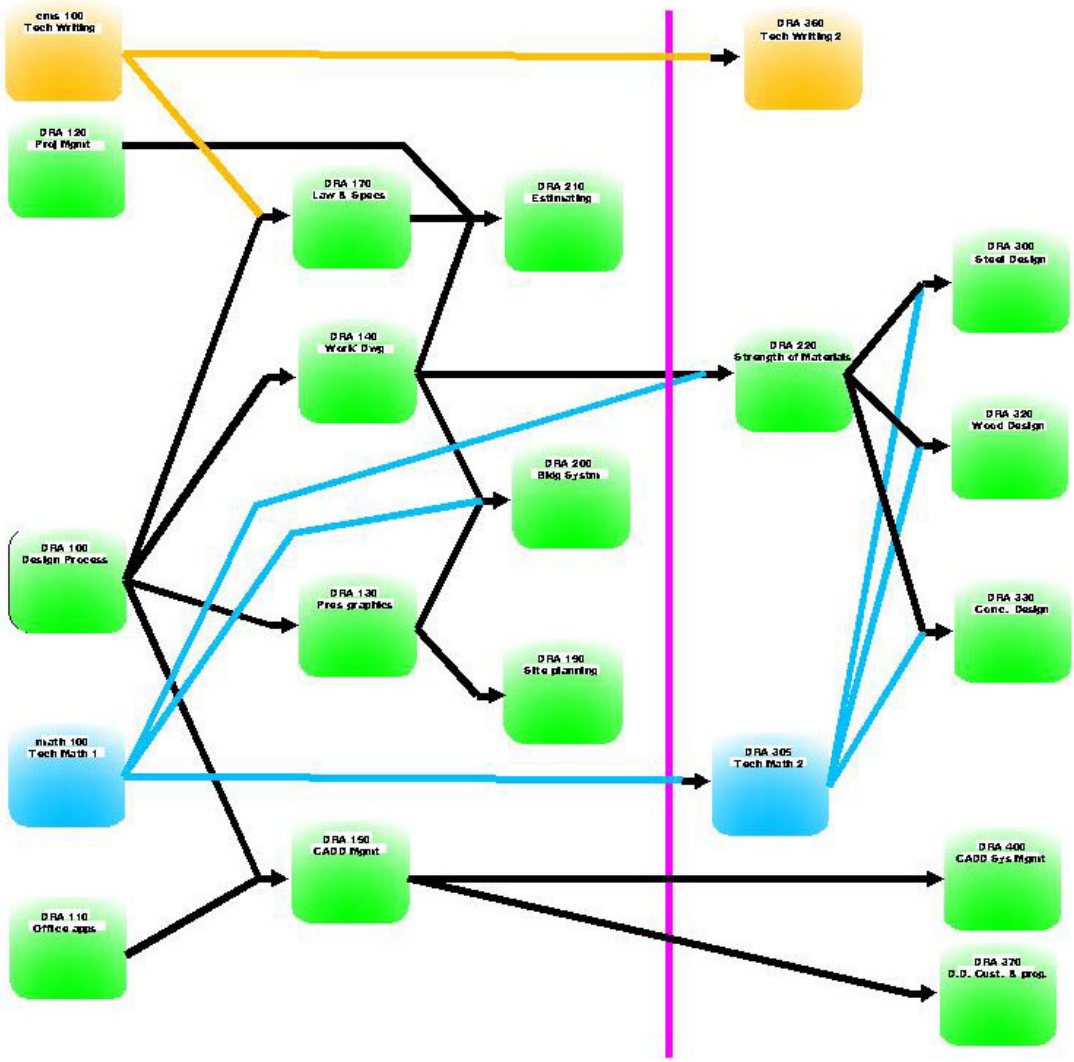


Figure 1: ADD T/T Course Flow

First Year

Entry to the First year is on completion of the Provincial Drafting Program Common Core, and any other drafting certificate requirements. These other requirements can also be met with PLA and advanced credit on some courses – this should be left up to each institution for implementation.

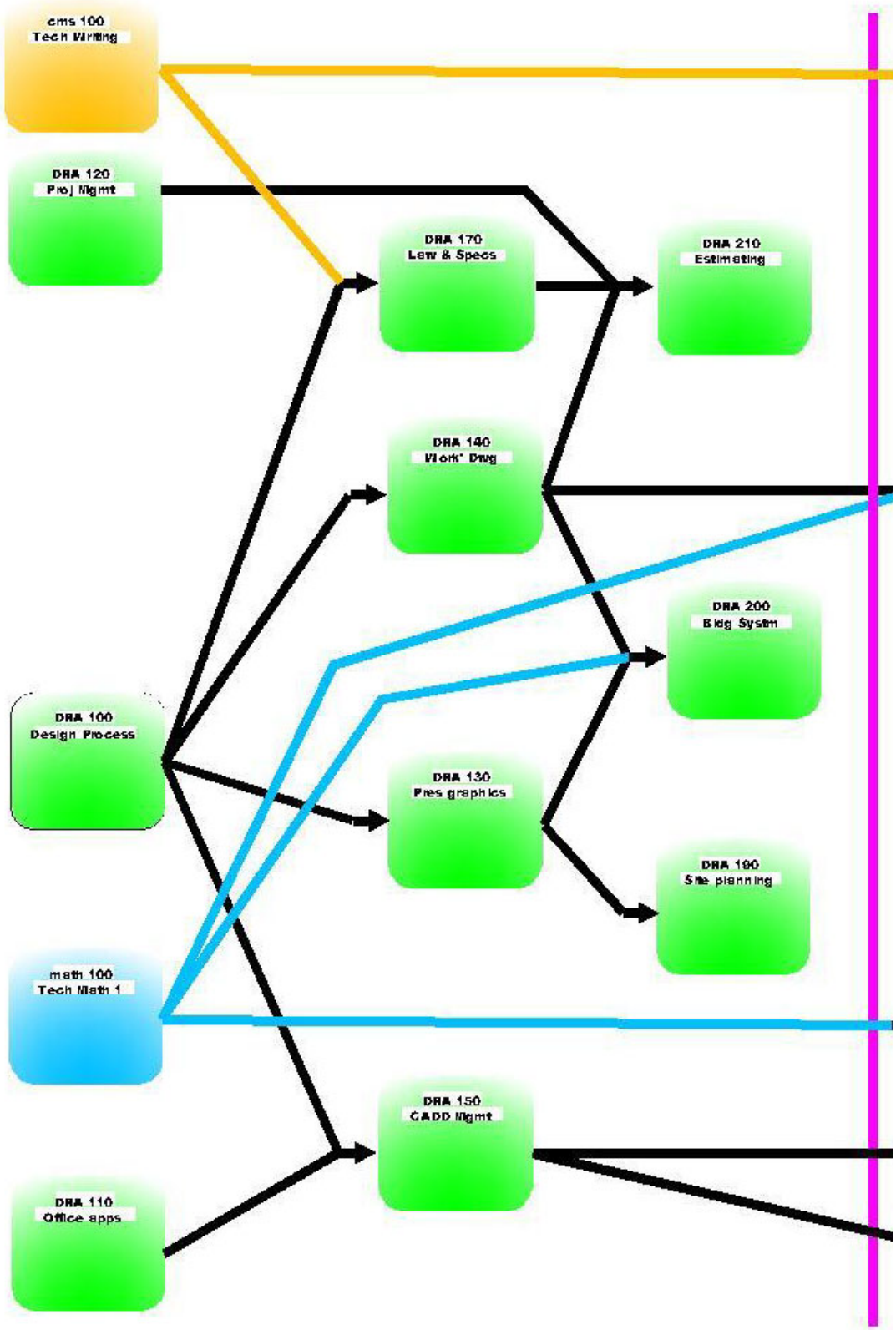
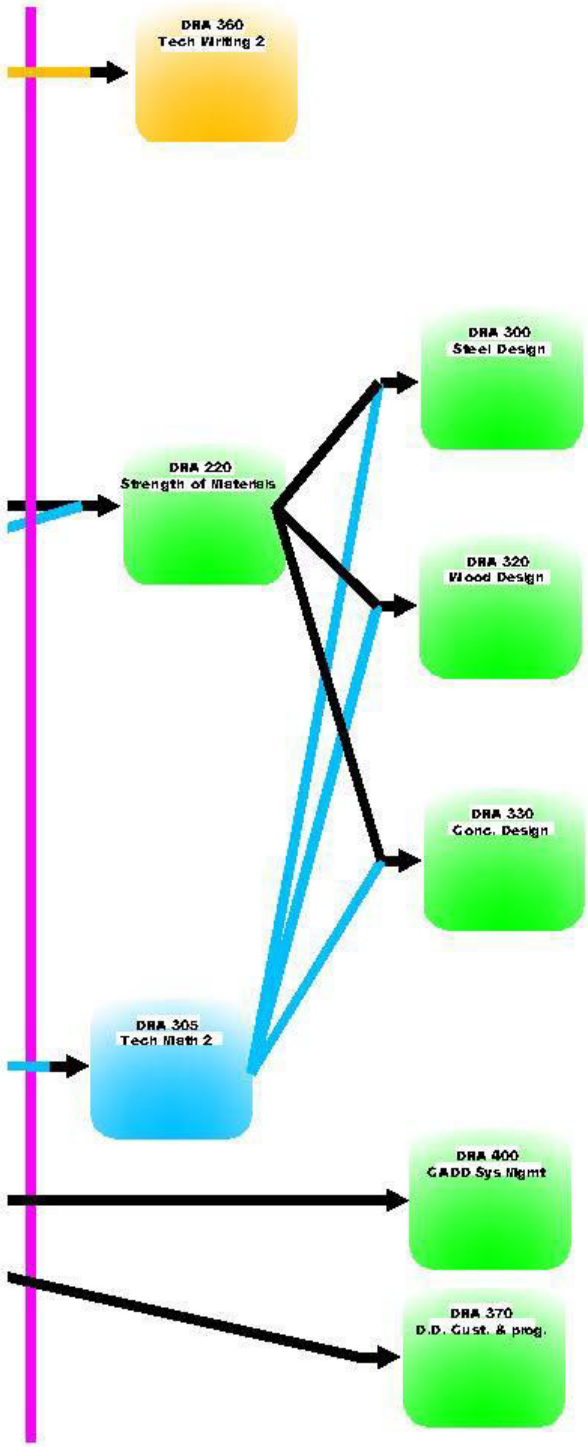


Figure 2: First Year course flow



Second Year

Entry to the second year is based on successful completion of the first year. Additional requirements may be made for co-operative experience between the first year and the second year. Equivalent credit for co-op. may be granted for prior work experience, at the institutions decision.

Figure 3: Second year course flow

Comparison to existing courses

To highlight the overlap and the unique courses in the ADD T/T program the course flow for the Building Construction Technician is provide as a comparison to the previous course diagrams.

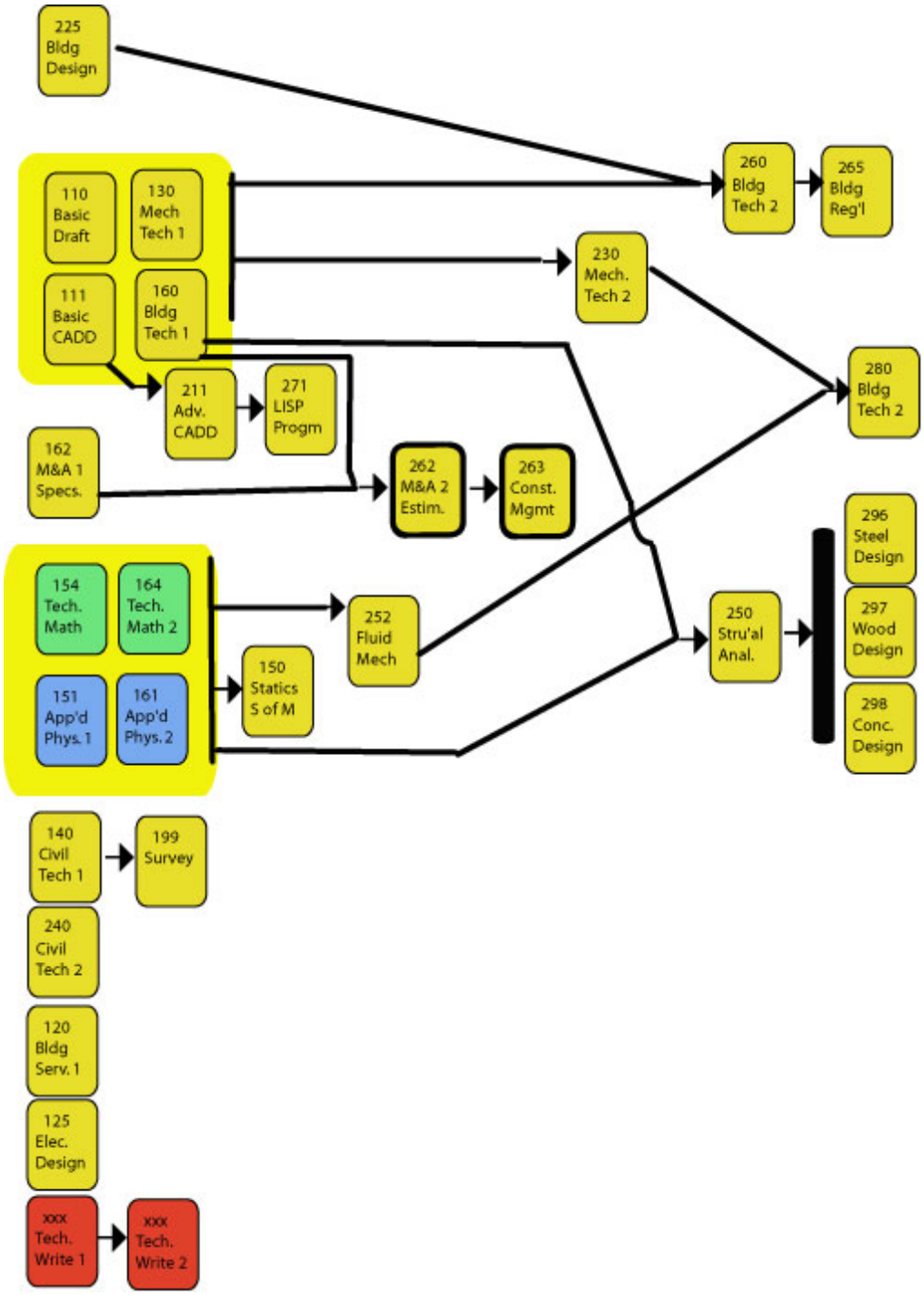


Figure 4: UCC Building Construction technician

Accomplished

The first accomplishment covered a status listing of courses in the province and was presented on the web site in March 2002. A printed version was sent in March 2002 as part of the first report on the project. The reorganization of the Ministry of Advanced Education and subsequent budget changes and challenges leaves the first report of this project dated and of historical interest only

The web site remains as a repository of the data, reports and material relevant to the project. This report and all supporting material will be available on the site for as long as the BC-DTAC wishes to support it. The web site continues as a valuable location to continue development of the courses, material and lead to the eventual on-line collection of teaching material, curriculum and instructor discussions. The discussion area, in particular, remains an underutilized resource to further the development of this project.

Of interest to many instructors is a discussion that started in UnFront eZine (a CAD industry on-line journal) on the relation between the adoption and use of CAD to the perceived quality of a drawing. Many comments and opinions are presented, reproduced on the web site by kind permission of Ralph Grabowski, publisher of UpFront. Some comments point out a lack of leadership of CAD instructors to present the issues of quality of a drawing, not just technical accuracy. How this might be accomplished, even if the exact nature of "quality" can be identified, remains unspoken. This may provide more food for thought at the provincial DTAC meetings. One comment is pertinent: "No, an inept drafter degrades drawing quality." (Teresa Easton, VCC) A feeling that seems to prevail amongst instructors, but we must ensure that we do not ignore the teaching of "quality" for the sake of using technology.

This report summarizes the analysis of the existing and proposed CTHRB technology standards with regard to the inclusion of course specific outcomes. The identification of some common courses for all technology programs has also highlighted the opportunities for new course streams. These have been presented for the Architectural Design Drafting Technician and Technologist areas. Further to this, some learning outcomes for these new streams have also been identified with a recommended course structure presented with sample course names. (No particular institutions naming/numbering system has been used; a general numbering system has been presented.)

To be done

This project provides a number of directions for future development of the Architectural Design Drafting Technician/ Technologist program. Aside from implementing the program, there are a few other opportunities for future investigation.

At each institution that signs the memorandum of understanding, a review of courses and consultation with each Program Advisory committee should be undertaken. Local implementation of courses should include local examples of construction and familiar buildings as examples of different building types.

Local adjustments of the course outlines and timing may be needed to accommodate the sharing and expansion of the "overlap" courses from other departments, for example the use of Technical Writing, or Technical communications.

Coordination of the development of course material would be desirable to ensure quick implementation by sharing the results of development. Provision of an on-line repository of course material with access to all signing members would facilitate this sharing and development. The existing web site can be expanded to this task.

What was not done

Development of on-line samples

Due to a change in pricing of on-line services and the access from various institutions, the development of the on-line samples was delayed and then dropped from the project. Of interest is a conversation on the usefulness of strictly on-line material to teach drafting. There is a concern that to teach the skills and techniques of drafting, a personal relationship is needed between the instructor and the student. The use of on-line material to supplement face-to-face instruction is recommended as the first step towards a strictly on-line course while allowing time to investigate the usefulness of fully on-line instruction. It was outside the scope of this project to investigate or justify the usefulness of this form of instruction.

The on-line samples were intended to compare the presentation and management of a short course segment in 2 or 3 different presentation systems. The short list of systems came down to:

A) Straight HTML coding, or simple, low cost HTML tools (such as Front Page)
B) Web publishing tools
C) Course management systems, such as WebCT, or FirstClass.

Upon further investigation, the comparison of these divergent systems became meaningless. Where the course management tools provided a lot of assistance in the tracking of students, the development of course material and in particular the graphics required for drafting instruction was no different than those of the straight HTML coding tools. It was further discovered that the existing course management tools do not interface with the various institutions administrative systems, which would result in a duplication of student tracking requirements. At this point interest in the on-line components fell off dramatically. The intention of these systems was to reduce the administrative requirements, not to increase it.

On further investigation at Kwantlen, the in-house tools developed to assist in on-line delivery, the AOR system based upon Lotus Notes, was also found to not interface with the student record systems for the Drafting department. Investigating, analysis and recommendations on these issues are outside the scope of this report.

Change in participation

At the inception of this project, it was intended that BCIT and Kwantlen take a leadership role in the project. Shortly after the project started there were many changes initiated by the change in government and the subsequent budget directions to all Ministries. The

budget challenges to each institution directed their energies to these challenges and away from participation in the discussions of the project.

One result of these changes was the direction given to the BCIT members to restrict participation in this project to that of observers. With the resulting change in direction, BCIT has pursued the development of the Applied Bachelor Degree in Architecture in conjunction with UBC. The Kwantlen members have continued to lead the project alone.

Observations

Over the duration of this project we have seen a number of changes to the tools used in the everyday drafting office. Further changes are occurring to the tools used in learning and training as new versions of software are released, faster computers are added to the networks, and better interconnectivity is achieved between class rooms. Even with the basic tool for drafting, AutoCAD, there have been 2 major releases of the software over the time of this project. This is a time of change, and like it or not, there will continue to be rapid change in the drafting industry. This implies a large challenge to keep up with the changes and the implications to the way we provide instruction.

Further to the challenges we face, there are now more budget imposed restraints to the freedoms we once enjoyed to keep up with the changes. The largest challenge facing us is how to reach as many students, with the most up to date material in the least costly way. The promise of technology to address these challenges is not hollow, but does not ring as clear as it once did. Economic changes, the implosion of the "dot-com" stock market for one, have caused many of the public to pause and ask if this technological promise is worthwhile to pursue. There appears to be a greater reluctance to upgrade hardware, software, networks and all the support tools on the regular basis we saw in the past decade. This reluctance is not only found in the industries we support, but also within the institutions themselves. Where we once "kept up" as a matter of course, we must now plan, decide and compromise our adoption of technology to stay within new limits of growth.

On-line philosophy changes

Telephone discussions with various instructors have brought out some more questions of how on-line tools would help in the drafting classroom. Where there once was an anticipation of the best tool that would answer our needs we now find a questioning of the appropriate application of on-line tools to support the drafting classroom.

Thought has been given to how on-line training might work with the hand's on observation and guidance needed for drafting education. I for one, am not convinced that a complete drafting program can be taught on-line only. There is still a requirement for mentorship and personal instruction to show techniques and methods. On-line support and collection of curriculum, sharing of electronic versions of the material along with 3Dimensional presentations of the results are great advances to increase the pace of learning. Reducing the time spent in acquiring the skills allows more time to be spent in acquiring the knowledge needed to apply the skills. The intent of these programs is to provide knowledgeable drafters in specific fields, not just fast "cad jockeys."

The rapid changes in technology are also affecting the on-line tools. There may well be a "killer app" just around the corner that will address all the concerns that drafting instructors shave at this time. Many of the components are there, but we should all agree on how to best use the tools that we have available now, and not wait for the magical solution. Further discussion is needed to clarify our expectations for on-line tools.

Recommendations

The following recommendations are provided for further development towards the implementation of the Architectural Design Drafting Technician and Technologists program.

Development of the courses to implement the program is the most obvious recommendation, and to not disappoint the reader, it is the first recommendation listed. However other factors are important to not only develop, but to also implement within the province this program. To this end other recommendations are provided as guidance to establish further alliances within the province that will assist this program.

Development of courses

The work to date has identified many aspects of the ADD T/T program that can be shared with other Technician and technologists programs. These courses to some extent exist within the PSE sector. The unique courses identified in this report need to be fully developed with expanded learning outcomes, establish further class breakdowns and streaming. Curriculum development for these will be needed to establish the material base for the courses.

Licensing or adapting outside courses is an additional method of developing the required courses. The Project Management Institute has established on-line courses to upgrading their members. This material could be licensed and adapted as the core of the Project Management course. Online material from ASHRAE can also be purchased and licensed as part of the Building Services Integration course. This could form the core of the major services with less additional material needing to be developed.

By licensing this material, more time and funds can be focused on the unique courses for Presentation and Computer Systems.

Existing courses that are provided at one or two institutions might be shared amongst the rest of the signing institutions, thus removing the need to re-invent the wheel.

Shared “team” teaching of courses

With the advent of the Provincial Learning Network (PLN) and the success of other projects in the province, for example the e-merge project, the potential of having shared instruction across the province may reduce the time and expense of implementing this program. A good candidate for a pilot study is the existing Lighting course at UCC (EDDT 182) using the Illuminating Engineering Society design calculations.

As curriculum is developed, the potential for online delivery is criteria that should be kept at the forefront of the design of the material. The collection in electronic form, and the central storage and access of the material for province wide access is paramount to the success of the program.

Align with design schools

In the past there has been a focus on direct employment and an alliance with employer groups. A concerted effort should be made to ally with the various design schools to reduce the misinformation and concerns about Technicians involved with the design process. There does exist a mystic about the design professions that only those who have

been though the proper schooling can effectively design. The intent of this program is to provide technicians who can support the design process by understanding the process and the needs and goals of the designers. Removing the suspicion of attempting to "techy" the design profession will go a long way to gaining valuable supporters, and lead to future employment for our graduates.

Re-examine usefulness of outside review/ accreditation

There has been some (internal) discussion on the usefulness of the outside accreditation in this area. In the technology sector many of the "accreditation" standards and groups are a branch of one company and exist to "certify" technicians on their products only. Existing groups that have set up whole industries around this process include for-profit training companies, certification boards and testing groups. Examples are the Novell, Oracle and Microsoft companies who have established various levels of certification of use of their products.

Many of the products are complex and require many years of study and use to master. I do not question the usefulness of the certification, however this has created confusion with employers as to who provides certification and what it means. Many employers use outside certificates as a threshold for employment consideration; if you do not have this piece of paper, don't bother to apply. A lot of the marketing effort on the part of the vendors is spent on brand awareness of their own certification process.

Many employers do not know about CTHRB, CTAB or provincial standards in these technician areas. Awareness of standards, understanding their usefulness and applicability to current company challenges is far beyond the scope of this project.

It does remain a concern that there is little credit given to many of the competing certification bodies that might be available to this program. If BC-DTAC were to move toward the professional level an ally with AICB/RAIC (Architectural Design profession) and FIDER/ NCIDQ (for the Interior Design profession) this may alienate alliances with ASTTBC. On the other hand, alliance with ASTTBC/CTHRB/CTAB would preclude a closer tie with AIBC et al. Examination of the relationships and history between these groups is also outside this project, however awareness of these issues may guide a review of possible accreditation of the program.

An option remains of deferring any action on outside accreditation until there is a clearer direction for the industry as a whole in the province.

Review with employer's focus group

Technology changes over time. We have seen an increase in the rate of change over the last decade. This does impact on the amount of material that must be covered in that not only must we cover the understanding of what needs to be done, we must also show how it changes for the better as technology allows us to do more. Within the Architectural design areas there is now much more technological "horsepower" available on the desktop, or handheld computer than ever before. Techniques that were only dreamed about in 3D modeling and rendering a decade ago are now commonplace and expected by the public. Providing the knowledge of what to draw (design, place, select etc.) becomes more important to effective design support because the temptation to use the ability of the tools at hand to mask a lack of decisions. We need to provide decision makers and not

cad jockeys. To best understand the decisions that ADD Technicians can make we need to work with the employers groups, or create them, to educate potential employers of the abilities of these technicians. Feedback to the development of curriculum will benefit the program. Ongoing efforts to market the skills and capabilities of ADD technicians and technologist will be required.