COLLIN COLLEGE

Program: Construction Management

Program CIP: 52.2001

Effective Term: Spring 2018

Rationale:

Home and commercial building is up significantly; however, there is a critical shortage of workers, according to industry officials. Although the labor shortage is nationwide, the Dallas / Fort Worth area has been hit even harder.

New Program: Construction Management

AAS - Construction Management

OSA - Construction Management

Certificate Level 1 - Residential or Commercial Construction Management

Certificate Level 2 - Construction Manager

New Courses: ARCE 1342, CNBT 1300, CNBT 1301, CNBT 1302, CNBT 1311, CNBT 1315, CNBT 1346, CNBT 1359, CNBT 1380, CNBT 2304, CNBT 2310, CNBT 2337, CNBT 2340, CNBT 2342, CNBT 2344, CNBT 2346, OSHT 1305

Authorized Signature (Proposer) 2nd Signature (if applicable) 3rd Signature (if applicable)

☐ CAB Recommended

☐ CAB Not Recommended (Give Explanation Below)

Comments:

CAB Chair

☐ Administrative Approved

☐ Administrative Not Approved (Give Explanation Below)

Comments:

Designated Academic Officer Signature

Collin College
Curriculum Outline

Architecture and Construction Career Cluster
Construction Management

AAS - Construction Management CIP 52.2001

First Year

First Semester			Lec	Lab	Ext	Cont	Hours
CNBT	1301	Introduction to the Construction Industry	3	0	0	48	3
CNBT	1311	Construction Methods and Materials I	2	2	0	64	3
ECON	*1301*	*Introduction to Economics (see Social / Behavioral Sciences options)*	3	0	0	48	3
MATH	*1324*	*Mathematics for Business and Social Sciences (see Mathematics options)*	3	1	0	64	3
OSHT	1305	OSHA Regulations - Construction Industry	2	2	0	64	3
		Total Hours	13	5	0	288	15

Second Semester			Lec	Lab	Ext	Cont	Hours
CNBT	2304	Construction Methods and Materials II	2	2	0	64	3
CNBT	2342	Construction Management I	3	0	0	48	3
ENGL	*1301*	*Composition I*	3	0	0	48	3
HUMA	*1301*	*Introduction to Humanities I (see Humantities / Fine Arts options)*	3	0	0	48	3
CNBT	1300	Residential and Light Commercial Blueprint Reading	2	2	0	64	3
Or							
CNBT	2310	Commercial/Industrial Blueprint Reading	2	2	0	64	3
		Total Hours	13	4	0	272	15

Summer Semester			Lec	Lab	Ext	Cont	Hours
CNBT	1380	Cooperative Education - Construction Engineering Technology/Technician	1	0	19	320	3
		Total Hours	1	0	19	320	3

Second Year

First Semester			Lec	Lab	Ext	Cont	Hours
CNBT	1315	Field Engineering I	2	2	0	64	3
CNBT	1346	Construction Estimating I	3	0	0	48	3
CNBT	2344	Construction Management II	3	0	0	48	3
SPCH	1321	Business and Professional Communication (see Speech options)	3	0	0	48	3
CNBT	1302	Mechanical, Plumbing & Electrical Systems in Construction I (Residential)	2	2	0	64	3
Or							
CNBT	2340	Mechanical, Plumbing & Electrical Systems in Construction II (Commercial)	2	2	0	64	3
		Total Hours	13	4	0	272	15

Second Semester			Lec	Lab	Ext	Cont	Hours
ARCE	1342	Codes, Specifications and Contract Documents	3	0	0	48	3
CNBT	1359	Project Scheduling	2	2	0	64	3
CNBT	2337	Construction Estimating II	2	2	0	64	3
CNBT	2346	Construction Management III (Capstone)	3	0	0	48	3
		Total Hours	10	4	0	224	12
		GRAND TOTAL				***1376***	***60***

Collin College
Curriculum Outline

Architecture and Construction Career Cluster
Construction Management

OSA - Construction Management CIP 52.2001

CNBT	1301	Introduction to the Construction Industry	3	0	0	48	3
CNBT	1311	Construction Methods and Materials I	2	2	0	64	3
CNBT	2342	Construction Management I	3	0	0	48	3
OSHT	1305	OSHA Regulations - Construction Industry	2	2	0	64	3
		Total Hours	10	4	0	224	12
		GRAND TOTAL				***224***	***12***

Collin College
Curriculum Outline

Architecture and Construction Career Cluster
Construction Management

Certificate Level 1 - Residential or Commercial Construction Management CIP 52.2001

First Semester			Lec	Lab	Ext	Cont	Hours
CNBT	1301	Introduction to the Construction Industry	3	0	0	48	3
CNBT	1311	Construction Methods and Materials I	2	2	0	64	3
CNBT	2342	Construction Management I	3	0	0	48	3
OSHT	1305	OSHA Regulations - Construction Industry	2	2	0	64	3
CNBT	1300	Residential and Light Commercial Blueprint Reading	2	2	0	64	3
Or							
CNBT	2310	Commercial/Industrial Blueprint Reading	2	2	0	64	3
		Total Hours	12	6	0	288	15

Second Semester			Lec	Lab	Ext	Cont	Hours
ARCE	1342	Codes, Specifications and Contract Documents	3	0	0	48	3
CNBT	1346	Construction Estimating I	3	0	0	48	3
CNBT	1359	Project Scheduling	2	2	0	64	3
CNBT	1380	Cooperative Education - Construction Engineering Technology/Technician (Capstone)	1	0	19	320	3
CNBT	1302	Mechanical, Plumbing & Electrical Systems in Construction I (Residential)	2	2	0	64	3
Or							
CNBT	2340	Mechanical, Plumbing & Electrical Systems in Construction II (Commercial)	2	2	0	64	3
		Total Hours	11	4	19	544	15
		GRAND TOTAL				***832***	***30***

Collin College
Curriculum Outline

Architecture and Construction Career Cluster
Construction Management

Certificate Level 2 - Construction Manager CIP 52.2001

First Year

First Semester			Lec	Lab	Ext	Cont	Hours
CNBT	1301	Introduction to the Construction Industry	3	0	0	48	3
CNBT	1311	Construction Methods and Materials I	2	2	0	64	3
OSHT	1305	OSHA Regulations - Construction Industry	2	2	0	64	3
		Total Hours	7	4	0	176	9

Second Semester			Lec	Lab	Ext	Cont	Hours
CNBT	2304	Construction Methods and Materials II	2	2	0	64	3
CNBT	2342	Construction Management I	3	0	0	48	3
CNBT	1300	Residential and Light Commercial Blueprint Reading	2	2	0	64	3
Or							
CNBT	2310	Commercial/Industrial Blueprint Reading	2	2	0	64	3
		Total Hours	7	4	0	176	9

Summer Semester			Lec	Lab	Ext	Cont	Hours
CNBT	1380	Cooperative Education - Construction Engineering Technology/Technician	1	0	19	320	3
		Total Hours	1	0	19	320	3

Second Year

First Semester			Lec	Lab	Ext	Cont	Hours
CNBT	1315	Field Engineering I	2	2	0	64	3
CNBT	1346	Construction Estimating I	3	0	0	48	3
CNBT	2344	Construction Management II	3	0	0	48	3
CNBT	1302	Mechanical, Plumbing & Electrical Systems in Construction I (Residential)	2	2	0	64	3
Or							
CNBT	2340	Mechanical, Plumbing & Electrical Systems in Construction II (Commercial)	2	2	0	64	3
		Total Hours	10	4	0	224	12

Second Semester			Lec	Lab	Ext	Cont	Hours
ARCE	1342	Codes, Specifications and Contract Documents	3	0	0	48	3
CNBT	1359	Project Scheduling	2	2	0	64	3
CNBT	2337	Construction Estimating II	2	2	0	64	3
CNBT	2346	Construction Management III (Capstone)	3	0	0	48	3
		Total Hours	10	4	0	224	12
		GRAND TOTAL				***1120***	***45***

Program Outcomes
and
Course Alignment

Program Name: Construction Management

Program Contact: Mike Coffman

Program Mission: To prepare students for entry-level positions in construction management

Program Outcomes ▼

Program Learning Outcomes	Measure	Standard	Course(s) where outcome will be measured
1. Demonstrate knowledge of the construction industry to include safety; construction methods and materials; building codes, specifications and contract documents, project scheduling and basic cost estimating.	Passing end-of-course examinations with a minimum standard of 70%		OSHT 1305 CNBT 1301 CNBT 1311 CNBT 2304 CNBT 1346 CNBT 2337 CNBT 1359 ARCE 1342
2. Demonstrate ability to understand basic principles of MEP systems and utilize tools and technology appropriate to the construction industry.	Passing end-of-course examinations with a minimum standard of 70%		CNBT 1300 CNBT 2310 CNBT 1315 CNBT 1359 CNBT 2440 or CNBT 2440
3. Demonstrate construction management skills to include understanding the different methods of project delivery and the roles and responsibilities of all constituents involved; analyzing construction document for planning and management of construction processes, and the application of written and oral communications, leadership and motivation, problem solving and ethical decision making in construction management.	Passing end-of-course examinations with a minimum standard of 70%		CNBT 2342 CNBT 2344

Program Outcomes
and
Course Alignment

4. Demonstrate ability to apply math, science, and communications techniques to support planning, analyzing, and problem solving in the construction industry in both oral and written form.	Completion of capstone project determined to meet minimum standards as reviewed by business and industry leaders		CNBT 2346

Construction Management Program Map ▼

Program Courses	Program Outcome 1	Program Outcome 2	Program Outcome 3	Program Outcome 4
ARCE 1342	I,E,A			I, E, A
CNBT 1300 OR CNBT 2310		I,E,P,A		
CNBT 1301	I,E,A			I
CNBT 1302 OR CNBT 2340	I,E,A			
CNBT 1311	I,E,A			
CNBT 1315		I,E,P,A		
CNBT 1346		I,E,P,A		
CNBT 1359		I,E,P,A		
CNBT 1380	I,E,P,A	I,E,P,A	I,E,P,A	I,E,P,A
CNBT 2304	I,E,A			
CNBT 2337		I,E,P,A		E
CNBT 2342	I,E,A	I,E,P,A	I	I
CNBT 2344	I,E,A	I,E,P,A	E	E
CNBT 2346	I,E,P,A	I,E,P,A	I,E,P,A	I,E,P,A
ECON 1301	I,E,A			

Program Outcomes
and
Course Alignment

ENGL 1301			I,E,P,A	
HUMA 1301	I,E,A			
MATH 1324	I,E,A	I,E,P,A		
OSHT 1305	I,E,A			E
SPCH 1321			I,E,P,A	

I=Introduced P=Practiced E=Emphasized A=Assessed

Workforce Demand for a Program in Construction Management at Collin College

Background and Program Need

Headlines read:

> "Construction of homes and commercial buildings is up significantly this year but the industry would be sizzling if not for a critical shortage of workers, industry officials say. The labor crunch is delaying projects, raising home prices and forcing companies to turn down work, which in turn curtails building activity and economic growth." (Davidson, Paul, USA Today online, updated 10:53 a.m. ET Aug. 27, 2015) While the labor shortage is nationwide, it is hitting the Dallas, Fort Worth Metroplex even harder according to news reports.

The front page of the business section of the Dallas Morning News on Sunday, March 12, 2017, reads "A Small Army: Crews of thousands work on huge Toyota HQ amid labor shortage," (pg. 1D) At the time, the Toyota project reportedly had as many as 2,000 workers on the job site on a daily basis. The labor demands of a project of this scope has far-reaching effects and which included the creation of extreme shortages of residential construction workers.

Additional headlines read:

> "Labor shortages are hammering Dallas housing with higher prices" https://www.dallasnews.com/business/real-estate/2017/04/17/labor-shortages-hammering-dallas-housing-higher -prices-build-times
>
> "Construction Labor Shortages Are Taking a Toll on Texas," https://www.bisnow.com/houston/news/construction-development/construction-labor-shortages-are-taking-a-toll-on-texas-64849
>
> "Skilled Labor Shortage a Strain on Dallas-Fort Worth Construction Boom," http://www.constructiondive.com/news/skilled-labor-shortage-a-strain-on-dallas-fort-worth-construction-boom/434129/
>
> "One reason for Dallas' soaring home prices and labor shortage: immigrants aren't coming to work," https://www.dallasnews.com/business/business/2017/04/21/one-reason-dallas-soaring-home-prices-labor-shortage-immigrants-coming-time.

FMI is the leading management consulting and investment banking firm dedicated exclusively to engineering and construction, infrastructure and the built environment. According to Scott Winstead, President of Consulting at FMI:

> "We're in a perfect storm right now where there are abundant opportunities in the marketplace but not enough labor to do the work. This is further compounded for those firms that are simultaneously transition in ownership and management to the next generation. It sounds simple in retrospect, but the firms that remained committed to investing in people and perpetual succession management through the downturn are much better-positioned than those that didn't." (U.S. Markets Construction Overview 2017, p. 2)

According to Sal DiFonzo, Managing Director FMI Compensation, "… Nearly all of our clients are reporting increased business backlogs—they have more business than they even know what to do with—and their greatest challenge is the inability to procure labor to handle those projects." (U.S. Markets Construction Overview 2017, p. 6.)

Labor shortages have also had a significant impact on construction wages. According to Laila Assanie, a business economist with the Federal Reserve Bank in Dallas, "inflation adjusted average wages for Texas' construction sector climbed 20.2 percent in 2016 compared with 2011 – roughly four times the 4.7 percent increase in average wages for the U.S. construction sector." (Dallas Morning News, Real Estate, March 12, 2017, p. 7D)

Collin College Master Plan

In the year prior to these headlines, Collin College conducted a comprehensive master planning process. According to findings, employers in the region were seeking greater access to, and involvement with local colleges in an effort to find employees with the skill sets needed for their labor market. FutureWorks, LLC prepared the labor market analysis for the master plan in consultation with PBK Architects. FutureWorks used the following as a basis of their labor market demand analysis:

1. North Central Texas Council of Governments Comprehensive Economic Development Strategy, 2015.
2. Targeted Industry and Occupations List, Workforce Solutions for North Central Texas, October 1, 2015.
3. Texas Industry Concentrations: Where the State's Key Sectors Cluster, Office of the Governor, Economic Development and Tourism, 2012.

Construction was among the areas of greatest opportunity for the college with generalists in construction being in highest demand, followed by electricians. According to the master plan, the stability and possible growth of jobs in the region will likely persist as the industry's outlook is driven by the region's explosive population growth in the foreseeable future. (Collin College Long Range Master Plan, April 2016, Section 5, p. 5)

FutureWorks also found that,

> "There are very few construction related sub-baccalaureate credentials produced by area postsecondary institutions, in part because the industry requires licenses and certifications that are often delivered outside of the academic institutional setting…. Enrollment and completion scenarios show that Collin College could create a significant construction program over a ten year period. Given the absence of comparable programs in neighboring community colleges, this may be a significant opportunity for the College to build enrollments quickly…. Moreover, these programs tend to have high completion rates. The College could also build programs around project management and construction supervision and related fields such as building and environmental systems management." (Collin College Long Range Master Plan, April 2016, Section 5, p. 5)

Construction Technology Think Tank

Set against a backdrop of these headlines and with direction provided by the master plan Collin County took steps to engage business and industry leaders from all segments of the construction industry. On March 30th 2017, a Construction Think Tank was held with 28 attendees representing 12 general contractors, 5 subcontractors, 4 home builders and 2 professional organizations. Six additional companies and the Construction Education Foundation have provided input through Survey Monkey and/or face to face meetings. In an effort to align high school career and technology programs with certificate and AAS degree programs at Collin, representatives from Allen, Frisco, McKinney and Plano ISD's attended to listen to the think tank discussion

Industry representatives confirmed the critical nature of the labor market shortage in North Texas and indicated that job growth is expected to continue for many years. Adding to this is the fact that many retirements are expected in the next few years. According to a source at the Construction Education Foundation, 44% of the skilled workforce in construction will not be here in 10 years and according to the Bureau of Labor Statistics, 20% will be gone in the next 4 years. The average age in some trades is in the 50's according to think tank participants.

Documentation of Workforce Demand

The construction think tank participants were seated in at tables of 4-6 industry representatives with a facilitator and scribe from Collin College. Facilitators guided their small group through a questionnaire/survey (questionnaire and summary attached) designed to elicit information about specific job titles associated with labor shortages, industry certifications, skills needed, experiential learning opportunities, etc.

A matrix (attached) was also used to determine education level required by job title. While several jobs are open to individuals possessing only a high school diploma, most indicated that certification and AAS programs would be of interest in the future. The matrix also collected input on which job titles were currently in demand and which were expected to be in demand in the future.

These job titles in current demand and expected to be in demand in the future fell into two broad categories of positions.

- Management/Supervisory Positions:
    - Superintendents, supervisors, construction managers, assistant project managers and project managers
- Trades
    - Plumbers, electricians, and masons
    - Business management for skilled tradesmen to fill pending retirement

Subcontractor were particularly concerned about impending retirements of current owner, managers and supervisors and the fact that current skilled tradesmen did not possess management skills. This suggests the need for construction management certificate and degrees.

Over the past five years the need for Supervisory of Construction and Extraction Workers, SOC 47-1000, has increased in Collin County by 6.7% compared to an increase of 2.5% in Texas and 2.5% in the US. Over the next 10 years the average annual growth percent is expected to be 3.1% compared to an annual growth percent overall of 2.7%. (Source: JobsEQ, Exported on Wednesday, March 22, 2017, 4:30 pm.)

According to the findings in the master plan, there is no distinct geographic concentration of construction-related occupational employment across the region. Since construction laborers tend to work in dispersed places an occupation snapshot of Supervisory of Construction and Extraction Workers was also run for Collin, adjacent Counties plus Tarrant. The average annual growth percent is forecast to increase by 2.1% over the next 7 years compared to the overall average annual growth rate for all occupations at 1.6%. (Source: JobsEQ, Exported Tuesday, May 9, 2017, 4:54 pm)
Furthermore, according to the Bureau of Labor Statistics, Construction and Extraction Occupations are projected to grow 10 percent from 2014 to 2024, faster than the average for all occupations, increasing from 6.5 million jobs to 7.2 million jobs. Overall growth in the economy and population will increase demand for new buildings, roads, and other structures, which will

create new job openings for construction and extraction occupations. (https://www.bls.gov/ooh/construction-and-extraction/print/home.htm, Printed 5/9/2017.)

The median annual wage for all construction and extraction occupations was $43,610 in May 2016, which was higher than the median annual wage for all occupations of $37,040. (https://www.bls.gov/ooh/construction-and-extraction/print/home.htm, Printed 5/9/2017.)

According to the Labor Availability Estimator compiled by the Texas WorkForce Solutions, Supervisors of Construction and Extraction Workers for the North Central Texas Metroplex region is expected to grow by 25.89% from 13,750 in 2012 to 17,310 by 2022. (https://www.texasindustryproviles.come/apps/lae/reloccdetails.asp?soc+53-1021&lwda=91No, Printed 5/9/2017.)

Assurance of Basic and Workforce Skills
Construction Management at Collin College

Initial Business and Industry Involvement

On March 30th 2017, a Construction Think Tank was held with 28 attendees representing 12 general contractors, 5 subcontractors, 4 home builders and 2 professional organizations. Six additional companies and the Construction Education Foundation have provided input through Survey Monkey and/or face to face meetings. The purpose of the think tank was to identify opportunities for the development of certificates and associate degree programs. Additionally, the think tank participants provided initial guidance related to basic skills needed for employment, software tools used in the industry, licensure requirements and other information that serves as a baseline for the curriculum development process

The think tank discussion was focused on the needs analysis of a program rather than on specific skill sets needed; however significant input was collected on skills in which employers found their current workers to be deficient. In order of frequency mentioned these include:

- A broad range of soft skills such as communication, management and people skills
- General work ethic to include having a sense of urgency and wanting a career – not just a job
- Basic leadership skills in recognition of a move away from top-down management and the need for teamwork and collaboration
- Additionally, deficiencies were mentioned in blueprint reading, understanding contract language, scheduling, project management software, computational skills and digital literacy
- The need to be bilingual was mentioned several times

The process used to identify and validate knowledge, skills and abilities to be incorporated into the curriculum took these deficiencies into consideration.

Think tank participants identified multiple software packages used by their employees and indicated that IT is a key component in all aspects of the construction industry. Participants generally agreed that the specific software tool was not important; however all employees are expected to have some knowledge of and experience in:

- Project management programs such as P6, Prolog, BuilderPro, or MS Project
- Collaboration and workflow programs such as BlueBeam, Timberline/Sage, AutoDesk 360
- Computer aided drafting and 3D modeling programs such as AutoCAD, BIM (building information modeling)
- Microsoft Office tools
- Also mentioned were scheduling, estimating and surveying software

Involvement of Professional Associations

Collin College identified three key professional associations or organizations in which construction professionals participated. The executive directors/presidents of each of the following organizations were contacted initially and invited to participate in the think tank. They identified key industry leaders who should be involved and shared information with their executive committees regarding the college. College personnel held follow up meetings with the executive directors and their staff and continued to involve these organizations throughout the process.

TEXO
The ABC (Association of Builders and Contractors) and the AGC (Association of General Contractors) came together to form TEXO, the construction association. The organization currently has 200 members and an 11 member board. Their emphasis is currently on the workforce. They have a foundation that gives out college scholarships although they are interested in reaching HS students. TEXO currently provides the Safety First training which is 7.5 hours with an additional 2.5 hours of follow-up training. Over 20,000 workers in DFW are Safety First trained. They have mobile labs at the Toyota facility and the Scottish Rite Hospital construction site in Collin County. Finally, TEXO has developed an ABC Tree to illustrate opportunities in the construction field.

CEF – Construction Education Foundation
When TEXO came together in the mid 1990's they began identifying employer's educational and training needs. CEF was started in 1995 to facilitate training for subs, initially HVAC, but CEF is now the primary provider of training for incumbent workers in construction trades. CEF belongs to TEXO and is very industry driven with trade councils for each area that drive the curriculum.

Dallas Builders Association
DBA is a non-profit trade association representing all segments of the residential building industry in the Dallas Metropolitan area. Its mission is to enhance its members' ability to provide safe, affordable, quality housing to the citizens of the local communities. Its Builder members are engaged in single and multifamily building, land development, remodeling and rehab and general light construction. Its Associate members are companies and individuals who provide materials, products, financing and many other services, including subcontracting, to builders and developers. Education and training is one of the major elements of the association. DBA was originally established as an affiliate of the National Association of Home Builders (NAHB) so members of the Dallas Builders Association automatically are also members of NAHB and TAB (Texas Association of Builders.) DBA has over 400 members locally.

Construction BILT (Business and Industry Leadership Team)
Based on the needs analysis, input from the Construction Think Tank and discussions with professional construction associations, Collin College formed a Construction BILT. Invitations to attend the first BILT meeting on June 15, 2017, were extended to all business and industry representatives who had been involved in any capacity. Additional BILT meetings were scheduled throughout the curriculum development process.

Curriculum Development Process
The Department of Labor O*Net Online system was used to identify knowledge, skills, abilities, tasks and work activities of first line supervisors of construction trades and extraction workers (47-1011.00.) The executive director of TEXO and the DBA were asked for initial input on the proposed process to validate the O*Net items. A total of 77 items were identified for further industry validation.

Collin College used a modified version of the Performance Criteria Analysis (PCAL) originally developed by Richland College, Dallas, Texas. BILT members were asked to rank each knowledge, skill, ability, task and work activity on a performance criteria scale. BILT participants were asked to evaluate how important it is for entry level employees to know or do each performance criteria, how frequently entry level employees are expected to know or do each criteria, and how difficult it is for entry level employees to know or do each criteria. Each items

was briefly discussed to ensure common understanding of the terminology and to allow business leaders to provide additional information. After the discussion, a vote was taken on each item. Counts of those voting “4”, “3”, “2” and “1”. Staff used a spreadsheet to tabulate and come up with a numeric “value” for each performance criteria.

Following this, a gap analysis was conducted in order to identify any additional performance criteria that the BILT considered critical. Ultimately, XX critical performance criteria were identified as critical for entry level first time supervisor of construction trades. College staff then identified potential WECM courses available in Texas and mapped each critical performance criteria to a WECM course.

College staff scanned other community college construction programs paying particular attention to community college programs that were accredited by the American Council of Construction Education (ACCE). Based on input from the BILT and a review of programs at other community colleges, staff drafted certificates and an associate of applied science degree plan. The BILT was invited to a second face-to-face meeting to review how the critical performance criteria were mapped to WECM courses and to provide input on the proposed certificate and degree programs.

2f. Assurance of Adequate Funding

A projection of 100 students enrolled in the first year.

Projected number of completers by award per academic years 1 – 5

AWARD	COMPLETERS					5 Years
	1ST Year	2nd Year	3rd Year	4th Year	5th Year	Cumulative Total
AAS - Construction	0	5	5	5	5	20
OSA – Construction	15	15	15	15	15	75
Level I Cert – Residential / Commercial Construction Manager	30	30	30	30	30	150
Level II Cert – Construction Manager	0	10	10	10	10	40

Funding

1. **Faculty/Personnel**: One fulltime faculty, 2 part-time faculty and a program career coach will be hired in the 1st year. The table below shows the base pay for the 1st year with 3% increase beginning the 2nd year until the 5th year.

    - Fulltime faculty salary based on the following credentials: Masters + 24 with 5 years directly related experience with 20% FTE – additional role such as program director or discipline lead.
    - Part-time/Adjunct faculty salary based on the following: 2 lec hr/2 lab hrs
    - Program Career Coach – the college will hire a career coach for the program. The coach will be charged with tracking students to facilitate success and completion, coordinating cooperative work experience or internship opportunities and working with employers.
    - Lab Personnel – someone to run/set up the lab once it is open. Will be responsible for safety, scheduling, secure storage and check-out of the tools, etc.

2. **Facilities**: Assuming 2 classrooms and 50-70,000 sq. ft. of lab space for the program in the Collin Technical Center.

3. **Equipment's:** Equipment's acquisition budget is $5,000.00. Equipment operation, maintenance and replacement is priced at $1,500 per year for five years.

4. **Five-Year Cost's and Revenue**

Proposed Budget - Construction Management Program							
COSTS							
		1st Year	**2nd Year**	**3rd Year**	**4th Year**	**5th Year**	**5 Years Cumulative Total**
PERSONNEL							
			with 3% increase	with 3% increase	with 3% increase	with 3% increase	
Full time Faculty with 20% FTE (1)	$52,849 * 20% = $10,569.80 = 52,849 + 20% = **$63,418.8**						
Fulltime faculty benefit (32%)	$20,294.02	$83,712.82	$86,224.20	$88,810.93	$91,475.25	$94,219.51	$444,442.71
Adjunct Faculty (2)	2hr Lec/2hr Lab = $2,970 /sem $2,970*2/sem = $ 5,940/yr						
Adjunct Benefit (20% per individual)	$1,188.00						
Adjunct Faculty + Benefit Total (per individual)	**$7,128.00**	$14,256.00	$14,683.68	$15,124.19	$15,577.92	$16,045.25	$75,687.04
Program Career Coach + 32% Benefit (1)	$55,484 + 32% =$55,484 + $17,754.88=**$73,238.88**	$73,238.88	$75,436.05	$77,699.13	$80,030.10	$82,431.00	$388,835.16
Lab Personnel +32% Benefit (1)	26,000 *30% = 8,320 +26,000 = **$34,320**	$34,320.00	$35,349.60	$36,410.09	$37,502.39	$38,627.46	$182,209.54
Personnel Subtotal							***$1,091,174.45***
EQUIPMENTS / FACILITY							
Equipment's Acquisition		$5,000.00					$5,000.00
Classrooms by sqft/rm (2)	891sqft/rm*$250/sqft = $222,750.00	$222,750.00					$222,750.00
Computer Lab (1)	1400 sqft/rm*$250/sqft = $350,000.00	$350,000.00					$350,000.00
Equipment Operation, Maintenance & Replacement		$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$7,500.00
Sub-Total							***$585,250.00***

SUPPLIES/MISCELLANEOUS (Classroom Supplies, Software, Materials, etc**)**							
Books/Supplies		$2,500.00	$2,500.00	$2,500.00	$2,500.00	$2,500.00	$12,500.00
Library/Online Resources		$2,500.00	$2,500.00	$2,500.00	$2,500.00	$2,500.00	$12,500.00
Software for simulation labs		$5,000.00					$5,000.00
Wood/Pipe Materials/Electrical Wiring		$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$7,500.00
Printing Brochure/Handbook		$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$5,000.00
Sub-Total							***$42,500.00***
OTHERS (Travel, Professional Development, Marketing, Meeting Expenses, Accreditations, etc**)**							
Professional Travel/ Devt		$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$7,500.00
Promotional/Marketing Activities		$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$50,000.00
Accreditation & Site Visit							
Meeting Expenses - Adv Committee		$850.00	$850.00	$850.00	$850.00	$850.00	$4,250.00
Professional Membership		$1,500.00	$1,500.00	$1,500.00	$1,500.00	$1,500.00	$7,500.00
Sub-Total							***$69,250.00***
TOTAL COSTS							**$1,788,174.45**

FUNDING & REVENUE					
Credit Hours per award	**State Funding**	**Tuition Funding**	**Total Funding Per Student (State & Tuition)**	**Projected Completers for 5 years**	**Cumulative 5 Years Total**
60 SCH - AAS Construction	$3,879.20	$2,760.00	$6,639.20	20	$132,784.00
12 SCH - OSA Construction	$647.36	$552.00	$1,199.36	75	$89,952.00
18 SCH - Level I Residential or Commercial Construction Manager	$1,973.60	$966.00	$2,939.60	150	$440,940.00
42 SCH - Level II Construction Manager	$3,087.04	$1,932.00	$5,019.04	40	$200,761.60
TOTAL REVENUE					**$864,437.60**

ENROLLMENT PLAN

Program Name: Construction Technology/Management

RECRUITMENT, INCLUDING SPECIAL POPULATIONS

The following table captures the subpopulations that will be targeted for recruitment into construction technology/management certificate and associate of applied science programs.

Sub population	Subpopulation size	Recruitment Target
Dual Credit CTE Students in local HS's	CTE programs at Allen, Frisco, McKinney & Plano CTE programs at all other local ISD's	10 juniors from each = 40 10 seniors from each = 40 2 students from 5 schools =10
Graduating HS Student	Students graduating from all Collin County and service area high schools	50% of graduating CTE students above = 20 20 additional grads = 20
Incumbent workers in trades moving into management	Multiple subcontractors in North Texas	8-10 students
Incumbent workers with some college credits, but no degree	Multiple contractors and subcontractors	8-10 students
TOTAL Annual Yield		100

Dual Credit CTE Students in Local High Schools

Collin College's Vision 2020 strategic plan includes a goal to serve over 6,100 students in dual credit by the end of fall 2020. To reach this goal, it was projected that the dual credit program at Collin would have to grow by nearly 400 students a year. Multiple initiatives are already in place to make this possible. In fall 2015, 3,766 students were enrolled in dual credit. The enrollment in dual credit courses grew to 4,557 in fall 2016, ahead of original projections. This growth is also being experience with dual credit career and technology education courses. In 2014, Collin offered 24 different CTE courses for dual credit. In fall of 2017, 45 CTE dual credit courses are being offered.

Collin College has acquired approximately 27 buildable acres along Highway 121 between Exchange and Alma to build the Collin Technical Center. Approximately 320,000 square feet of classroom and laboratory space is currently being designed to accommodate new workforce education programs. A formal partnership agreement will be signed between Collin College and Allen, Frisco, McKinney and Plano ISD's to cooperatively develop and offer new workforce/CTE programs at the Collin Technical Center. Only one of the four partners currently has a CTE program in construction; however, the other districts will begin promoting this new CTE program for their students during the 2017-18 academic year.

In addition to the CTE initiative at the Collin Technical Center, Collin College is in the process of hiring 16 career counselors who will be embedded in 32 local high schools to provide college and career counseling scheduled to begin during the 2017-18 academic year. The embedded

counselors will receive in-depth training on all workforce programs offered by Collin College and will be well-versed in techniques for career identification and exploration as well as college counseling. The embedded counselors should be able to reach students who are undecided about career choices and for whom a baccalaureate degree may not be necessary, or the best option.

Specific strategies to reach dual credit/CTE students include:

- Host a construction summer camp for middle school students to learn about multiple aspects of the profession. This builds on the idea of “maker spaces” that are already found in K-12 and at Collin College.
- Bring employers in to speak to middle school students.
- Offer job-site tours of major construction projects in the local community
- Emphasize the high tech aspect of the profession
- Find ways to make this CTE construction program “selective” so that there will be a waitlist of students wanting to get into the program in the high school
- Tell success stories and promote the entrepreneurial opportunities for students who might want to start their own business

Graduating High School Students

In addition to the 4 CTE programs participating in a formal partnership at the new Collin Technical Center (Allen, Frisco, McKinney and Plano ISD’s) the college will provide information, tours and other recruitment materials to the CTE directors throughout the service area. CTE students as well as all graduating seniors expressing interest in construction careers will be targeted to receive information about the construction technology program.

Career Centers on each campus serve as an entry point for graduating high school students as well as returning adults. The Career Centers are centrally located and provide resources and support for career exploration, counseling, and placement. Undecided students will be able to learn about construction careers, education requirements, starting salaries and other useful information.

Specific strategies to reach graduating high school students include:

- Embedded career counselors will help identify HS juniors and seniors expressing interest in architecture, construction or engineering. These students will be invited to a construction day of demonstrations and exhibits co-hosted by the college and local construction companies.
- Employers will be invited to make classroom presentations to CTE classes.
- HS students will be given job shadowing opportunities.
- Dual credit students will be able to earn at least one construction certificate and may be able to graduate with up to 30 credit hours. A clear pathway to the AAS degree will be included in all materials distributed to the HS students.
- Multiple opportunities will be available to tour the construction technology lab at the Collin Technical Center for students not already enrolled in dual credit.
- Scholarships for construction students will be solicited and employers will be invited to a special scholarship awards program. There will be a “signing day” for students going into construction programs during which they are celebrated and awarded their scholarship.
- Students may be eligible for part-time, paid internships when the graduate from high school. Internships often lead to employment and will be used as a recruitment tool.

- Build on the popularity of such HGTV shows as Love it or List it, Fixer Upper with Chip and Joanna Gaines of Waco, or Discovery Channel's Dirty Jobs with Mike Rowe. This could take the form of a celebrity guest speaker, video/YouTube clips or other strategies to create excitement.
- Develop articulation agreements with four-year universities so that students can seamlessly transfer to baccalaureate programs in construction and/or civil engineering.

Incumbent Workers in Construction Trades

Local employers indicate that one of their greatest concerns about the future is that they do not have a viable succession plan for their supervisors and management positions. Current tradesmen with experience do not have management skills and will need to be trained in order to take over the companies with the current leadership retires. This presents opportunities for certificate programs at Collin College.

- Collin will reach out to current employers in all segments of the construction industry through relationships being built with their professional organizations to promote the construction management certificate and AAS degree. These organizations include:
    - Dallas Builders Association
    - TEXO
    - Construction Education Foundation
- The Construction BILT (Business & Industry Leadership Team) serves as the program advisory committee and is comprised of representatives from large general contractors, home builders and subcontractors of all sizes. This organization will be engaged to get the word out to others in the construction field.
- Collin is developing a partnership with the Construction Education Foundation to offer continuing education training to subcontractors in multiple fields to include: electricians, plumbers, carpenters and framers, HVAC companies, masonry and concrete, etc. CEF is governed by industry advisory committees with a vested interest in high providing high quality, industry driven training. These companies fund CEF through tuition, in-kind contributions, and donations. This partnership will provide Collin College with an opportunity to promote management courses and programs for incumbent workers.

Incumbent Workers with Some College, but No Degree

- In addition to the above strategies for reaching incumbent workers, a brochure or online information will be developed and widely distributed informing employers of opportunities targeting their employees with some college, but no earned degree. Collin will be developing strategies to award credit for experiential learning though competency based testing, employer validation, or other methods.
- The Continuing Education Division at Collin College offers a local certificate program in construction project management. Students who have completed one or more of the CE courses in this program will be sent information about the credit certificate and associate degree options and will be invited to an information session regarding the credit program.

In addition to the targeted populations listed above, special populations to be targeted for the program include:

X racial/ethnic groups (primarily Hispanic);
X veterans;

X displaced workers (will work with WorkForce Solutions);
X gender disparities by occupation (primarily women);
X underemployed (primarily incumbent workers in construction related fields),

RETENTION

Tracking Progress
It will be relatively easy to track the progress of three of the targeted populations for recruitment. Systems are already in place to track dual credit students' progress. Attendance is monitored as this is a funding factor for the school districts as well as a high school graduation requirement. Students with unexcused absences will be contacted by the professor initially and referred to the dual credit office through the embedded counselor if additional follow-up is needed.

Incumbent workers who are referred by their employers will sign a permission form upon enrollment authorizing the college to tract their attendance and work with the employer to mitigate unexcused absences or other factors impeding progress. Given the hands-on nature of the labs, class sizes may be smaller than average so faculty should have an opportunity to know their students and can be asked to make counselors and advisors aware of any issues that may be impacting attendance and/or course completion.

Program Career Coaches
Collin College will hire a program career coach for the construction program. The career coach will be charged with tracking students to facilitate success and completion, coordinating cooperative work experience or internship opportunities and working with employers. They will be developing early intervention strategies and providing general academic advising to construction students.

Motivating Factors
Employers have been extremely involved in the creation of the construction program and will be relied upon to help motivate students through guided participation in professional opportunities, job site tours and meet and greet functions at job sites, scholarship awards ceremonies and other celebrations recognizing milestone achievements. In addition, structured internships and/or cooperative work experiences will be incorporated to provide field experience. Construction employers highly value such field experiences and Collin will balance classroom instruction with practical applications. Job placement prospects are a tremendous selling factor for the program with virtually all graduates being guaranteed employment.

Stackable Credentials
Dual credit will be a significant component of the program so stackable credentials will be developed and promoted. In addition, certificate programs will be heavily marketed as an expedient way to earn basic credentials. Students earning certificates will be strongly encouraged to continue for the associate degree. Degree audits will be run at the end of each semester for student identified in the construction program.

COMPLETION

Given the acute labor shortage, one of the greatest risks for completion will be the potential for employers to hire students for full-time employment (possibly on job sites throughout the

Metroplex) that prevents them from completing. This will be addressed, in-part, through the development of short-term certificate programs that can be offered on a fast-tack basis.
In addition, BILT members and all employers will be made aware of the need to maintain completion rates and will be asked to work with Collin College and the students they wish to employ or who are already employed. The same message will be communicated through professional associations and their respective advisory committees.

Courses schedules will need to be developed through close communication with construction employers. Some employers have expressed an interest in one day a week courses that could be complete in 6 weeks. Evening and weekend schedules will be developed and courses will be sequenced through the development of an annual schedule or two-year schedule that can be widely communicated to the employers and students. This will hopefully mitigate employer poaching of non-degreed students and include employers in promoting completions.

Experiential Learning Credit
Several courses in the construction program will be skills-based. The college will explore ways to award credit for experiential learning or to assess skills acquired through continuing education courses in an effort to enhance progression through certificate and degree programs.

Career Counseling
A career counselor will be assigned to assist construction students and will communicate with them about pending awards and remaining requirements.

University Articulation Agreements:
Local employers recruit heavily from Texas A&M and Texas Tech, Oklahoma State University, OU, University of Louisiana-Monroe and UNT. Collin has an opportunity to build on existing articulation agreements and relationships to create pathways for students to earn a baccalaureate degree. Articulation agreements and the opportunity to transfer to a baccalaureate program will be used as a recruitment and retention tool for graduating high school students.

Scholarships
Employers in virtually all segments of the construction industry are desperate for skilled works. The best recruitment and retention tools will be the opportunity for scholarships and the guarantee of employment upon completion.

A “signing day” or targeted scholarship event will hopefully enhance the student’s commitment. Scholarship awards could be structured to promote completion or students could be provided incentives for completion such as the purchase of certain tools or payment of certification exams.

PLACEMENT

Over 40 employers, representing large and mid-sized general contractors, sub-contractors and home builders participated in think tank discussions, surveys, and/or individual interviews/meetings. Placement is virtually guaranteed for the students in this program at the current time. Given that the population of Collin County is expected to double by 2030 and triple by 2040 and the ensuing growth this will produce in all aspects of the construction industry, it is expected that all graduates will find employment in the field.

Average starting salaries are in the mid $50,000's or higher, and Construction BILT members indicate that there are numerous opportunities for advancement in the field. Positions in construction and construction trades have a bright future according to O*Net and all local indicators.

Internships

Employers on in the commercial construction sector indicate a preference for internship. This gives them an opportunity to "sell" their company and entice top baccalaureate degree recipients to their firms. Internships will be incorporated into the associate of applied science degree to give students a chance to experience the job environment and employers an opportunity to see the student in an applied setting.

Collin College Construction Management
Program Linkages

Secondary Linkages

Collin College and the Allen, Frisco, McKinney and Plano Independent School Districts have formed a partnership designed to expand Career and Technical Education programs and to enhance Collin College's ability to meet workforce needs. On May 6th, 2017, Collin College passed a $600 million bond package to build new campuses and facilities. Phase I of the expansion project includes funds to design and build the Collin Technical Center (CTC) to be located on Highway 121 between Exchange and Alma. The CTC will house a variety of new and existing workforce programs and will provide dual credit CTE courses in partnership with the Allen, Frisco, McKinney and Plano Independent School Districts. Construction is expected to begin during the 2017-18 academic year.

The CTC/CTE partnership is intended to expand workforce ready academic preparation that is cost effective and avoids unnecessary duplication – particularly in expensive, equipment-intensive or highly technical program areas. By centrally locating the CTC and coordinating the CTE offerings for multiple school districts, local school districts can offer CTE programs that might not have sufficient student enrollment otherwise.

New workforce programs and courses will be developed to address labor market needs using a model that connects business and industry leaders directly with the curriculum development process. The Business and Industry Leadership Teams (BILTs) will serve as advisory committees for the school districts and the college in an effort to ensure the coordination of industry recognized credentialing, responsive curriculum development, timely program review and the availability of applicable field experiences for the students. Stackable programs will ensure employment opportunities for high school graduates possessing entry level certifications as well as for students continuing on to earn certificates or associate degrees.

During the 2017-18 academic year:

- School districts will be invited to participate in curriculum planning discussions to include BILT meetings and determining dual credit offerings.
- A detailed strategy to promote the new CTE programs and recruit high school students will be developed targeting students and parents in middle schools and high schools.
- Career counseling will be expanded through Collin's embedded career counselor program.
- Resources outlining employment opportunities, salary expectations, educational requirements, etc. will be developed and/or shared between local school districts and Collin College.
- Additional details will be identified and resolved to ensure that a mutually beneficial partnership will be developed.

College & University Linkages

As the new career and technology programs are developed, Collin College will seek to develop university partnerships so that students can successfully transfer to BAAS degrees that will allow for the maximum number of credits to transfer and the shortest time to degree.

Documentation of meetings with CTE directors and formal partnership agreements are attached or available.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: ARCE1342

Course Title: Codes, Specifications and Contract Documents

Course Description: Study of ordinances, codes and legal documents as they relate to specifications and drawings. Discussion of owner/architect-contractor responsibilities, duties, and legal relationships. Additional topics include EPA, RRC, and other regulatory entities potentially impacting construction projects, delivery methods and resulting contracts.

Course Credit Hours: 3
Lecture Hours: 3

Prerequisites: OSHT 1305, CNBT 1300 or CNBT 2310

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Utilize codes, ordinances and legal documents;
  2. Solve planning and construction problems with available resources;
  3. Compose written construction specification documents; and
  4. Analyze owner/architect/contractor relationships.

- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Identify regulations by EPA, RRC, and other regulatory entities potentially impacting construction projects, delivery methods, and resulting contracts.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 1300

Course Title: Residential and Light Commercial Blueprint Reading

Course Description: Blueprint reading for residential and light commercial construction. Additionally, this course will include an introduction to computerized prints and related software.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Scale residential and light commercial prints with architectural and engineering scales;
  2. Identify construction blueprint symbols and abbreviations;
  3. Interpret a set of residential and light commercial construction contract documents; and
  4. Correlate elevations, sections, details, plan views, schedules, and general notes.
- **Additional Collin Outcomes:**
  1. Apply blue print reading skills to residential and light commercial computerized prints.
  2. Use appropriate software to manipulate computerized prints.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook*

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT1301

Course Title: Introduction to the Construction Industry

Course Description: Overview of the construction industry. Additionally, this course will cover basic construction terminology in English and Spanish, outline the process from land acquisition to finished project and provide an introduction to ethical issues facing the industry.

Course Credit Hours: 3
Lecture Hours: 3

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Identify types of construction and organizational structures; explain purposes for various construction documents;
  2. Describe the responsibilities of the construction office and field operations;
  3. Identify environmental health and safety agency requirements;
  4. Identify the various construction crafts and trades, and
  5. Describe green and sustainable building practices and standards.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook*

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT1302

Course Title: Mechanical, Plumbing & Electrical Systems in Construction I (Residential)

Course Description: A presentation of the basic mechanical, plumbing, and electrical components in construction and their relationship to residential and light commercial buildings. Additionally, the course includes MEP blueprints, schedule coordination, and safety.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Prerequisites: CNBT 1300, OSHT 1305

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Identify equipment and components of electrical, plumbing, heating, air conditioning, and ventilations systems; and
  2. Describe the relationships between the mechanical, plumbing and electrical systems; and
  3. Discuss implications of sustainable building systems on design

- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Demonstrate appropriate use of MEP blueprints;
  2. Coordinate a construction schedule;
  3. Identify safety regulations related to mechanical, plumbing, and electrical systems in construction.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT1311

Course Title: Construction Methods and Materials I

Course Description: Introduction to construction materials and methods and their applications.

Prerequisite: OSHT 1305

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
    1. Identify various construction materials, their applications and the safe uses of various machines and tools pertinent to the construction industry.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT1315

Course Title: Field Engineering I

Course Description: Surveying equipment, sketches, proper field note taking, methods of staking, layout of building site, and horizontal and vertical controls.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Prerequisites: OSHT 1305

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Explain quality control / quality assurance requirements;
  2. Define terms used in field engineering;
  3. Identify equipment and tools used by field engineers;
  4. Perform sketching and field note taking; and
  5. Establish horizontal and vertical controls.

- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Solve complex field engineering related problems.
  2. Demonstrate a basic understanding of structural behavior; and
  3. Apply mathematical calculations associated with field engineering.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 1346

Course Title: Construction Estimating I

Course Description: Fundamentals of estimating materials and labor costs in construction

Course Credit Hours: 3
Lecture Hours: 3

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Explain estimating procedures
  2. Estimate materials from blueprints;
  3. Estimate cost of waste removal and recycling related to sustainable construction processes; and,
  4. Calculate labor units and costs.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT1359

Course Title: Project Scheduling

Course Description: A study of conventional scheduling using critical-path-method; precedence and arrow networks; bar charts; monthly reports; and fast track scheduling. Additionally, scheduling software for the construction industry will be used.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Prerequisites: CNBT 1311

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Prepare flow chart diagrams using the precedence networks;
  2. Utilize the "forward pass" and "back pass" in-scheduling procedures;
  3. Construct bar charts, and
  4. Calculated critical paths in scheduling.

- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Demonstrate coordinated work activity in scheduling associated with construction projects; and
  2. Demonstrate use of software related to scheduling and work flow in a construction project.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 1380

Course Title: Cooperative Education - Construction Management

Course Description: Career-related activities encountered in the student's area of specialization offered through an individualized agreement among the college, employer and student. Under the supervision of the college and the employer, the student combines classroom learning with work experience. Includes a lecture component. Contact the Cooperative Work Experience Office.

Course Credit Hours: 3
Lecture Hours: 1
External Hours: 19

Prerequisite: Program Coordinator approval required.

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
    1. As outlined in the learning plan, apply the theory, concepts, and skills involving specialized materials, tools, equipment, procedures, regulations, laws, and interactions within and among political, economic, environmental, social, and legal systems associated with the occupation and the business/industry; and
    2. Demonstrate legal and ethical behavior, safety practices, interpersonal and teamwork skills, and appropriate written and verbal communication skills using the terminology of the occupation [Construction Management] and the business/industry [Construction].

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 2304

Course Title: Construction methods and Materials II

Course Description: Continuation of the study of the properties of building materials, methods and equipment for their integrated use in completing construction projects. Additionally, the course will address quality control in construction.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Prerequisites: CNBT 1311, OSHT 1305

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Identify materials used in construction
  2. Describe the basic characteristics, traditional uses for; and manner of assembly of common materials used in construction.
- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Demonstrate an understanding of basic principles of structural behavior
  2. Demonstrate an understanding of the process for evaluating quality or performance.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

Americans with Disabilities Act Statement: Collin College will adhere to all applicable federal, state and local laws, regulations and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to contact the ACCESS office, SCC-D140 or 972.881.5898 (V/TTD: 972.881.5950) to arrange for appropriate accommodations. See the current *Collin Student Handbook* for additional information.

COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 2310

Course Title: Commercial/Industrial Blueprint Reading

Course Description: Blueprint reading for Commercial/Industrial construction. Additionally, this course will include an introduction to commercial/Industrial computerized prints and related software.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Student Learning Outcomes:

- **State-Mandated Outcomes:** Upon successful completion of this course, students will:
  1. Scale commercial/Industrial prints with architectural and engineering scales;
  2. Identify construction blueprint symbols and abbreviations;
  3. Interpret a set of commercial/Industrial construction contract documents; and
  4. Correlate elevations, sections, details, plan views, schedules, and general notes.

Additional Collin Outcomes:

1. Apply blue print reading skills to commercial/Industrial computerized prints.
2. Use appropriate software to manipulate computerized prints.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook*

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 2337

Course Title: Construction Estimating II

Course Description: Advanced estimating concepts using computer software for construction and crafts.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Prerequisites: CNBT 1346

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Utilize various estimating resources;
  2. Determine types of estimating needed in construction;
  3. Calculate quantities, cost, and time units;
  4. Develop computerized reports for detailed construction estimates.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 2340

Course Title: Mechanical, Plumbing & Electrical Systems in Construction II (Commercial)

Course Description: Processes and methods used in design, selection of equipment, and installation of mechanical, plumbing, and electrical systems in commercial buildings. Includes heating and cooling systems, duct work, mechanical and electrical control systems, lighting requirements, and design of water supply and sanitary sewer systems. Additionally, the course addresses MEP blueprints, schedule coordination, and safety.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Prerequisites: CNBT 2310, OSHT 1305

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Describe a simple mechanical, plumbing, and electrical system for a commercial building;
  2. Interpret blueprints and specifications for information used in the design of mechanical, plumbing, and electrical systems.
- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Interpret MEP blueprints;
  2. Identify basic elements requiring coordination in a simple construction schedule;
  3. Identify safety regulations related to mechanical, plumbing, and electrical systems in construction.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook.*

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 2342

Course Title: Construction management I

Course Description: Management skills on the job site. Topics include written and oral communications, leadership and motivation, problem solving, and decision making. Additionally, this course includes customer and contractor relations and ethics in the construction industry.

Course Credit Hours: 3
Lecture Hours: 3

Student Learning Outcomes:

- **State-Mandated Outcomes:** Upon successful completion of this course, students will:
  1. Define terms associated with the construction supervision, leadership motivation, problem solving, and decision making.
  2. Demonstrate problem solving and decision making in construction problems.
  3. Apply green and sustainable building codes and standards.
  4. Demonstrate techniques for successful contractor interaction including professional protocol and communication.

Additional Collin Outcomes:

1. Demonstrate techniques for appropriate customer relations and communication for construction industry.
2. Identify ethical issues common to construction management.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 2344

Course Title: Construction Management II

Course Description: A management course in contract documents, safety, planning, scheduling, production, control, law and labor issues. Topics include contracts, planning, cost and production peripheral documents, and costs and work analysis. Additional topics include customer service and quality control.

Course Credit Hours: 3
Lecture Hours: 3

Prerequisite: CBNT 1311

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Develop skills in in construction contract documents, planning and scheduling, and cost and production controls;
  2. Explain the legal implication related to construction projects.
  3. Plan, schedule and document a construction project including the use of sustainable rating systems.

- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Demonstrate ethical decision making, critical thinking and problem solving associated with construction management. Identify and correct common network problems at layers 1, 2, 3, and 7 using a layered model approach.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: CNBT 2346

Course Title: Construction Management III

Course Description: Advanced course work in safety procedures, project management, scheduling, material handling, layout, payment scheduling, and inspection. Additionally, this is a capstone course in which program learning outcomes will be demonstrated.

Course Credit Hours: 3
Lecture Hours: 3

Prerequisite: Program Coordinator approval required.

Student Learning Outcomes:

- **State-mandated Outcomes:** Upon successful completion of this course, students will:
  1. Implement construction safety procedures;
  2. Design a project layout, payment schedule, and job inspection plan;
  3. Develop a schedule and material handling layout plan; and
  4. Develop a sustainable construction plan based upon contract requirements.

- **Additional Collin Outcomes:** Upon successful completion of this course, students will:
  1. Demonstrate program level learning outcomes for Construction Management.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

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COLLIN COLLEGE
COURSE SYLLABUS

Course Information

Course Number: OSHT 1305

Course Title: OSHA Regulations – Construction Industry

Course Description: A study of Occupational Safety and health Administration (OSHA) regulations pertinent to the construction industry.

Course Credit Hours: 3
Lecture Hours: 2
Lab Hours: 2

Student Learning Outcomes:

- **State-Mandated Outcomes:** Upon successful completion of this course, students will:

1. Identify the OSHA regulations which apply to the construction industry.
2. Demonstrate proficiency in retrieving specific information from Title 29 C.F.R. Part 1926 regulations.

Additional Collin Outcomes: Upon successful completion of this course, students will:

1. Earn OSHA 30 and CPR certification and be able to develop a safety plan pertinent to the construction industry.

Withdrawal Policy: See the current *Collin Registration Guide* for last day to withdraw.

Collin College Academic Policies: See the current *Collin Student Handbook*

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