



# **An Organizational Review of CIP Code Designations for Construction Science, Technology, Engineering, and Management Programs and Curriculum**

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## **ABSTRACT**

The higher education programs in the United States are organized using the Classification of Instructional Program (CIP) codes. This taxonomic scheme provides a structure for the identification, tracking, and reporting of higher education programs. The coding structure includes multi-digit major categories, including architecture, engineering, business, and construction trades. However, the multi-disciplinary and application-oriented disciplines such as construction reach over multiple categories. In most states, cataloged course offerings also carry CIP designations, and these designations are used for various purposes, including reviews of new program/course development efforts and funding. This paper aims to provide an organizational review of construction science, technology, engineering, and management programs in the state of Texas. Two and Four-Year programs that carry the word “construction” in their title are reviewed using the CIP codes at the program/degree level and individual course offerings in their curriculum. The review showed a wide variety of CIP designations that highlight the construction discipline’s complex nature with multiple examples of different designations for the same topical content. A discussion of the advantages and disadvantages of using different designations is included in the paper.

## **INTRODUCTION AND BACKGROUND**

Construction is a multi-disciplinary and application-oriented discipline. It is also a relatively young academic discipline with various teaching and learning activities approaches. Construction higher education is also recognized and differentiated by multiple professional accreditation agencies with similar but different interpretations of expected outcomes. These include the American Council for Construction Education (ACCE) [1] and ABET (under engineering, technology, and applied science categories) [2].

The multi-disciplinary and continuously evolving nature of the construction higher education has been recognized in several studies [3-5]. Liska [3] documented the beginning stages of formal construction education structure through the lens of the ACCE history starting in the 1970s. Liska also noted the joint efforts of academia and industry, including the Associated Schools of Construction, American Institute of Constructors, Associated General Contractors of America (AGC), Mechanical Contractors Association of America, AGC Education and Research Foundation, National Electrical Contractors Association, Associated Builders and Contractors, National Constructors Association, and American Road Builders Association.

Construction programs are often influenced by their development and history. Programs that originated from architecture or engineering often carry a design-heavy structure, while programs with industrial technology backgrounds include more hands-on applications [6, 7]. The industry's expectations also play an essential role in shaping the educational content, including the technical, managerial, and soft skills [8-11]. In 1998, Rosso conducted a study to review the current status of four-year construction education programs and highlighted the evolving approaches and the distinct programs of study under the “construction” umbrella [12]. The discussion of the different teaching and learning approaches, as they relate to the nature of construction practice, is also a focus of attention from an educational perspective [13-15].

The natural starting point for any construction higher education discussion is to understand the current program structures and educational approaches clearly. In most states in the United States, programs and course offerings carry Classification of Instructional Programs (CIP) code designations for organizational purposes. These designations are used for various purposes, including reviews of new program/course development efforts and funding.

This paper aims to provide an organizational review of construction science, technology, engineering, and management programs in the state of Texas. Higher education programs that carry the word “construction” in their title are reviewed using the CIP codes at the program/degree level and individual course offerings in their curriculum. A discussion of the advantages and disadvantages of using different designations is included in the paper.

## **CLASSIFICATION CODES**

The National Center for Education Statistics publishes and maintains the Classification of Instructional Programs (CIP) codes [16]. These codes are used to classify programs (identification of the program type) and categorize each course offered by the program. The state of Texas utilizes this taxonomy by overlapping with the first six digits of the national codes and adds 7th and 8th digits when more detail is required in the definitions. In the 2020 Texas CIP code structure [17], the construction programs may be classified under one of the following codes:

- 14 – Engineering
  - 14.3301.00 – Construction Engineering
- 15 –Engineering/Engineering Technologies/Technicians
  - 15.1001.00 – Construction Engineering Technology/Technician
- 19 –Family and Consumer Sciences/Human Sciences
  - 19.0604.00 – Facilities Planning and Management
- 46 – Construction Trades
  - 46.0000.00 – Construction Trades, General
  - 46.0412.00 – Building/Construction Site Management/Manager
- 52 – Business, Management, Marketing, and Related Support Services
  - 52.2001.00 – Construction Management, General
  - 52.2002.00 – Construction Project Management

Texas also uses discipline categories for identification, funding formula, and legislative appropriation purposes, which are noted as a part of the Texas CIP codes [18]. In the 2020 Texas CIP code structure [17], the construction programs may be classified under one of the following disciplines:

- Engineering (06) - to include CIP code 14 (Engineering) and the majority of CIP code 04 (Architecture and Related Services)
- Vocational Training (12) - to include CIP code 46 (Construction Trades)
- Business Administration (16) - to include CIP code 52 (Business, Management, Marketing, and Related Support Services)
- Technology (19) - to include the majority of CIP code 15 (Engineering/Engineering Technologies/Technicians)

Texas CIP codes do not differentiate between the degrees associated with the designations but focus on the subject matter. In other words, the same CIP code may be utilized for two-year, four-year, or graduate degree programs.

## CONSTRUCTION PROGRAM DATA

The state of Texas maintains a database of higher education programs through the Texas Higher Education Coordinating Board [19]. The database was searched for “construction” keyword in “Community Colleges,” “State Colleges,” “Technical Colleges,” “Public Universities, Health Related Institutions,” “Independent Colleges and Universities of Texas (ICUT),” “For Profit Colleges & Universities Authorized by Certificate,” and “Other Institutions Authorized by Certificate” categories. Tables 1, 2, 3, and 4 show the results of the keyword program search for the associate, bachelor, master, and doctorate levels.

INSTITUTION	PROGRAM NAME	CIP CODE (2-DIGIT)
Alamo Community College - St. Philip's College (ACCD)	Construction Engineering Technology/Technician	15 – Technology
Amarillo College	Construction Engineering Technology/Technician	15 – Technology
Austin Community College	Construction Management, General	52 – Business
Blinn College District	Building/Construction Site Management/Manager	46 – Construction Trades
Brazosport College	Construction Engineering Technology/Technician	15 – Technology
Collin County Community College District	Construction Management, General	52 – Business
Del Mar College	Building/Construction Site Management/Manager	46 – Construction Trades
Houston Community College System (HCCS)	Construction Engineering Technology/Technician	15 – Technology
Howard College (HCJCD)	Construction Engineering Technology/Technician	15 – Technology
South Texas College	Construction Engineering Technology/Technician	15 – Technology
Southwest Texas Junior College	Construction Trades	46 – Construction Trades
Tarrant County College - South Campus (TCCD)	Construction Engineering Technology/Technician	15 – Technology
Texarkana College	Construction Engineering Technology/Technician	15 – Technology
Texas Southmost College	Building/Construction Site Management/Manager	46 – Construction Trades
Lamar State College-Orange (TSUS)	Construction Management, General	52 – Business
Texas State Technical College (TSTC)	Construction Engineering Technology/Technician	15 – Technology

**Table 1. Construction Program Inventory at Associate Level**

INSTITUTION	PROGRAM NAME	CIP CODE (2-DIGIT)
Lamar University	Construction Management	14 – Engineering
Prairie View A&M University	Construction Science	15 – Technology
Sam Houston State University	Construction Management	15 – Technology
Stephen F. Austin State University	Construction Management	52 – Business
Tarleton State University	Construction Science and Management	15 – Technology
Texas A&M University	Construction Science	15 – Technology
Texas A&M University-Commerce	Construction Engineering	14 – Engineering
Texas State University	Construction Science and Management	15 – Technology
Texas Tech University	Construction Engineering	14 – Engineering
The University of Texas at Arlington	Construction Management	14 – Engineering
The University of Texas at El Paso	Construction Engineering and Management	14 – Engineering
The University of Texas at San Antonio	Construction Science and Management	46 – Construction Trades
The University of Texas at Tyler	Construction Management	52 – Business
University of Houston	Construction Engineering	14 – Engineering
University of Houston	Construction Management	15 – Technology
University of North Texas	Construction Engineering Technology	15 – Technology
University of North Texas	Construction Management	15 – Technology

**Table 2. Construction Program Inventory at Bachelor Level**

INSTITUTION	PROGRAM NAME	CIP CODE (2-DIGIT)
Texas A&M University	Construction Management	15 – Technology
Texas State University	Construction Management	15 – Technology
The University of Texas at Arlington	Construction Management	14 – Engineering
The University of Texas at El Paso	Construction Management	52 – Business
University of Houston	Construction Management	15 – Technology

**Table 3. Construction Program Inventory at Master Level**

INSTITUTION	PROGRAM NAME	CIP CODE (2-DIGIT)
Texas A&M University	Construction Science	15 – Technology

**Table 4. Construction Program Inventory at Doctorate Level**

At the associate level, 56% of the programs are designated under the technology (CIP 15), 25% under construction trades (CIP 46), and 19% business. At the bachelor level, the distribution changes to 47% under technology (CIP 15), 35% under engineering (CIP 14), 12% under business (CIP 52), and, only one program, 6% under construction trades (CIP 46). Master-level programs include 60% designation under technology (CIP 15), 20% under engineering (CIP 14),

and 20% under business (CIP 52). The only doctorate-level construction program is designated under technology (CIP 15).

Tables 1 to 4 also show a variety in program names which includes the words “management,” “science,” “engineering,” “engineering technology,” or a combination. It is also significant to observe the unique nature of the program name and CIP code coupling where the “construction management” program title may be linked to technology (CIP 15), engineering (CIP 14), or business (CIP 52).

## ASSOCIATE-LEVEL COURSE OFFERINGS

As a part of the workforce development and college/career readiness efforts, Texas incorporates the curriculum, as presented in Table 5, for the construction management program of study under the Associate of Applied Science (AAS) degrees [20].

COURSE TITLE	COURSE NUMBER
Residential and Light Commercial Blueprint Reading	CNBT 1300/1400
Construction Methods and Materials I	CNBT 1311/1411
Mechanical, Plumbing & Electrical Systems in Construction I	CNBT 1302/1402
Project Scheduling	CNBT 1359/1459
OSHA Regulations - Construction Industry	OSHT 1305/1405
Construction Estimating I	CNBT 1346/1446
Building Codes and Inspections	CNBT 1342/1442
Construction Management I	CNBT 2342/2442
Construction Management II	CNBT 2344
Practicum (or Field Experience)/Internship	CNBT 2266/2286

**Table 5.** Construction Management Program of Study Curriculum

As listed in Table 1, “Community Colleges,” “State Colleges,” and “Technical Colleges” that offer an AAS degree utilize the construction management curriculum in Table 5. Although a searchable database of individual courses is not available for the associate level, a review of individual school catalogs shows that the CNBT courses are designated under the technology code (CIP 15). The individual programs may require additional CNBT numbered courses to complement their degree programs; however, the curriculum structure in Table 5 is always included with technology CIP designation.

## UNDERGRADUATE AND GRADUATE-LEVEL COURSE OFFERINGS

Table 6 (undergraduate only) and 7 (undergraduate and graduate) present the course offerings for the construction programs under each CIP code. The table lists the course offerings in the lower (100/1000 and 200/2000), upper (300/3000 and 400/4000), and graduate (>400/4000) levels. For the undergraduate (bachelor) and graduate (master and doctorate) level programs, the course inventory was searched for each program listed in Tables 2, 3, and 4 in the Texas Higher Education database [21].

INSTITUTION	RUBRIC	# of Lower-Level Courses	# of Upper-Level Courses	# of Graduate-Level Courses	Total # of Courses
Prairie View A&M University	CONS	-	15 – CIP 15 – Technology (81%) 2 – CIP 04 – Architecture (12%)	-	15 – CIP 15 – Technology (81%) 2 – CIP 04 – Architecture (12%)
Sam Houston State University	ETCM	3 – CIP 15 – Technology (100%)	7 – CIP 15 – Technology (70%) 3 – CIP 46 – Construction (30%)	-	10 – CIP 15 – Technology (77%) 3 – CIP 46 – Construction (23%)
Stephen F. Austin State University	CMGT	2 – CIP 19 – Facilities (100%)	2 – CIP 19 – Facilities (40%) 2 – CIP 04 – Architecture (40%) 1 – CIP 52 – Business (20%)	-	4 – CIP 19 – Facilities (57%) 2 – CIP 04 – Architecture (29%) 1 – CIP 52 – Business (14%)
Tarleton State University	CNST	4 – CIP 15 – Technology (100%)	16 – CIP 15 – Technology (100%)	-	20 – CIP 15 – Technology (100%)
Texas A&M University-Commerce	CONE	1 – CIP 14 – Engineering (100%)	20 – CIP 14 – Engineering (100%)	-	21 – CIP 14 – Engineering (100%)
The University of Texas at Tyler	CMGT	2 – CIP 15 – Technology (100%)	12 – CIP 15 – Technology (48%) 8 – CIP 14 – Engineering (32%) 5 – CIP 52 – Business (20%)	-	14 – CIP 15 – Technology (52%) 8 – CIP 14 – Engineering (30%) 5 – CIP 52 – Business (19%)
University of Houston	CNST	9 – CIP 15 – Technology (90%) 1 – CIP 52 – Business (10%)	24 – CIP 15 – Technology (100%)	-	33 – CIP 15 – Technology (63%) 18 – CIP 14 – Engineering (35%) 1 – CIP 52 – Business (2%)
University of North Texas	CNET	6 – CIP 15 – Technology (100%)	30 – CIP 15 – Technology (100%)	-	36 – CIP 15 – Technology (100%)

**Table 6.** Course Inventory of Construction Programs with Only Undergraduate Offering

INSTITUTION	RUBRIC	# of Lower-Level Courses	# of Upper-Level Courses	# of Graduate-Level Courses	Total # of Courses
Lamar University	CMGT	6 – CIP 14 – Engineering (100%)	13 – CIP 14 – Engineering (81%) 3 – CIP 52 – Business (19%)	11 – CIP 52 – Business (100%)	19 – CIP 14 – Engineering (58%) 14 – CIP 52 – Business (42%)
Texas A&M University		7 – CIP 15 – Technology (64%) 2 – CIP 14 – Engineering (18%) 2 – CIP 04 – Architecture (18%)	23 – CIP 15 – Technology (64%) 6 – CIP 14 – Engineering (17%) 5 – CIP 52 – Business (14%) 2 – CIP 04 – Architecture (6%)	14 – CIP 52 – Business (61%) 9 – CIP 15 – Technology (39%)	39 – CIP 15 – Technology (56%) 19 – CIP 52 – Business (27%) 8 – CIP 14 – Engineering (11%) 4 – CIP 04 – Architecture (6%)
Texas State University	CSM	4 – CIP 15 – Technology (80%) 1 – CIP 04 – Architecture (20%)	9 – CIP 15 – Technology (60%) 3 – CIP 04 – Architecture (20%) 3 – CIP 52 – Business (20%)	20 – CIP 15 – Technology (91%) 1 – CIP 14 – Engineering (5%) 1 – CIP 52 – Business (5%)	33 – CIP 15 – Technology (79%) 3 – CIP 52 – Business (10%) 3 – CIP 04 – Architecture (10%) 1 – CIP 14 – Engineering (2%)
Texas Tech University	CONE	3 – CIP 14 – Engineering (100%)	15 – CIP 14 – Engineering (100%)	12 – CIP 14 – Engineering (100%)	30 – CIP 14 – Engineering (100%)
The University of Texas at Arlington	CM	7 – CIP 15 – Technology (100%)	22 – CIP 15 – Technology (100%)	17 – CIP – 52 – Business (94%) 1 – CIP 15 – Technology (6%)	29 – CIP 15 – Technology (64%) 17 – CIP – 52 – Business (36%)
The University of Texas at El Paso	CE	12 – CIP 14 – Engineering (92%) 1 – CIP 45 – Economics (8%)	36 – CIP 14 – Engineering (100%)	64 – CIP 14 – Engineering (84%) 12 – CIP 52 – Business (16%)	112 – CIP 14 – Engineering (90%) 12 – CIP 52 – Business (10%) 1 – CIP 45 – Economics (1%)
The University of Texas at San Antonio	CSM	4 – CIP 14 – Engineering (80%) 1 – CIP 15 – Technology (20%)	16 – CIP 14 – Engineering (84%) 1 – CIP 15 – Technology (5%) 1 – CIP 52 – Business (5%) 1 – CIP 46 – Construction (5%)	12 – CIP 14 – Engineering (50%) 12 – CIP 52 – Business (50%)	32 – CIP 14 – Engineering (67%) 13 – CIP 52 – Business (27%) 2 – CIP 15 – Technology (4%) 1 – CIP 46 – Construction (2%)

**Table 7.** Course Inventory of Construction Programs with Undergraduate and Graduate Offering



The data presented in Tables 6 and 7 show a variety of CIP codes for the course offering regardless of the program title/type or degree level. A variety can also be observed within the same program for lower, upper, and graduate-level offerings. However, it is essential to recognize the limitations of this database search process. The database was queried for each institution using the rubric closely associated with the construction program. In some instances, and very likely in a large departmental structure with multiple degree programs, the search process captures more courses than a typical construction curriculum would utilize. The search also captures “special topics” and “thesis/dissertation” type offerings, which, by definition, would vary in content. Even with these limitations, the course offerings portfolio covers a wide range from architecture to facility management.

## **SUMMARY AND CONCLUSIONS**

The goal of this paper was to provide an organized review of the construction programs in Texas using the CIP code designations as a reference. The multi-discipline nature of construction education is clearly reflected in this review. The program names, program CIP designations, and individual course offerings show a wide range that may interpret institutions' different approaches. This paper does not include the accreditation status, type, and agency review. The accreditation process relates to the entire curriculum for a degree program and is assessed mainly by the outcomes rather than the course offering types.

As a part of the review discussion, the following issues must be noted:

- In most cases, the CIP code designations are defined when a new program or course is created but not necessarily reviewed and updated regularly.
- The program's origins are expected to impact the course portfolio significantly. A construction program with an architecture or engineering background will likely include CIP 04 and CIP 14 designations.
- The organizational structure of the program also is a factor in this discussion. The construction program’s department/school/college affiliation may directly impact the CIP designations.

Although the CIP code reference is not a perfect tool in reviewing the status of construction education, it provides an insight into how the programs are structured. A topical content comparison may provide a further understanding of the programs using a similar approach. For example, how do the programs designate their estimating or structures courses? This method can also be utilized in a regional or national study to review the construction education programs.

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