

AMERICAN COUNCIL FOR CONSTRUCTION EDUCATION

DOCUMENT 103

STANDARDS AND CRITERIA FOR ACCREDITATION OF POSTSECONDARY CONSTRUCTION EDUCATION DEGREE PROGRAMS



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I. INTRODUCTION

1.1 Purpose

The purpose of this document is to define the standards and criteria by which those construction education programs seeking accreditation or re-accreditation by ACCE shall be assessed. Assessment shall be by peer educators from other programs in concert with construction practitioners, representatives of the construction industry associations and organizations, and society at large. Assessment shall occur through an on-site visitation by a designated team following procedures specified in Document 101.

1.2 Definitions

Educational (degree) Program – ACCE accredits post secondary degree programs. A program is an education system with identified academic coursework, containing the bodies of knowledge necessary to obtain a college or university degree in that field of study.

Educational (academic) Unit – ACCE recognizes there are units at institutions of higher learning composed of faculty and staff capable of teaching and/or conducting research. These units typically offer degree programs with which they are affiliated. Operations may include (but are not limited to) budgets, faculty evaluations, promotion and tenure, scholarly activities, and determination of work assignments.

Educational Institution – Multi-unit organizations influencing education by providing knowledge, instruction or information through teaching and/or research (e.g., a university or college).

1.3 Institution and Program Eligibility

To be considered for accreditation, a program in construction education must:

1.3.1 Be located in an institution of higher learning that is legally authorized under applicable law to provide a program of education beyond that of the secondary level. Furthermore, in the case of those institutions in the United States, be accredited by the appropriate regional accrediting agency, and in the case of other countries, be accredited by the accrediting agency appropriate for its locale, if such exists.

- 1.3.2 Have been in operation for sufficient time to have at least one (1) class of graduates.
- 1.3.3 Offer either a baccalaureate or associate degree program with a major emphasis on professional construction education.

II. ORGANIZATION AND ADMINISTRATION

2.1 Institution

The organizational structure of the educational institution should provide a basis for establishing authority and responsibility, utilizing resources and achieving goals within the construction education unit and for its respective educational (degree) programs. It is expected that the construction education program functions within the framework established for the educational institution and is consistent with the institutional mission and assessment procedures. The administrative function and responsibilities should be accepted and discharged within the context of appropriate experience, preparation, and commitment.

A successful educational (degree) program will reflect the importance of having strong administrative leadership based firmly upon specific administrative procedures and policies. Educational institutional support of the administration of the affiliated construction education unit should provide status within the institution comparable to that of other academic units of similar size and function with regard to finances, staffing, teaching loads, promotions in rank and salary, appointment to educational institution policy-making committees, program priorities, and other academic affairs.

It is recognized that varying types of administrative structures are possible and acceptable to accomplish the goals of the educational institution. There should exist a well-defined and documented formal organizational structure. Areas of authority and responsibility must be clearly defined and adhered to. The administrative staff should be well balanced in all functional areas-e.g., student counseling and advising, budget management, academic administration, teaching effectiveness, involvement with local industry and, where appropriate, research, and extension.

For each goal there should be an area of assigned administrative responsibility indicating a commitment by the governing body to achieving that goal. In addition, it must be determined if the educational institution administration has a generally positive attitude and support for the program. This should be verified by discussion with the construction educational (academic) unit, program administrators and faculty, and with all levels of administration within the educational institution.

2.2. Construction Unit

The construction educational (academic) unit and/or program must be headed by a qualified administrator who is knowledgeable and committed to the construction profession and is empowered by the educational institution with sufficient authority and given sufficient support and time to accomplish the unit's goals and objectives. The administrator should provide sufficient leadership and supervision to develop a strong academic construction education program. To this end the educational institution and the unit administrator must insure that the total administrative workload is carefully controlled in relation to the total workload of the administrator. The organizational structure of the construction education unit along with its program should be designed to encourage communication, coordination, and interaction between administrative officers, faculty, students within the unit, other disciplines, and other educational institutions. The administrative structure must be sufficiently flexible to make the functional changes necessary to attain the program objectives. To the extent institution policies permit, the administrator should encourage professional development of faculty through such means as leaves of absence for gaining professional experience, study and research, participation in professional organizations, and attendance at professional meetings and workshops. The administrator and the faculty must cooperate to develop a construction education program of high quality and establish a structure to facilitate planning and evaluation for continuous improvement.

It is important that the construction unit have a well-defined organization in order to achieve its stated goals and objectives. The effectiveness of the leadership of the construction unit can be ascertained from the clarity and conciseness of policies and decision-making relative to curriculum, faculty, students, and facilities. Program organization must be structured to ensure the future capacity of the program to achieve its purposes.

A construction program can benefit from closely related programs such as architecture, engineering, and business. The use of appropriate courses, the interaction of faculty, and the interaction of students are all positive indicators of a valuable and beneficial relationship with closely related programs.

Experimentation and innovation are encouraged in teaching methods and curriculum.

2.3 Budget

Financing for the construction unit is an indication of administrative support for the program. Budget allocations must be compatible with the size of the unit with respect to students, faculty, and staff. An important indication of institution support is adequate funding of the program including: competitive salaries, support for materials and supplies, laboratory facilities and equipment, and other needs of the program. Adequate budgetary support must be provided to the

construction program by the institution to enable the program to achieve its stated purposes. In addition, projected resources must be adequate to ensure the capacity of the program to achieve its planned future goals and objectives.

Relative to the sources of funds to support the construction education program, it is necessary to determine the extent of non-budgeted funds (soft monies, donations, etc.) that are used for faculty development, including travel. Non-budgeted funds should be used to supplement institution funds allocated by the administration rather than to replace those funds.

III. CURRICULUM

3.1 Purpose

The purpose of the curriculum is to provide an education that will lead to a leadership role in construction and to prepare the student to become a responsible member of society. The curriculum should be responsive to social, economic, and technical developments and should reflect the application of evolving knowledge in construction and in the behavioral and quantitative sciences.

The ACCE encourages accredited programs to regularly evaluate current curricula ~~for~~ and develop new curricula that reflect changing construction technologies and management trends.

The educational (degree) program offered by the construction educational (academic) units must be consistent with the philosophy and the purposes of both the institution and construction education unit. The curricular goals of construction programs must be related to the needs of society and the construction profession.

The ACCE recognizes the autonomy of educational institutions in the matter of curriculum development, and the levels and designations of the degrees awarded upon completion of the various programs. At the same time, it is preferred that the word "Construction" be included in the name of the degree awarded just as other professional disciplines name the profession in the degree awarded.

The ACCE also recognizes the autonomy of educational institutions in establishing standards and policies pursuant to acceptance of transfer credits for educational courses from either accredited or non-accredited institutions.

3.2 General Requirements

It is recognized that no construction education degree program either at the Baccalaureate or Associate degree level can offer every course or experience which, justifiably, could be suggested for the education of a Constructor. Further,

it may be desirable in some instances to develop curricula in one or more areas of construction specialization. Such specialties may be developed as the only program or as part of a multi-option program. It is assumed that each unit will develop its own program goals and objectives and particular emphasis, and will prescribe the number of courses for graduation, sequencing of study, course numbers, and titles.

The curriculum should be designed to accommodate continually expanding requirements of the profession, advancements in knowledge, and the contributions of related disciplines. Programs seeking accreditation should strive to provide offerings that exceed the ACCE standards and criteria for accreditation. Curriculum planning flexibility in the following subject areas recognizes and encourages differing emphases by the various construction education units.

To accurately determine student learning outcomes, category and core subject matter credit hour distribution and the inclusion of topical content, programs must provide a syllabus/outline for each course included in the construction/construction science categories which includes the course objectives in relation to the program goals and objectives, instructional methods, a topical outline and a method of assessment . Syllabi/outlines must be presented in a standard, consistent format.

In addition, programs must provide at the time of the visit:

- 3.2.1 Copies of textbooks, laboratory manuals and reference materials used, in order to determine appropriateness, adequacy of coverage, and currency of texts and other reference materials.
- 3.2.2 Copies of examinations and quizzes, term papers, laboratory reports, and special study assignments given which are representative of student work and not a compilation only of the best work.
- 3.2.3 Evidence of any contact the students may have with research, community service and internship or similar professional experiences.
- 3.2.4 Student records for compliance with program curriculum requirements and policies.
- 3.2.5 Documentation of specific and measurable student learning outcomes that encompass the course learning outcome(s) (demonstrated in 3.3.4 below)

3.3 Curriculum - Baccalaureate Degree Programs

A minimum of 120 semester (180 quarter) credit hours is required for accreditation of United States construction education baccalaureate programs.

An equivalent minimum, as determined by ACCE, is required for accreditation of a non-US baccalaureate program.

Additional credits to meet graduation may be required by the construction unit or the institution.

3.3.1 Category Requirements

The total curriculum should support the goals and objectives of the construction education unit and meet content requirements within the five major subject categories listed below.

Where content of a course spans more than a single category or core subject matter, credit hours may be divided, as appropriate, in order to accurately reflect the course content. Course titles or identification designations should not be used exclusively in determination of credit hour distribution.

<u>Curriculum Categories</u>	<u>Minimum Academic Credit</u>
1) General Education	15 semester (22 quarter) hours
2) Mathematics and Science	15 semester (22 quarter) hours
3) Business and Management	18 semester (27 quarter) hours
4) Construction Science*.....	20 semester (30 quarter) hours
5) Construction*	20 semester (30 quarter) hours
 Total Combined Construction Science and Construction*	 50 semester (75 quarter) hours
 <u>Subtotal: Prescribed Category Credits</u>	 98 semester (146 quarter) hours
 6) Other Credit Hours (As needed to complete 120 hour threshold or to meet additional institutional and program requirements)	 22 semester (34 quarter) hours
 Total ACCE Accreditation Requirement	 120 semester (180 quarter) hours**

* Construction Science and Construction are separate subject categories. The minimum aggregate of both Construction Science and Construction combined requirement is 50 semester (75 quarter) hours of academic credit.

* One semester hour equals 15 instructional hours; one quarter hour equals 10 instructional hours

3.3.2 Subject Matter Requirements

The curriculum must include minimum academic coverage of specific core subject matter that is essential for a graduate to function effectively in the construction environment. These core subjects and credit hour minimums are listed below. Core subject matter credit hour standards which do not comprise a full course shall be interpreted as proportionate minimum requirements for coverage of the designated subject material.

1) GENERAL EDUCATION....15 semester (22 quarter) hours

It is important that every Constructor's education include appropriate courses in communications, social sciences, and the humanities. This content should reflect the needs of the construction industry as well as the philosophy of the educational institution.

Construction is concerned with people and their relationships. Thus, the ability to communicate, both orally and in writing, and the understanding of human behavior are essential assets to the constructor.

Core Subject Matter	Minimum Academic Credit
Oral Communication	2 semester (3 quarter) hours
Written Communication	2 semester (3 quarter) hours
Total Oral and Written communication*	8 semester (12 quarter) hours in formal, stand alone courses
Ethics**	1 semester (1.5 quarter) hour(s)

*In addition to stand alone courses, oral presentation, technical writing, and/or business writing must be integrated into at least 33% of the total number of Construction and Construction Science courses. This integration is to be documented by the same means as other course content in these categories.

** Ethics must be integrated into at least five Construction and/or Construction Science courses.

Example courses in this division include:

Human relations, psychology, sociology, social science, literature, history, philosophy, art, language, political science, and other appropriate courses.

Exclusions: Courses concerned with physical education or military science and general studies do not fulfill this requirement.

2) MATHEMATICS AND SCIENCE....15 semester (22 quarter) hours

It is essential that every Constructor possess a well-developed concept of mathematics and physical science. Construction is in part a technical process that can be best controlled by applying the principles of mathematics, statistics, and computer science. Furthermore, an understanding of the behavior of the materials, equipment, and methods used in construction requires knowledge of the laws of physics, chemistry, geology, and environmental sciences.

Basic scientific, quantitative, and qualitative topics, which provide a foundation for subsequent technical subjects, are to be considered in this category.

Core Subject Matter	Minimum Academic Credit
Analytical: physical or environmental science	8 semester (12 quarter) hours
Statistics and/or Mathematics	3 semester (4.0 quarter) hours

Example courses in this division include:

- a) Mathematics...analytic geometry, pre-calculus, calculus, linear algebra, statistics...
- b) Physical Sciences...physics, chemistry, geology, environmental science
- c) Other Sciences...computer science, etc.

Sciences should be analytically (laboratory) based and not descriptive. Courses in computer sciences, general computer applications, programming, or computer languages are to be included in this category.

Exclusions: Only mathematics beyond college algebra and trigonometry may be used for this requirement. Other natural sciences do not fulfill this category requirement. Courses such as estimating, cost control, and scheduling that adapt the use of computers to construction are appropriate for the Construction category, but cannot be included in this category.

3) BUSINESS AND MANAGEMENT....18 semester (27 quarter) hours

The Constructor is a manager. To be an effective manager, the Constructor must know how to manage the principal resources of the industry, i.e., people and money. The Constructor should have a broad understanding of the fundamentals of the free enterprise system, accounting, finance, business regulations, contract law, labor law, and marketing.

This category involves fundamental courses to provide a foundation for contemporary business practices appropriate to applications in construction. No specific number of semester/quarter hours/core subject are required, however, eighteen semester (twenty seven quarter) hours are required in this category.

Core Subject Matter	
Economics	
Principles of Management	
Accounting	
Business Law	

Example courses in this division include:

- a) Economics...macro, micro, and labor economics
- b) Accounting and Finance... financial accounting, managerial accounting, cost accounting, finance, economic evaluation techniques and applications
- c) Industrial Relations...personnel management, labor relations, supervision, productivity
- d) Management...principles of management, business management, industrial management, organizational behavior, investment
- e) Other Business...real estate, business law, marketing, business electives

4) CONSTRUCTION SCIENCE.....20 semester (30 quarter) hours

The Constructor must have an understanding of the contribution of the design disciplines' processes. The Constructor must be able to communicate with the design professionals, and should be capable of participating during the planning phase of design-build projects.

Construction sciences and architectural or engineering design topics selected to facilitate communications with the design disciplines and to

solve practical construction problems are to be considered in this category.

Core Subject Matter	Minimum Academic Credit
Design Theory	3 semester (4 quarter) hours
Analysis and Design of Construction Systems	6 semester (9 quarter) hours
Construction Methods and Materials	6 semester (9 quarter) hours
Construction Graphics	1 semester (1.5 quarter) hour(s)
Construction Surveying	1 semester (1.5 quarter) hour(s)

Example courses in this division include:

- a) Fundamentals of Design Theory...statics, strength of materials, dynamics, thermodynamics, soil mechanics, hydraulics, hydrology
- b) Analysis and Design of Construction Systems...structural, HVAC, plumbing, mechanical, electrical, roadways, drainage, utilities
- c) Construction Design...temporary facilities, rigging, formwork, scaffolding, foundations; construction surveying; and construction graphics
- d) Construction Materials...construction materials, assembly techniques, equipment selection, components, and materials testing
- e) Other...project development, feasibility studies, value analysis, site planning, building codes, inspection, basic elements of building and site design, and architectural or engineering electives

5) CONSTRUCTION.....20 semester (30 quarter) hours

The construction curriculum category is of vital importance in a quality construction curriculum. Courses should include both office and field activities and include the effective management of personnel, materials, equipment, costs, and time. All types of construction should be included.

Curricula topics should address the constructor's role as a member of a multi-disciplinary team, the assessment of project risk, and the alternate methods that can be used to structure the owner-designer-constructor team. Course work will examine the various roles and responsibilities of project participants throughout a project's life and the creative ways that project teams can be assembled.

Fundamental topics to provide an appropriate combination of breadth and depth in current construction industry practice are to be considered

in this category. These topics should develop skills, which will facilitate advancement of the individual in the construction profession.

Construction courses should be presented in a manner that encourages problem definition and solution, creativity, communication, evaluation, and continuous learning. The knowledge, understanding, and skills gained from prerequisite courses should be integrated and utilized in subsequent courses.

Core Subject Matter	Minimum Academic Credit
Estimating	3 semester (4 quarter) hours
Planning and Scheduling	3 semester (4 quarter) hours
Construction Accounting and Finance	1 semester (1.5 quarter) hour(s)
Construction Law	1 semester (1.5 quarter) hour(s)
Safety	1 semester (1.5 quarter) hour(s)
Project Management	3 semester (4 quarter) hours

Example courses in this division include:

- a) Construction Fundamentals...orientation, drawings and specifications, contract documents, computer applications in construction
 - b) Estimating and Bidding... quantity surveying, pricing, manpower estimates, bid compilation, bidding strategy
 - c) Project Execution... work analysis, safety, field records, quality control and assurance, job supervision, productivity
 - d) Project Control...scheduling, project budgeting, purchasing, expediting, cost control, cash flow
 - e) Specialty Construction Topics...mechanical, electrical, process plant construction, roadways
 - f) History of Construction...history of the construction process
 - g) Safety
 - h) Other construction...work experience, construction electives
- 6) OTHER CREDIT(S)There are no ACCE minimum hour requirements beyond the 120 semester (180 quarter) hour curriculum total.

3.3.3 Required Fundamental Construction Topics

It is recognized that the construction curriculum is an integration of all five mandatory subject categories and that each institution will use a unique blend of program and supporting courses to address its objectives within the institutional environment.

To assure a minimum core of construction principles and practices, each program must contain fundamental topical content specifically listed in the table below. The curriculum location and appropriate extent or depth of coverage for each of the fundamentals is left to the discretion of the program as it fulfills its mission. This list is to provide guidance for preparing a self-evaluation study and to assist visiting teams in their evaluation of the program curriculum. For purposes of preparing or evaluating a program's self-evaluation study, the following points address Topical Content within the curriculum:

- All topical content must be included within the curriculum.
- No quantitative measure is applied to topical content.
- Topical content points of evidence can include documentation on tests, syllabus notations, student papers, projects, or homework assignments.

Topical content in this chart is organized for ease of reference but is not intended to imply specific location within a curriculum category or course.

	Curriculum Topical content
	General Education
	Communications
	Ethics
	Humanities
	Social Sciences
	Mathematics and Science
	Analytical Physical Science
	Mathematics and/or Statistics
	Business & Management
	Economics
	Principles of Management
	Accounting
	Business Law
	Construction Science
	Design Theory (Select one or more from the following options.)
	Structural Mechanics
	Electricity
	Thermodynamics
	Soil Mechanics
	Analysis and Design of Construction Systems (It is the intent of this requirement to ensure that construction program graduates have, at minimum, some exposure to all basic systems that may be incorporated into a building project.)
	Civil

	Electrical
	Mechanical
	Structural
	Building Codes and Standards
	Construction Graphics
	Basic Sketching and Drawing Techniques
	Graphic Vocabulary
	Detail Hierarchies, Scale, Content
	Notes and Specifications, Reference Conventions
	Computer Applications
	Construction Surveying
	Survey, Layout, and Alignment Control
	Site Organization and Development
	Construction Methods and Materials (including: concrete, steel, wood, and soils)
	Composition and Properties
	Terminology & Units of Measure
	Standard Designations, Sizes, and Graduations
	Conformance References and Testing Techniques
	Products, Systems and Interface Issues
	Equipment Applications & Utilization
	Comparative Cost Analysis
	Assembly Techniques & Equipment Selection
	Building Codes & Standards
	Construction
	Estimating
	Types of Estimates and Uses
	Quantity Takeoff
	Labor and Equipment Productivity Factors
	Pricing and Price Databases
	Job Direct and Indirect Costs
	Bid Preparations and Bid Submission
	Computer Applications
	Planning and Scheduling
	Parameters Affecting Project Planning
	Schedule Information Presentation
	Network Diagramming and Calculations with CPM
	Resource Allocation and Management
	Computer Applications
	Construction Accounting and Finance
	Cost Accounting and Industry Formats
	Fixed and Variable Costs: insurance, bonding, marketing, general and Administrative expenses
	Bidding and Procurement Practices
	Record and Report Practices

	Capital Equipment, Depreciation, and Expensing
	Forecasting Costs, Cash Flow Requirements
	Payment Processes and Time Value of Money
	Construction Law
	Construction Contracts, Roles & Responsibilities of Parties
	The Regulatory Environment and Licensing
	Lien Laws and the Contractor's Rights
	National and Local Labor Law
	Administrative Procedures to Avoid Disputes
	Safety
	Safe Practices
	Mandatory Procedures, Training, Records, and Maintenance
	Compliance, inspection and penalties
	Project Management
	Concepts, Roles, and Responsibilities
	Labor Relations
	Administrative Systems and Procedures
	Cost Control Data and Procedures
	Documentation at Job Site and Office
	Quality Control Philosophies and Techniques
	Computer Applications

3.3.4 Student learning Outcomes

Programs must demonstrate that each course has specific and measurable learning outcomes that are aligned with topical content and program learning outcome(s) (documented in 3.2.5 above).

3.4 Curriculum - Associate Degree Programs

A minimum of 60 semester (90 quarter) credit hours is required for accreditation of United States construction education associate degree programs. An equivalent minimum, as determined by ACCE, is required for accreditation of a non/US associate degree program.

Additional credits to meet graduation may be required by the construction unit or the institution.

3.4.1 Category Requirements

The total curriculum should support the goals and objectives of the construction education unit and meet content requirements within the five major subject categories listed below.

Where content of a course spans more than a single category or core subject matter, credit hours may be divided, as appropriate, in order to

accurately reflect the course content. Course titles or identification designations should not be used exclusively in determination of credit hour distribution.

<u>Curriculum Categories</u>	<u>Minimum Academic Credit</u>
1) General Education.....	8 semester (12 qtr) hours
2) Mathematics and Science	8 semester (12 qtr) hours
3) Construction Design Principles and Practice ...	33 semester (50 qtr) hours
4) Business and Management	6 semester (9 qtr) hours
Total Prescribed Category Credits	55 semester (83 qtr) hours
5) Other credit Hours	0 semester (0 quarter) hours

No specific number of semester/quarter hours are required in this category. Requirements and electives determined by the faculty and/or students to meet the objectives of the program and to fulfill the requirement of sixty (60) total semester hours (90 quarter hours) may be included in this category.

Total ACCE Accreditation Requirement60 semester (90 quarter) hours

3.4.2. Subject Matter Requirements

The Curriculum must include minimum academic coverage of specific core subject matter that is essential for a graduate to function effectively in the construction environment. These core subjects and credit hour minimums are listed below. Core subject matter credit hour standards which do not comprise a full course shall be interpreted as proportionate minimum requirements of coverage of the designated subject material.

1) GENERAL EDUCATION - 8 semester hours (12 quarter hours)

Socio-humanistic topics, particularly those emphasizing written and oral communications skills are to be considered in this category.

It is important that every Constructor's education include appropriate courses in communications, social sciences, and the humanities. This content should reflect the needs of the construction industry as well as the philosophy of the educational institution.

Construction is concerned with people and their relationships. Thus, the ability to communicate, both orally and in writing, and the understanding of human behavior are valuable assets to the constructor.

<u>Core Subject Matter</u>	<u>Minimum Academic Credit</u>
Oral and written communication*	6 semester (9 quarter) hours
Total hours prescribed in this category	6 semester (9 quarter) hours

*In addition, oral and written presentations must be integrated into the construction curriculum.

Example courses in this division include:

- a) Communications...English composition, speech, technical writing
- b) Humanities...art, music, theater arts, literature, mythology, religion, philosophy, ethics
- c) Social Science...history, anthropology, socio-economics, geography, political science, psychology, sociology, human relations

Exclusions: Courses concerned with physical education, military science, and general studies do not fulfill this requirement.

2) MATHEMATICS AND SCIENCE - 8 semester hours (12 quarter hours)

Basic scientific, quantitative, and qualitative topics, which provide a foundation for subsequent technical subjects, are to be considered in this category.

It is essential that every Constructor possess a well-developed concept of mathematics and physical science. Construction is in part, a technical process that can be best controlled by applying the principles of mathematics, statistics, and computer science. Furthermore, an understanding of the behavior of the materials, equipment, and methods used in construction requires a knowledge of science.

<u>Core Subject Matter</u>	<u>Minimum Academic Credit</u>
Physical or Environmental Sciences	3 semester (3 quarter hours)
Mathematics	3 semester (3 quarter hours)
Total hours prescribed in this category	6 semester (6 quarter hours)

Example courses in this division include:

- a) Mathematics...algebra, trigonometry, analytic geometry, pre-calculus, calculus, statistics
- b) Biological, Natural, and Physical Sciences...earth science, biology, chemistry, physics, environmental science
- c) Computer Science

Exclusions: Technical mathematics, which does not include algebra or trigonometry, if required for the degree, may be classified as "Other Requirements."

Biological, natural and physical sciences should be analytically based and not descriptive. Courses in computer science, general computer applications, programming, or computer languages are to be included in this category. Courses such as estimating, cost control, and scheduling that adapt the use of computers to construction should be included in the Construction Design Principles and Practice category.

3) CONSTRUCTION DESIGN PRINCIPLES AND PRACTICE - 33 semester hours (50 quarter hours)

The Constructor must have a good understanding of the design disciplines (architecture and engineering) and the design processes to be effective in the construction industry. He/she must be able to communicate with design professionals and must also be able to use engineering principles to solve practical construction problems.

The construction courses should be presented in a manner that encourages both office and field problem definition and solution, creativity, communication, evaluation, and continuous learning. The knowledge, understanding, and skills gained from prerequisite courses should be integrated in subsequent courses.

Topics which provide an appropriate combination of breadth and depth in current construction industry practice are included in this category. These topics should develop skills which facilitate advancement of the individual in the construction industry.

Topics of architecture and engineering fundamentals selected to facilitate communications with the design disciplines and to solve practical construction problems are also included in this category.

The construction courses are of vital importance in the quality construction curriculum. The courses should include both field

and office activities and the effective management of personnel, materials, equipment, money and time.

<u>Core Subject Matter</u>	<u>Minimum Academic Credit</u>
Design Theory	2 Semester (3 Quarter) hours
Construction Materials	2 Semester (3 Quarter) hours
Construction Methods/Techniques	2 Semester (3 Quarter) hours
Construction Graphics/Blueprint Reading	2 Semester (3 Quarter) hours
Construction Layout	1 Semester (1.5 Quarter) hours
Estimating	2 Semester (3 Quarter) hours
Planning and Scheduling	2 Semester (3 Quarter) hours
Construction Accounting/Finance	1 Semester (1.5 Quarter) hours
Construction Law	1 Semester (1.5 Quarter) hours
Construction Safety	1 Semester (1.5 Quarter) hours
Project Management	2 Semester (3 Quarter) hours
Building Codes	1 Semester (1.5 Quarter) hours
Total hours prescribed in this category	19 Semester (28.5 Quarter) hours

Example courses in this division include:

- a) Construction Fundamentals...orientation, drawings, and specification reading, drafting, contract documents, interpretation of building codes, project inspection
- b) Construction Science...statics, strength of materials, soil mechanics, hydraulics
- c) Construction Design Principles...temporary facilities, rigging, formwork, scaffolding, structural systems, and building systems
- d) Estimating and Bidding...quantity surveying, materials takeoff, pricing, manpower estimating, bid compilation and strategy
- e) Project Execution and Control...construction methods, equipment selection, scheduling, budgets, purchasing, safety, inspections, field records, quality assurance, job supervision, productivity.
- f) Specialty Construction Topics...mechanical, electrical, process plant construction, roadways, drainage, utilities
- g) Other - computer applications, project development, site planning, surveying, work experience, design electives, construction electives, construction specialties.

4) BUSINESS AND MANAGEMENT - 6 semester hours (9 quarter hours)

The Constructor is a manager. To be effective managers, the graduates must have knowledge of how to manage the principal resources of the industry, i.e., people and money. They must also know and understand the United States free enterprise system, accounting, finance, business, regulations, contract law, marketing and a broad spectrum of business and management topics.

This category involves fundamental courses to provide a foundation for contemporary business practices appropriate to applications in construction. No specific number of semester/quarter hours/core subject are required, however, six semester (nine quarter) hours are required in this category. The distribution of credit hours/core subject will be determined by the program and shall encompass more than one area. The core subject matter areas listed below are not all inclusive.

<u>Core Subject Matter</u>	<u>Minimum Academic Credit</u>
Economics and/or Principles of Management and/or Accounting and/or Business Law	
Total hours prescribed in this category	6 Semester (9 Quarter) hours

Example courses in this division include:

- a) Accounting and Finance...general accounting, cost accounting, finance, investments
- b) Management and Supervision...principles of management, elements of supervision, labor relations, business management
- c) Other...business economics, real estate, business law, contract law, marketing, business ethics

5) OTHER REQUIREMENTS – No specific number of semester/quarter hours are required. Requirements and electives determined by the faculty and/or students to meet the objectives of the program and to fulfill the requirement of sixty (60) total semester hours (90 quarter hours) may be included in this category.

Example courses in this division include:

- a) General Requirements... technical mathematics which does not include algebra and trigonometry if required for the degree, military science, physical education, life sciences
- b) Free Electives

General Education

Written Communications
Oral Communications
Social Sciences

Mathematics and Science

Physical or Environmental Science
Mathematics

Business & Management

Accounting/Bookkeeping
Financial Statements
Contract Law

Construction Design Principles and Practice

Structural Design
Electrical
Mechanical
Plumbing
Construction Estimating
Construction Scheduling
Building Codes & Standards
Construction Graphics/Blueprint Reading
Construction Surveying
Construction Materials and Methods
Construction Safety
Ethics

- ◆ It is understood that computer applications are essential in the construction industry. Specific applications/software should be incorporated into the curriculum in various courses as required to fulfill the program's mission statement.
- ◆ Ethics must be integrated into the construction curriculum.

6) TOTAL REQUIREMENTS - A minimum of 60 semester (90 quarter) credit hours for United States construction education associate degree programs, or an equivalent minimum for non-US associate degree programs, as determine by ACCE.

The credit hours indicated above are minimums for ACCE accreditation. Additional credits to meet graduation criteria may be required by the construction unit. The additional courses may be from courses selected by the program administrator and/or the students.

3.4.3 Required Fundamental Construction Topics

It is recognized that the construction curriculum is an integration of all four mandatory subject categories and that each institution will use a unique blend of program and supporting courses to address its objectives within the institutional environment.

To assure a minimum core of construction principles and practices, each program must contain fundamental topical content specifically listed in the table below. The curriculum location and appropriate extent or depth of coverage for each of the fundamentals is left to the discretion of the program as it fulfills its mission. For purposes of preparing or evaluating a program's self-evaluation study, the following points address Topical Content within the curriculum.

- a) All topical content must be included within the curriculum.
- b) No quantitative measure is applied to topical content.
- c) Topical content points of evidence can include documentation on tests, syllabus notations, student papers, projects, or homework assignments.

Topical content in the follow chart is organized for ease of reference but is not intended to imply specific location within a curriculum category or course.

3.4.4 Student Learning Outcomes

Programs must demonstrate that each course has specific and measurable learning outcomes that are aligned with topical content and program learning outcome(s) (documented in 3.2.5 above).

3.5 Courses Delivered by Alternative Methods

Courses delivered by alternative methods to live classroom (e.g., distance learning or online courses via synchronous or asynchronous delivery) may be incorporated in an accredited construction education program's curriculum under the following conditions:

- 3.5.1 The alternative courses will be accepted for transfer credit as reviewed and accepted by the accredited university programs.
- 3.5.2 The program standing for initial accreditation or renewal of accreditation shall display the same kind of course material for evaluation of alternative courses as set forth in this document for a conventionally offered classroom lecture or laboratory course. Online course materials, including examples of student work, may be presented for review in online format as

long as they are readily accessible to the Visiting Team and are accurately identified with course number and semester (or quarter).

- 3.5.3 Construction specific courses shall be evaluated for content as set forth in this document, regardless of delivery format.
- 3.5.4 Programs that offer the same course via different delivery methods (i.e., live classroom and online) shall demonstrate that courses with the same course number have consistent content and learning objectives.

3.6 Split (dual) Campus Program Delivery

- 3.6.1 It is possible for split or dual institutional campuses to be accredited as a single construction educational (degree) program as long as the following conditions exist:
 - 3.6.1.1 There is a single institution providing the program with its degree.
 - 3.6.1.2 The educational (degree) program is led by the same qualified administrator(s).
 - 3.6.1.3 The program administrator has sufficient authority to be able to provide the required leadership and supervision that allows the development of a strong academic construction educational (degree) program.
 - 3.6.1.4 There are adequate faculty and staff to successfully facilitate the program at different geographic campus locations.
 - 3.6.1.5 Program curriculum, topical content and the degree requirements are the same on all campuses.
 - 3.6.1.6 If multiple educational (academic) units are units involved to support the educational (degree) program, they must use only one academic quality plan identifying the process used for the continuous improvement of the construction educational (degree) program. In addition, the goals and objectives of the units need to be aligned to facilitate the success of the program and its continual improvement.
- 3.6.2 One educational (academic) unit should be identified as the home for the program. This unit should be responsible for the successful delivery of the program and is typically the base for program operations.

3.7 Supporting Disciplines

Construction education programs should include courses from supporting disciplines that are essential to the general education of the person and which provide basic concepts or skills that are important to the area of specialization. Courses selected from supporting disciplines should enhance the interdisciplinary nature of the construction program.

IV. FACULTY AND STAFF

4.1 Qualifications

In determining the qualitative and quantitative adequacy of the construction education unit's faculty and staff, various criteria are applied.

Significant emphasis is placed on the qualifications and responsibilities of the construction faculty.

The faculty should possess appropriate academic qualifications, professional experience, and pursue scholarly and creative activities essential to the successful conduct of an academic program of construction. To ensure that the construction unit is competitive in seeking faculty members, the educational institution must provide the faculty with rank, status, salary, and benefits commensurate with their educational background and professional experience.

The educational preparation of each faculty member must include study in the areas for which he has teaching responsibility and include adequate background in the supporting disciplines from which his area of specialty draws major concepts and principles.

Evaluation of faculty competence must recognize appropriate professional experience as being equally as important as formal educational background. Continuing professional growth of the education faculty is a prerequisite to effective teaching. In addition, the faculty should actively participate in professional organizations and community services, and in interpreting construction education to other professions and to the general public. The size of the construction faculty should be commensurate with the number of courses offered, the number of students enrolled, and the other responsibilities of the faculty. The faculty should be appropriate to the type of instruction and comparable to that of the faculty of other academic programs of the institution. The institution should recognize the total professional responsibilities and services (in addition to the teaching assignments) of each faculty member.

4.2 Faculty Work Load

It is important that the faculty workload be distributed fairly. It is recognized that workload assignment is a difficult process and requires the qualitative judgment of the administrator. The following factors should be considered in the determination of a work load: number of lecture hours, number of laboratory hours, number of separate preparations, class size, availability of teaching assistants, counseling activities, administrative activities, committee assignments, extension or continuing education commitments, and research activities.

4.3 Administrative and Technical Staff Support

Administrative and technical staff support should be adequate to sustain fulfillment of the construction educational (academic) unit's mission and be consistent with the level of support enjoyed by other program units within the parent institution.

4.4 Employment Policies

It is recognized that salary may not be a primary motivation or reward for good teaching. However, it is important that faculty compensation be competitive with comparable positions in other institutions and industry to insure that quality faculty and high morale exist. It is expected that construction faculty have some assurance that adequate financial security is provided.

4.5 Professional Development

A clearly defined program of professional development is required to maintain a high level of professional competence. Caution should be exercised to prevent any faculty member with a strong area of expertise from being given teaching assignments that limit opportunity to develop other areas of expertise.

Consulting work is desirable and encouraged, provided such activities do not conflict with normal assigned duties and responsibilities of the faculty member. Administrative policy should insure that opportunities for professional development are made available and used by the entire faculty.

4.6 Faculty Evaluation

A clearly defined program of faculty evaluation is required in order to assure the maintenance of high quality instruction. These evaluations should be made annually, and may include student, peer, and/or administrator evaluations.

V. STUDENTS

5.1 Admissions and Enrollment

It is important that attention be given to the capabilities and professional motivation of students entering the construction program. It is recognized that no single criterion for the admission of students can predict the potential for success of the individual. However, it is generally accepted that established national norms of standardized tests are of value in predicting academic achievement. Qualifications of students admitted to a program in construction education should be comparable with those of students in other areas of the institution and appropriate to the requirements for construction education.

Entering students should have academic abilities appropriate to the respective institution, motivation, and career orientation. Recruitment should be directed

toward those individuals with high academic achievement and community involvement, as well as those with defined career goals in construction. Admissions policies should be directed toward students with the ability and credentials for successful completion of the curriculum.

If constraints on construction program enrollment exist, such constraints should be the result of a broad institution policy rather than from the desire for convenient administration of the program. Recruitment and publicity for the construction program should be comparable to other programs of the institution.

5.2 Academic Progress

There must be an organized system of counseling and professional guidance available to all students in the construction education program so that their needs, interests, and abilities are considered in preparing and implementing a plan of study. Academic advising may be conducted in person or electronically. The academic advising and counseling procedures should include a close relationship between the individual student and the construction faculty. A record system should exist that keeps both the student and advisor informed regarding the student's progress toward completion of degree requirements.

It is important that academic performance be monitored. High academic achievement should be recognized and rewarded. Low academic achievement should be detected and appropriate actions taken. This is especially important if the admissions process does not provide for initial screening of students.

5.3 Extracurricular Activities

Extracurricular activities provide valuable interpersonal and leadership experience. Thus, students should be encouraged to participate in activities in addition to their academic studies. Such activities should include involvement with industry-based professional and trade organizations. Students who are participating in courses via alternative delivery methods and who are not able to participate in campus-centered extracurricular activities should be encouraged to become involved with industry-based professional and trade organizations and other related volunteer activities in their local area. The extent of participation by students in extracurricular activities is an indication of the unity of the student body and promotes interest in citizenship and professional societies after graduation.

5.4 Graduates

A measure of the quality of any academic program is the success of graduates in practice. Therefore, there must be communication with alumni and periodic follow-up of graduates.

VI. FACILITIES AND SERVICES

6.1 Physical Facilities.

Physical facilities should be well maintained and organized to accommodate academic activities such as lectures, discussions, demonstrations, seminars, conferences, laboratory work, and research. The nature of construction programs imposes a need for special types of space and equipment to introduce the student to realistic construction methods and procedures. It is important that the facilities be arranged to encourage student and faculty interaction.

Traditional laboratory courses such as drafting, surveying, and material testing may use facilities developed for the design disciplines. However, it is important that there also be laboratory facilities for the teaching of construction principles and practices. There should be facilities for office oriented activities with adequate storage space for multiple copies of plans and specifications, and facilities for field-oriented activities such as space for model building and simulations.

6.2 Library

The library is a critical resource of any educational system. Adequacy of the library facilities must be shown in the scope and depth of library holdings as related to the general and professional components in the field of construction. Adequacy should also be reflected in the acquisition of current publications relative to construction. There should be evidence of both adequacy and use in the selection of library materials, and of responsibility for their effective use.

6.3 Other Services

Appropriate services on campus shall be used effectively by the construction education unit. These include the computer center, audiovisual, placement and student services, and financial aid. Appropriate tools and media, including technical support, shall be available to support courses that are delivered via alternative methods.

VII. RELATIONS WITH INDUSTRY

7.1 Support From Industry

Construction is a practice oriented profession. Therefore, it is imperative that an advisory committee, consisting of representatives from the construction industry, be actively involved in an advisory role for the construction program.

The committee should meet at least once a year for the purpose of advising and assisting the development and enhancement of the program. Although the composition of the committee should change periodically, there should be provisions to ensure continuity. The composition of the committee should be representative of the potential employers of the graduates of the construction program.

7.2 Support for Industry

There should be an active program of continuing education and research (where required by the institution) directly applicable to and in support of the construction industry. The construction program should maintain continuous liaison with the various constituencies it serves for the purpose of establishing educational and professional development activities for the construction industry.

7.3 Student-Industry Relations

Communication and participation among faculty, students and the construction industry should be well documented through industry involvement such as field trips and speakers for student organizations. Students should actively participate in activities of construction related organizations, including associations and institutes. They should also work to obtain construction related experience through participation in internships and cooperative education programs.

Students who are participating in courses via alternative delivery methods should actively participate in activities of construction related organizations, including associations and institutes in their local area. Construction-related work experience is equally important for students who are enrolled in online classes, or are participating in the program via distance education. Distance Students who participate in an alternative delivery method should have access to information about internships and cooperative education programs that may be within or outside of their local area.

VIII. RELATIONS WITH THE GENERAL PUBLIC

Accredited programs shall manifest accountable behavior in providing information for release in any manner to the general public.

- Institutions should broadly and accurately publish the objectives of the program, admission requirements, program assessment measures employed and the information obtained through these assessment measures, student achievement, the rate and types of employment of graduates, and any data supporting the qualitative claims made by the program.
- No release is authorized of a program's term or period of accreditation.
- No ranking is to be implied through linkage to ACCE accreditation.
- Indication of accreditation status is authorized during any defined term of accreditation.

IX. PROGRAM QUALITY AND OUTCOME ASSESSMENT

9.1 Academic Quality Plan

There must be an Academic Quality Plan specific to the construction educational (degree) program identifying the process used for the continuous improvement of the educational (degree) program, specific to the educational (degree) program. This plan will serve as a tool for continual assessment and improvement of the educational (degree) program and be available in the administrative office for review by the Visiting Team.

A significant part of any assessment plan is identifying the indicators of academic quality in construction education programs. Indicators are the measures used directly related to the construction program's goals and are designed to provide reliable data measuring progress towards meeting those goals. The indicators and respective metrics shall be clearly stated.

The Academic Quality Plan will form the basis of empirically assessing the stated outcomes of the educational (degree) program. Assessment input should be obtained from the unit's constituencies, including students, graduates, employers, benefactors, the construction industry, and the program planners (faculty, staff, and administrators). The plan/process should define the quality assessment cyclic process.

Accredited baccalaureate programs are encouraged to utilize a certification or competency examination as a component of the program's outcome assessment effort.

9.2 Planning and Evaluation

The planning and evaluation process of the Academic Quality Plan must contain measurable outcomes; a systematic means of collecting, quantifying, and analyzing data relevant to those outcomes; development of conclusions based on the data collected; and program modifications, when deemed appropriate to improve the program.

9.3 Application

The conclusions and inferences drawn from the quality assessment process should then be incorporated into the Academic Quality Plan. The process will generate a data profile (composite report of data) to be used in such a manner, as to foster enhancement of student achievement with respect to the construction education program. After each comprehensive quality assessment period, the entire process should be reviewed and updated with plans for implementation for improvement recorded and cited.

9.4 Resources

Adequate resources must be available to the program so that it may structure a mission statement, goals, and outcomes, which will serve to ensure continual improvement of the program. In addition, the available resource must support a systematic means for collecting, quantifying, and analyzing data relative to the unit's outcome; the formulation of conclusions based on this data; and the making of appropriate program modifications. A record of revisions identified and incorporated into the program must be kept and available.

The program planning and assessment schedule must be defined by each institution, and be consistent with the program's ACCE accreditation schedule.