

An Analysis of Master's Curricula in Construction Programs in the US

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Abstract

Today, construction management programs are evolving. The Master's programs in Construction Management are offered not only in traditional Civil and Environmental Engineering Department, but also in new departments, such as Construction Management Department, Department of Construction Science and Management, Department of Architecture, Engineering and Construction, etc.. An analysis of core Construction Engineering and Management courses reveals the similarities and differences between the master's program of Construction Engineering and Management inside and outside Civil and Environmental Engineering Department. It is expected that this study will enable educators and students to better understand the Master's Curricula in construction engineering and management programs in the US.

Keywords

Master's Curricular, Construction, Civil, course topics

1. Introduction

Master's programs in Construction Engineering & Management are offered in both Civil & Environmental Engineering Department and Construction Management Department in the US. Through the search engines of www.petersons.com and www.ascweb.org, we find out that 32 universities in the United States offer MS. programs in Construction Engineering & Management within Civil and Environmental Engineering Department(Figure 1), while 19 universities in the United States offer it outside Civil and Environmental Engineering Department(Figure 2), namely, Construction Management Department, Department of Construction Science and Management, Department of Architecture, Engineering and Construction, etc.. The former offers a Master's program within the Civil and Environmental Engineering department with concentration in Construction Engineering & Management. The latter offers it outside Civil and Environmental Engineering Department, represented by Construction Management Department.

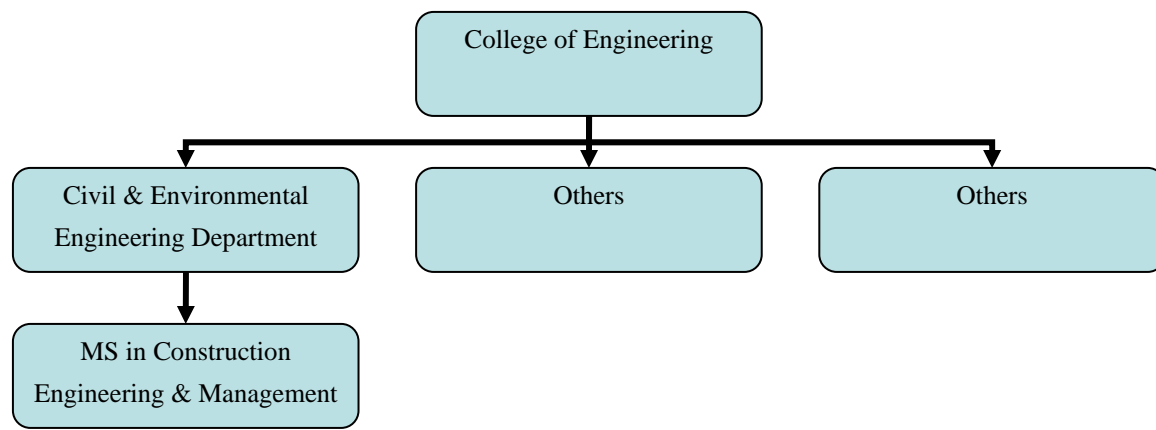


Figure 1: A Traditional MS Construction-related program inside Civil and Environmental Engineering Department

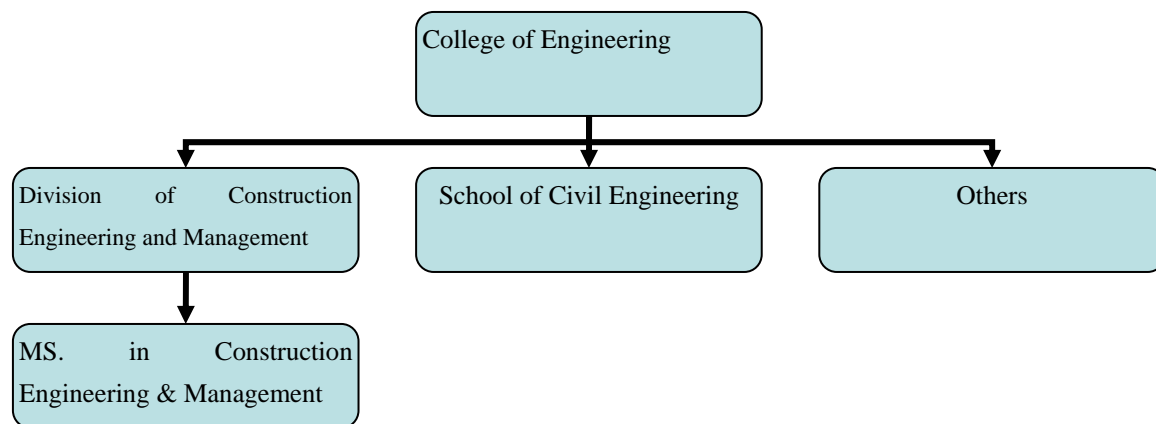


Figure 2: Purdue University: Example of a Typical New MS Construction-related program outside School of Civil Engineering

As Civil and Environmental Engineering departments are older programs, Construction Management departments are relatively new (Roe, 2004). Are the Master's core courses in Construction Engineering & Management offered by Civil and Environmental Engineering Department different from those offered by Construction Management Department? This question propelled a study of the core courses offered by both Civil and Environmental Engineering Departments and Construction Engineering & Management Departments. Through data collection and analysis, we find out that there are similarities and differences of these curricula in these two different groups of departments.

2. Analysis of Core Construction Management Courses

In order to better analyze the similarity and difference of these courses offered inside and outside Civil and Environmental Engineering department, codes are randomly assigned to major course topics:

Code	Course Topics
C1	Project/Construction Management
C2	Computer-Related
C3	Mathematical Methods
C4	Finance/Economics/Accounting

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- C5 Risk Management/Decision
 - C6 International Management
 - C7 Construction Techniques
 - C8 Law/Legal Practice
 - C9 Cost Estimating/Control
 - C10 Environmental Issues
 - C11 Safety Management
 - C12 Oral/Written Competency
 - C13 Contract
 - C14 Productivity
 - C15 Scheduling/Planning
 - C16 Equipment/Facility Management
 - C17 Quality
 - C18 Design
 - C19 Soil/Material
 - C20 Delivery System
 - C21 Special Topics
 - C22 Drawing
 - C23 Building Systems
 - C24 Organization
 - C25 Bonds/Insurance
 - C26 Thesis
 - C27 Construction Engineering
 - C28 Human Resources Management
 - C29 Construction Company
 - C30 Value Engineering
 - C31 Case Studies
 - C32 Seminar
 - C33 Professional Paper/Project
 - C34 Transportation Systems Planning & Management
 - C35 Research Methods
 - C36 Land Development
 - C37 Construction Procurement System

Each core course is marked with codes of these course topics. For example, CE 825 Project Management for Construction offered by Polytechnic University, Brooklyn Campus is marked with C1, while CE 251 Finance and Accounting for Engineers offered by Vanderbilt University is marked with C4. After each core course offered by either the Construction Management Department or the Civil & Environmental Engineering Department is marked with these course topic codes, the number of each topic code (C1, C2...C37) is counted in order to get the total number of each course topic (N_1, N_2, N_3, \dots). Thus we get to know how many times these courses are offered under each course topic. The total number of each course topic (N_1, N_2, N_3, \dots) is then added to get the total number of courses ($N_T = N_1 + N_2 + N_3 + \dots$). By dividing the total number of each course topic ((N_1, N_2, N_3, \dots)) by the total number of courses (N_T), we get the percentage of each course topic ($P_1 = N_1/N_T, P_2 = N_2/N_T, P_3 = N_3/N_T, \dots$) out of the total courses. By sorting the percentage (P_1, P_2, P_3, \dots) in descending order in both tables, we notice the most and more popular core course topics offered by both departments (Table 1).

3. The Most Popular Core Course Topics

- a. C1: Project/Construction Management (P=15%):
This topic includes courses such as Construction Project Management, Civil Engineering Project Management, Applied Project Management, Advanced Project Management, Construction Project Engineering and Management, Advanced Techniques in Project Management, Management and Organization Development, and Leadership and Management.
- b. C4: Finance/Economics/Accounting (P=9%):
This topic includes courses such as Construction Business Environment, Financial Management for Constructors, Construction Financial Management, Financial Planning & Analysis, etc..
- c. C9: Cost Estimating/Control (P=9%):
This topic includes courses such as Project Estimating, Construction Control Systems, Project Estimating, Planning and Control, Advanced Cost Estimating for Construction Projects, Construction Estimating, etc..
- d. C2: Computer-related (P=6%):
This topic includes courses such as Information Technologies for Construction, Civil/Surveying Software, Computer Applications in Construction, Database Systems for Engineering and Management, Web-based systems for Engineering and Management, etc..
- e. C15: Scheduling/Planning (P=6%):
This topic includes courses such as Construction Planning, Construction Planning & Scheduling, Advanced Construction Scheduling, etc..
- f. C8: Law/Legal Practice (P=3%):
This topic includes courses such as Construction Law, Legal Principles and Practice, Engineering Law, Legal Aspects of Construction, Legal Aspects of Civil Engineering, Legal Issues, etc..

4. The More Popular Core Courses

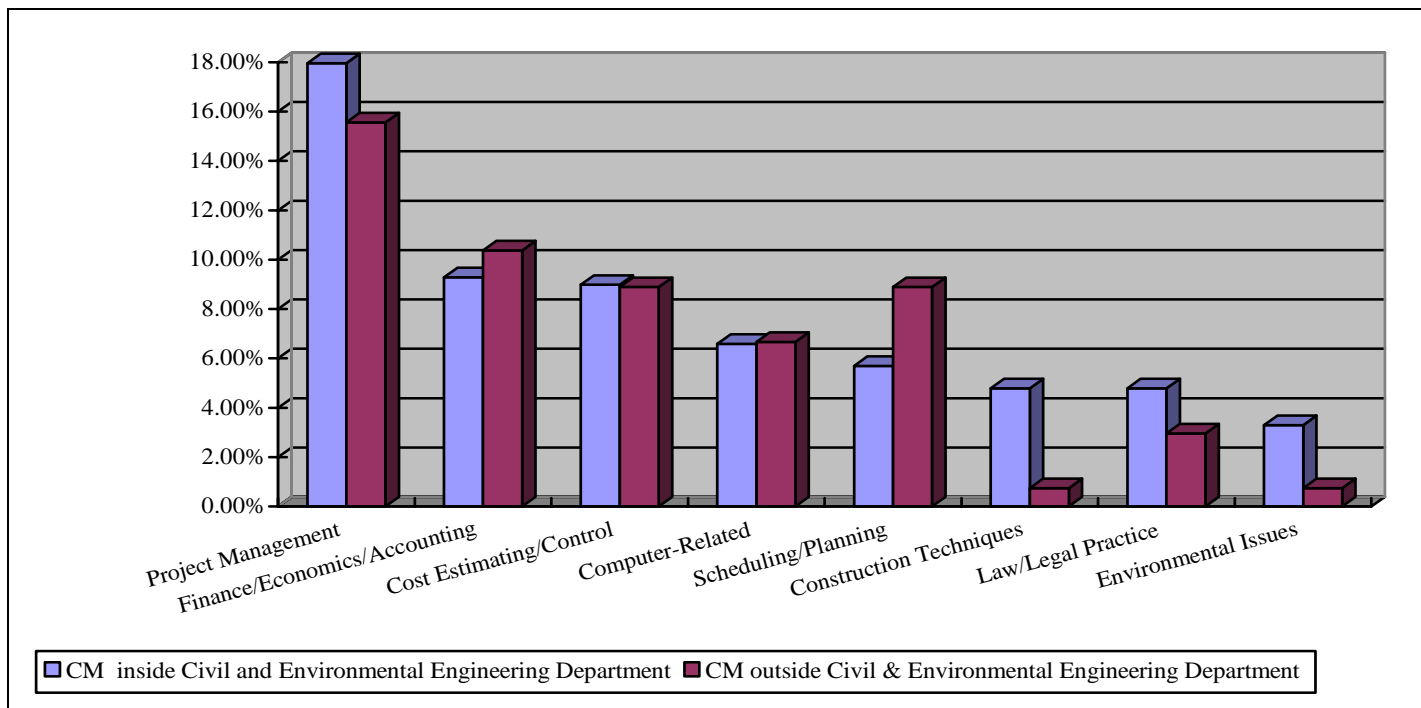
Construction Management Departments offered more core courses than Civil & Environmental Engineering Departments in the following areas:

- a. C15: Scheduling/planning
This topic includes courses such as Construction Planning, Construction Planning & Scheduling, Advanced Construction Scheduling, etc..
- b. C14: Productivity
This topic includes courses such as Construction Productivity, Construction Labor and Productivity, Construction Productivity Improvement, etc..
- c. C26: Thesis
This topic includes courses such as Master's Thesis.
- d. C33: Professional Paper/project
This topic includes courses such as Capstone Project, Construction Industry Practicum, etc..
- e. C16: Equipment/Facility Management
This topic includes courses such as Construction Equipment, Operations, & Management, Construction Equipment Operation and Management, Professional Trends in Facility

Management, Facilities Management, etc..

- f. C20: Delivery system
This topic includes courses such as Construction Project Delivery Systems, Design-Build, etc..
- g. C22: Drawing
- h. C35: Research methods
This topic includes courses such as Research Techniques, Research in Technology, Introduction to Research methods, Construction Management Research, Construction Communication and Research, Special Studies Research, etc..
- i. C36: Land Development
- j. C37: Construction Procurement Systems

Table 1: Percentage of Individual Course Topic out of the Total Number of Courses



Civil & Environmental Engineering Departments offered more core courses than Construction Management Departments in the following areas:

- Project Management
- Construction Techniques
- Law/Legal Practice
- Risk Management/Decision
- Environmental Issues
- Contract
- Building System
- Quality
- Organization
- International Management

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- Human Resources Management
 - Case Studies
 - Transportation Systems Planning and Management
 - Bonds/Insurance
 - Construction Company

Major Construction Engineering and Management core courses that are offered by Construction Management departments instead of Civil & Environmental Engineering departments:

- Research/Research Methods
- Land Development
- Construction Procurement System

Major Construction Management core courses that are offered by Civil & Environmental Engineering departments instead of Construction Management departments:

- Human Resource Management
- Building systems
- Case Studies
- Transportation Systems Planning and Management
- Bonds/Insurance
- Construction Company

5. Conclusion

From the analysis of these core courses offered by the Construction Management Department and Civil & Environmental Engineering Department in the United States, we can see that the Construction Management Department has similar courses as Construction Engineering & Management programs in Civil & Environmental Engineering Department. Both of them have courses topics, such as project/construction management, Finance/Economics/Accounting, Cost Estimating/Control, Computer-related Courses, Scheduling/Planning, and Law/Legal Practice. In addition, the former has more practical core courses, such as scheduling/planning, productivity, and delivery systems. The latter, Civil & Environmental Engineering Department, has courses with broader topics such as Environmental Issues, Human Resources Management and Transportation Systems Planning and Management.

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