

PROGRAM MODIFICATION PROPOSAL FORM

Name of Institution: **Clemson University**

Briefly state the nature of the proposed modification (e.g., adding a new concentration, extending the program to a new site, curriculum change, etc.): **Change of CIP Code to a more appropriate coding that is also aligned with a USCIS/DHS STEM designation (Proposed change to 15.1001)**

Current Name of Program (include degree designation and all concentrations, options, and tracks):
BS Construction Science and Management

Proposed Name of Program (include degree designation and all concentrations, options, and tracks):
BS Construction Science and Management [no change]

Program Designation:

- | | |
|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <input type="checkbox"/> Associate's Degree | <input checked="" type="checkbox"/> Master's Degree |
| <input type="checkbox"/> Bachelor's Degree: 4 Year | <input type="checkbox"/> Specialist |
| <input type="checkbox"/> Bachelor's Degree: 5 Year | <input type="checkbox"/> Doctoral Degree: Research/Scholarship (e.g., Ph.D. and DMA) |
| <input type="checkbox"/> Doctoral Degree: Professional Practice (e.g., Ed.D., D.N.P., J.D., Pharm.D., and M.D.) | |

Does the program currently qualify for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes
 No

If No, should the program be considered for supplemental Palmetto Fellows and LIFE Scholarship awards?

- Yes
 No

Proposed Date of Implementation: **15 August 2020**

CIP Code: **52.0201 (Proposed change to 15.1001)**

Current delivery site(s) and modes: **Clemson Main Campus (50104)**

Proposed delivery site(s) and modes: **Clemson Main Campus [no change]**

Program Contact Information (name, title, telephone number, and email address):

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Institutional Approvals and Dates of Approval: **Board of Trustees Approval: 11 October 2019**

Background Information

Provide a detailed description of the proposed modification, including target audience, centrality to institutional mission, and relation to strategic plan.

Clemson University's Nieri Family Department of Construction Science and Management (CSM) requests that the CIP code for the BS Construction Science Management be changed from 52.0201 (Business Administration and Management, General) to 15.1001 (Construction Engineering Technology/Technician), which is better aligned with the program goals and curriculum, the new CIP code to be requested for our master's degree, and various occupational codes associated with program graduates.

Construction is a dominant growth industry in the US and abroad—driven by both population growth and organic per capita economic growth that results in concomitant demand for new roads, transportation systems, buildings (particularly those associated with healthcare, education, and other forms of social infrastructure), and other structures/systems. BLS statistics project 11% growth in domestic construction occupations from 2016 to 2026. Seasonally adjusted construction spending in the US topped \$1.3 *trillion* in the US in 2018 according to the Associated General Contractors of America. Price Waterhouse Cooper [forecasts](#) construction output volume growing 85% by 2030 to \$15.5 trillion worldwide. This 3.9% annual growth rate exceeds estimates of global GDP growth by a full percentage point as emerging economies industrialize and develop.

In this context, construction offers significant long-term opportunities to professionally educated students. However, these future professionals must have a thorough knowledge of construction materials and methods, complex and evolving technologies of modern construction, and a preparatory background to manage equipment, financial capital, and human resources. The BS Construction Science Management program is designed for students pursuing a career in professional construction. The development and evolutionary stewardship of robust interdisciplinary academic programs that address future needs (of individual students and society) are a core strategy for success within strategic priority #3 (The Academic Core) of the University's [ClemsonFORWARD](#) plan.

Reflecting positive exogenous factors, the BS program has shown recent strong demand. Fall enrollment has grown by 54% over the past 5 years. First-time freshman student applications to the program have risen 56% over the past 3 years. This modification proposal requests a CIP code change to strengthen this robust program, and its benefits for students and workforce partners, even further via four means:

- A CIP code that is better aligned with program goals and with the aspirational occupations of graduates
- A CIP code that would support a STEM-based extension to Optional Practical Training for any future international undergraduates
- A CIP code that is the same as that to be requested soon for our Masters of Construction Science Management degree, where appropriate CIP-based support for STEM-based extension to Optional Practical Training for international graduates is crucial to remaining competitive.
- A CIP code that supports what we believe to be a strong case for a request for STEM supplements to Life/Palmetto scholarships for SC students enrolled in the BS program.

Assessment of Need

Provide an assessment of the need for the program modification for the institution, the state, the region, and beyond, if applicable.

The need for a CIP change is three-fold: a) better alignment of a designated code with the nature and goals of the program, b) better alignment of a designated CIP code with various occupational codes and CIP-occupation code crosswalks used by external entities, and c) maintaining the alignment of the CIP code of the BS and Master's programs.

- The proposed 15.1001 Construction Engineering Technology/Technician CIP code, defined below, is also better aligned with the nature and aspirations of the program than the current CIP code:

A program that prepares individuals to apply basic engineering principles and technical skills in support of engineers, engineering contractors and other professionals engaged in the construction of buildings and related structures. Includes instruction in basic structural engineering principles and construction techniques, building site inspection, site supervision, construction personnel supervision, plan and specification interpretation, supply logistics and procurement, applicable building codes, and report preparation.

- The proposed CIP – occupational code crosswalking is better aligned with our graduates' jobs. The crosswalking of CIP 15.1001 to Census, BLS, OMB/SOC, O*NET, USDOE, and National Skill Standards Board-Industry Cluster codes and data crosswalk frameworks includes construction managers, engineering technicians, cost estimators, architecture & construction, and manufacturing.

An examination of the de-identified individual respondent-level Public Use Microdata Samples from the most recent dataset of the US Census Bureau's American Community Survey reveals the nature of employment in this field for those having construction-coded majors:

- A 2018 workforce of 118,088 individuals that has grown 10.4% year-over-year
 - Three of the four most common jobs for these majors are construction managers, other managers, and construction project specialists
 - The most specialized occupations within the industry are construction managers and cost estimators
 - An average workforce wage of \$96,343 that has grown 8.76% year-over-year
 - The large occupation and wage growth in the sector reflect a scarcity of human resources. A potential solution to this scarcity is improving the gender balance of degree holders. For the Fall 2019 semester, the percentage of females enrolled in our BS Construction Science Management program was twice the average of the 5 largest national degree producers in the discipline.
- Clemson's master's program in Construction Science Management is highly-ranked, and the program's graduates are highly-recruited nationally and internationally by some of the world's largest and most prestigious construction firms. This "employability" is a significant factor in attracting high-achieving students.

However, Clemson's international graduate students in Construction Science are currently only allowed 12 months of OPT training after graduation given the current CIP classification of 52.0201 (Business Administration and Management, General). It is becoming increasingly difficult for international graduates to obtain work and a permanent work visa in the US, even when they are filling positions where there is a shortage of qualified Construction Science graduates. Even with shortages in the workforce, employers are cautious about making an investment in an employee whose tenure is limited to 12 months.

By changing the Master of Science degree program to the more appropriate CIP code 15.1001 (Construction Engineering Technology/Technician), a USCIS-approved STEM classification, graduate students majoring in Construction Science Management and workforce partners would benefit. Graduate students would be allowed up to 36 months of OPT, which would allow them to further their Construction Science Management training/education.

Clemson's international graduate students have petitioned to implement this change. They are at a disadvantage compared to graduates from other prestigious Construction Science programs in the US that already have the STEM designation, and with whom the Clemson CSM department regularly competes, including (but not limited to): Arizona State University, Virginia Tech., Auburn University, Texas A&M University, Louisiana State University, and the University of Florida.

Transfer and Articulation

Identify any special articulation agreements for the modified proposed program. Provide the articulation agreement or Memorandum of Agreement/Understanding.

N/A

Description of the Program

The BS Construction Science and Management is a 125 credit hour program that prepares students for a professional career in the broad construction industry by providing them with skills in managing people, equipment, and capital, and ensuring a thorough knowledge of construction materials, construction methods, and complex modern construction technologies. provides students with a high level of skills and knowledge in the technical areas of construction project administration and control. Substantial emphasis is placed on advanced study in new and emerging techniques for construction project delivery systems and in the administration of construction firms. Fall enrollment for the fall 2013-2019 time period has averaged 23 students.

Historical Fall Enrollment - BS Construction Science and Management				
Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
168	190	199	213	214

Projected Enrollment						
Year	Fall Headcount		Spring Headcount		Summer Headcount	
	New	Total	New	Total	New	Total

Explain how the enrollment projections were calculated.

Curriculum

Attach a curriculum sheet identifying the courses required for the program.

There are no changes to the BS Construction Science and Management curriculum.

Curriculum Changes

Courses Eliminated from Program	Courses Added to Program	Core Courses Modified
None	None	None

New Courses

List and provide course descriptions for new courses.

There are no new courses or other curriculum changes associated with this proposal

BS Construction Science and Management curriculum – 125 total credit hours

Freshman Year, 1st semester	
Course Name	Credit Hours
CSM 1000 - Introduction to Construction Science and Management	3 Credits
ECON 2110 - Principles of Microeconomics	3 Credits
ENGL 1030 - Composition and Rhetoric	3 Credits
MATH 1060 - Calculus of One Variable I ¹	4 Credits
PHYS 2070 - General Physics I	3 Credits
PHYS 2090 - General Physics I Laboratory	1 Credits
Freshman Year, 2nd semester	
COMM 1500 - Introduction to Human Communication <i>or</i>	3 Credits
COMM 2500 - Public Speaking	3 Credits
PHYS 2080 - General Physics II	3 Credits
PHYS 2100 - General Physics II Laboratory	1 Credits
<ul style="list-style-type: none"> • Arts and Humanities (Non-Lit) Requirement 3 Credits ² • Social Science Requirement 3 Credits ² • Elective 3 Credits 	
Sophomore Year, 1st semester	
AGM 2210 - Surveying: Earthwork and Area Measurements	3 Credits
CSM 2010 - Structures I	3 Credits
CSM 2030 - Materials and Methods of Construction I	3 Credits
MGT 2180 - Management Personal Computer Applications	3 Credits
<ul style="list-style-type: none"> • Arts and Humanities (Literature) Requirement 3 Credits ² 	
Sophomore Year, 2nd semester	
ACCT 2010 - Financial Accounting Concepts	3 Credits
CSM 2020 - Structures II	4 Credits
CSM 2040 - Contract Documents	3 Credits
CSM 2050 - Materials and Methods of Construction II	3 Credits
STAT 3090 - Introductory Business Statistics	3 Credits
Junior Year, 1st semester	
CSM 3040 - Environmental Systems I	3 Credits
CSM 3060 - Emerging Technologies in Construction	3 Credits
CSM 3510 - Construction Estimating	3 Credits
ENGL 3040 - Business Writing <i>or</i>	3 Credits
ENGL 3140 - Technical Writing	3 Credits
LAW 3220 - Legal Environment of Business	3 Credits
Junior Year, 2nd semester	
CSM 3050 - Environmental Systems II	3 Credits
CSM 3070 - Principles and Practices of Sustainable Construction	3 Credits
CSM 3520 - Construction Scheduling	3 Credits
CSM 3530 - Construction Estimating II	3 Credits
MGT 3070 - Human Resource Management	3 Credits
Senior Year, 1st semester	
CSM 4110 - Safety in Building Construction	3 Credits
CSM 4500 - Construction Internship	1 Credits
CSM 4530 - Construction Project Management	3 Credits
CSM 4610 - Construction Economics Seminar	3 Credits
<ul style="list-style-type: none"> • Major Requirement 3 Credits ³ • Elective 3 Credits 	
Senior Year, 2nd semester	
CSM 4540 - Construction Capstone	6 Credits
<ul style="list-style-type: none"> • Major Requirement 3 Credits ³ • Science and Tech. in Society Requirement 3 Credits ² 	

• Elective 3 Credits	
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Similar Programs in South Carolina offered by Public and Independent Institutions

Identify the similar programs offered and describe the similarities and differences for each program.

The table below is confined to baccalaureate programs like our BS Construction Science and Management.

Program Name and Designation	Total Credit Hours	Institution	Similarities	Differences
BS Construction Engineering	138	The Citadel		CIP 14.3301 Construction Engineering
BPS Professional Studies (concentration in Construction Mgmt)		College of Charleston		CIP 30.9999 Multi-/Interdisciplinary Studies, Other
BS Construction Science and Management	125	Clemson University		CIP 52.0201 Business Administration and Management, General [current] CIP 15.1001 Construction Engineering Technology/Technician [proposed]

Faculty

State whether new faculty, staff or administrative personnel are needed to implement the program modification; if so, discuss the plan and timeline for hiring the personnel. Provide a brief explanation of any personnel reassignment as a result of the proposed program modification.

There are no new personnel needed to effect or as a consequence of the CIP code change

Resources

Identify new library, instructional equipment and facilities needed to support the modified program.

Library Resources: None

Equipment: None

Facilities: None

Impact on Existing Programs

Will the proposed program impact existing degree programs or services at the institution (e.g., course offerings or enrollment)? If yes, explain

Yes

No

Financial Support

Estimated Sources of Financing for the New Costs						
Category	1 st	2 nd	3 rd	4 th	5 th	Total
Tuition Funding						
Program-Specific Fees						
Special State Appropriation						
Reallocation of Existing Funds						
Federal, Grant, or Other Funding						
Total						
Estimated New Costs by Year						
Category	1 st	2 nd	3 rd	4 th	5 th	Total
Program Administration and Faculty and Staff Salaries						
Facilities, Equipment, Supplies, and Materials						
Library Resources						
Other (specify)						
Total						
Net Total (i.e., Sources of Financing Minus Estimated New Costs)						

Provide a brief explanation for all new costs and sources of financing identified in the Financial Support table.

There are no new costs or revenue sources associated with the CIP code change request.

Evaluation and Assessment

Program Objectives	Student Learning Outcomes Aligned to Program Objectives	Methods of Assessment
Offer a comprehensive program of education, scholarly and service activities for the purpose of improving the quality of the construction industry and thus the built environment.	Students will be able to demonstrate the ability to effectively communicate orally and in writing.	AIC Examination: Students will effectively demonstrate the partial attainment of the respective student learning outcome by performing at a minimum specified level on the American Institute of Constructors Associate Constructor certification examination relative to the questions assessing the skills associated with the respective American Council for Construction Education construction education program outcome.
	Students shall be able to describe practices of effective management of personnel, materials, equipment, costs and time.	Course Assignments: Students will effectively demonstrate the partial attainment of the respective student learning outcome by performing at a minimum specified level on a student course assignment directly related to the respective ACCE outcome utilizing a standard rubric. The results of the ratings of the performance of the individual students on the respective standard rubric will be summarized and used in the analysis as to whether or not the respective target has been achieved.
	Students will facilitate advancement within the field of the management of construction processes by demonstration of ability to define problems and recognize solutions; further students will demonstrate an ability to apply creativity, team work and evaluation in their work.	
Students will demonstrate an understanding of professional ethics.		

Will any the proposed modification impact the way the program is evaluated and assessed? If yes, explain.

Yes

No

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Will the proposed modification affect or result in program-specific accreditation? If yes, explain; and, if the modification will result in the program seeking program-specific accreditation, provide the institution's plans to seek accreditation, including the expected timeline.

Yes

No

Will the proposed modification affect or lead to licensure or certification? If yes, identify the licensure or certification.

Yes

No

Explain how the program will prepare students for this licensure or certification.

If the program is an Educator Preparation Program, does the proposed certification area require national recognition from a Specialized Professional Association (SPA)? If yes, describe the institution's plans to seek national recognition, including the expected timeline.

Yes

No