TO: The Academic Senate
FROM: The Committee on Academic Planning Review (CAPR)
SUBJECT: 15-16 CAPR 6: Proposal for new B.S. Civil Engineering degree program
PURPOSE: Approval by the Academic Senate

ACTION REQUESTED:
That the Academic Senate approve the attached proposal for a new B.S. Civil Engineering degree program to be placed on the CSUEB Academic Master Plan

BACKGROUND:
At its meeting on January 7th, 2015 CAPR welcomed Engineering Chair Saeid Motavalli and Construction Management coordinator Farzad Shahbodaghlou to discuss the department’s request for the addition of a B.S. in Civil Engineering degree program to the CSUEB Academic Master Plan. CAPR voted to approve the request.

The proposed B.S. in Civil Engineering is designed to go into effect with the change to semesters in 2018. The proposed Civil Engineering program is focused on design, maintenance, rehabilitation, and construction of large infrastructure projects which makes it unique among the Civil Engineering programs in the state. It will include courses such as: Computer Applications in Infrastructure, Transportation Engineering, Highway and Pavement Design, Sustainability and Green Building, and technical electives in construction and infrastructure engineering. The proposed program will be closely tied to the needs established by the State of California through its Board for Professional Engineers and the Civil Engineering and the Construction Industry. This closely ties to the institutional mission which is to “meet the educational needs and to contribute to the vitality of the East Bay, the State, the nation, and global communities”, by addressing the workforce needs of the State and country. Additionally, graduates of this program will have a key role helping to enhance the State infrastructure needs.

Drs. Motavalli and Shahbodaghlou also emphasized that a Civil Engineering program is a cornerstone to the growth of CSUEB’s engineering program, and that it will provide a strong pipeline for students into the M.S. in Construction Management graduate program. If approved, the B.S. in Civil Engineering will then go to the Chancellor’s Office for placement on the Board of Trustees agenda for approval of its addition to the CSUEB Academic Master Plan. The program would then go through a second round of Academic Senate review and approval of its detailed curriculum.
Memorandum

Date: December 8, 2015

To: Michael Hedrick, Chair of Faculty Senate

From: Michael Leung, Dean of the College of Science

Subject: Support for Addition of BS in Civil Engineering in Academic Master Plan

The College of Science is in full support of the addition of the Bachelor of Science in Civil Engineering to the CSU East Bay academic master plan. Engineering at East Bay is a relatively young program that is still in its growing phase. Currently, the School of Engineering offers undergraduate degree programs in Industrial Engineering, Computer Engineering and Construction Management. For it to serve the industry and the students of the region effectively additional degrees are needed to enhance the range of its offerings. Since the School already has a Construction Management degree program that has shown steady enrollment growth, Civil Engineering is a logical complementary addition. Both of these degrees work collaboratively in training students in the design and construction of buildings and infrastructures. In terms of resources, with its recent hire the School of Engineering has three faculty with Ph.D. in Civil Engineering that contribute towards fulfilling the accreditation requirements of ABET. The stable enrollment increase of all the Engineering Programs since their inception has helped in bringing fiscal resources for its growth. In conclusion, the College of Science strongly believes the Bachelor of Science in Civil Engineering is a strategically appropriate addition to the School of Engineering that will strengthen its contribution to the training of a strong STEM workforce for the Bay Area.

xc: Dr. Carolyn Nelson, Interim Provost
Please provide a brief (3 to 5 pages) Summary of the proposal, justifying adding projections to the Academic Plan or significant modifications thereof. These questions should be answered for New Degrees/Options/ Minors/Certificates/Credentials/SSMPPs and for proposed significant Modifications to Degrees/Options/Minors/ Certificates/Credentials/SSMPPs. Discontinuances will use the discontinuance form, unless it is part of a significant modification, in which case it may be included in this summary.

- Department and/or Degree Program

  Bachelor of Science in Civil Engineering (BSCE)

- Action Requested

  Addition of Bachelor of Science in Civil Engineering on the CSU East Bay Academic Master plan

- Requested Catalog Date

  Fall 2018 (on semesters)

Summaries should include the following elements, which are the criteria by which proposed changes to the Academic Master Plan are evaluated:

- A brief summary of the purpose and characteristics of the proposed degree program (or proposed modification/option/ minor/etc).

  The proposed Civil Engineering program is focused on design, maintenance, rehabilitation, and construction of large infrastructure projects which makes it unique among the Civil Engineering programs in the state. This program includes courses such as: Computer Applications in Infrastructure, Transportation Engineering, Highway and Pavement Design, Sustainability and Green Building, and technical electives in construction and infrastructure engineering.

  The proposed program will be closely tied to the needs established by the State of California through its Board for Professional Engineers and the Civil Engineering and the Construction Industry. We will establish an industry advisory board that will help us in accomplishing this task. This combined effort will graduate students who will have relevant certifications such as the Engineer in Training, OSHA, and Leadership in Energy and Environmental Design (LEED) Green Associate. The aforementioned certifications will help the students to become Licensed Professional Engineers (PE) by the State of California and certified as LEED Accredited Professional by the U.S. Green Building Council, once they gain sufficient professional experience. We will seek accreditation by the Accreditation Board for Engineering and Technology (ABET) at the earliest possible date.

- How the program fits into the campus mission and strategic plan

  The proposed program closely ties to the institutional mission which is to “meet the educational needs and to contribute to the vitality of the East Bay, the State, the nation, and global communities”, by addressing the workforce needs of the State and country. Additionally, our graduates will have a key role helping to enhance the State infrastructure needs.

  The proposed program closely ties to the institutional mission which is to “meet the educational needs and to contribute to the vitality of the East Bay, the State, the nation, and global communities”, by addressing the workforce needs of the State and country. Additionally, our graduates will have a key role helping to enhance the State infrastructure needs.
Whether the program is offered through

X state support or
☐ special sessions

How does the request relate/compare to other CSU/UC/private universities?

Our preliminary study shows that most CSU campuses that have engineering departments also offer civil engineering as part of their curriculum. These include San Francisco State, San Jose State, and Sacramento State. Other institutions offering civil engineering are UC Berkeley, UC Davis, and Stanford. A common denominator for such existing programs is their emphasis on traditional fields within civil engineering such as structures, geotechnical or environmental. There is no existing civil engineering program in the CSU, UC or private systems that focuses on infrastructure, such as the one proposed in this document.

The proposed curriculum has been designed to address the growing need for professionals with a strong background in infrastructure design and construction to deal with the growing needs for new infrastructure and maintenance in California. The curriculum has been vetted by civil engineering leaders in the private and public sector to cover special knowledge areas such as highway and bridge design, environmental issues and green building, building information modeling, and construction management. Currently, most civil engineering graduates have capabilities for design, but limited knowledge of construction processes to implement such design in an effective and cost efficient manner. Our proposed program is geared towards design and construction of new infrastructure and rehabilitation of existing infrastructure.

Anticipated student demand year 1: 20_; year 3: 60_; year 5: 80_; year 10: 150_

Estimated workforce demands and employment opportunities for graduates

Besides encouraging comments from our Advisory Board members regarding the demand for the degree program, we reviewed statistics from the US Bureau of Labor Statistics and California Labor Market Information. Both sources indicate strong demand for civil engineering.

This program is designed to advance the knowledge of the professionals in charge of designing, improving and maintaining California’s infrastructure. These projects are typically very complex and require a broad array of engineering knowledge to be supervised effectively. We believe that the proposed program will enable civil engineers to more effectively and scientifically integrate and implement their design through the different stages of a large infrastructure project. To support our claim, we have included the following data tables summarizing employment statistics for construction managers, from the U.S. Bureau of Labor Statistics and the California Labor Market Information.

National projection for labor market for civil engineers
The Bureau of Labor Statistics, US Department of Labor, has established that the Employment of Civil Engineers is expected to grow 19 percent from 2010 to 2020, which is about 8% faster as compared to the growth of all engineering fields and 5% faster than all other occupations combined (Figure 1).
Figure 1. Projected percent change in employment for Civil Engineering

- Other relevant societal needs

As infrastructure continues to age, civil engineers will be needed to design projects, to rebuild bridges, repair roads, and upgrade levees and dams. The American Society of Civil Engineering graded America’s infrastructure condition as D+, and has estimated that an investment of 3.6 Trillion will be needed by 2020 to keep the US economy competitive (see Figure 2).

Figure 2. Condition and investment needs for US Infrastructure. (Source: American Society of Civil Engineers)
- An assessment of the required/anticipated resources needed and a campus commitment to allocating those resources (or possible changes to current resources, including library collections). If no new resources are requested, provide justification/explanation.

We have already developed a sustainable materials laboratory to take care of the concrete and geotechnical portions of civil engineering. Our existing laboratory in North Science 247 has the testing equipment needed for teaching fundamental engineering courses. We would need to add a structural laboratory within five years after starting the program. The approximate cost for such lab, including equipment and capital improvements is $150,000. We are in the process of hiring the third faculty with a PhD in civil engineering, who are currently supporting the Construction Management (CM) program and are qualified to teach Civil Engineering courses. In four years, we anticipate the addition of one faculty member for Civil Engineering to complement current expertise of the CM faculty.

- And, as applicable:
  - If the projection is a pilot program, also list the academic years during which the program will operate in pilot status. (Pilot programs are rarely (if ever) done at CSUEB. Contact the AVP, Academic Programs if you have questions about this).
    
    n/a
  - If the projected program is now offered as an option, concentration, or emphasis, provide a brief rationale for elevation to a full degree program.
    
    n/a
  - For new degree programs that are not commonly offered as a bachelor’s or master’s degree, please provide a compelling rationale explaining how the proposed subject area constitutes a coherent, integrated degree program that has potential value to students and meets CSU requirements for an academic program at the undergraduate or graduate level. New bachelor’s degrees should be as enduring as possible in content and title. Breadth is the hallmark of bachelor’s degrees, and more narrow specialization occurs at the master’s level.
    
    n/a
  - If a discontinuation is reported to us for the first time, please confirm that all campus and system-level policies regarding discontinuation have been followed.
    
    n/a
  - If it is interdisciplinary in nature, please note involvement by other departments and faculty.
    
    n/a
  - Consultation with other affected departments prior to submission to the college and posting to the Curriculum Sharepoint site. Indicate departments consulted and whether or not objections were raised. Describe objections or concerns.
    
    We consulted all pertinent departments in the college of science.
  - Additional comments or issues
Department Chair signature (indicating approval by the department faculty)
Chair: __ Saeid Motavalli ________________________________ Date ____________

Dean’s signature (indicating approval by the college curriculum committee and acknowledgement of resource implications)
(Associate) Dean: _____ Jason Singley __________________________ Date ____________