

**From:** [noreply@wsu.edu](mailto:noreply@wsu.edu)  
**To:** [curriculum.submit](#)  
**Subject:** 701940 Civil and Environmental Engineering Requirements New : Add Graduate Certificate  
**Date:** Monday, April 11, 2022 9:38:54 AM  
**Attachments:** [2022.04.11.09.35.21.50.FormData.html](#)  
[2022.04.11.09.35.19.06.currentCatalogFile\\_CertificateProposalCEEPavement2022Ver1.1.docx](#)

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Kelly Caraher has submitted a request for a major curricular change. His/her email address is: [kcaraher@wsu.edu](mailto:kcaraher@wsu.edu).

**Request (from selection dropdown):** Add Graduate Certificate

**Department:** Civil and Environmental Engineering

**New Graduate Certificate:** Pavement Durability & Sustainability

**CIP Code:** 14.08

**Requested Effective Date:** Fall 2023

**Campus:** Global,

**Dean:** Field, David - Assoc Dean - VCEA - Grad

**Chair:** Xianming, Shi – Interim Chair – Civil and Environmental Engineering

\_\_\_\_\_  
Catalog Subcommittee  
Approval Date

\_\_\_\_\_  
AAC, PHSC, or GSC  
Approval Date

\_\_\_\_\_  
Faculty Senate  
Approval Date

**From:** [Shi, Xianming](#)  
**To:** [curriculum.submit](#)  
**Cc:** [Field, Dave](#)  
**Subject:** Re: 701940 Civil and Environmental Engineering Requirements New : Add Graduate Certificate  
**Date:** Monday, April 11, 2022 9:43:28 AM  
**Attachments:** [Outlook-Washington.png](#)

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1. I approve this proposal in its current form.

Thank you,  
Xianming



Xianming Shi, Ph.D., P.E., Professor, F. ASCE  
Interim Chair, Dept. Civil & Environmental Engineering  
Editor-in-Chief, *Journal of Infrastructure Preservation & Resilience*  
Director, Washington Transportation Research Center (TRAC)  
**Washington State University**  
Sloan Hall 137, Pullman WA 99164-2910

Director, National Center for Transportation Infrastructure Durability and Life-Extension (TriDurLE)

509-335-7088; [Xianming.Shi@wsu.edu](mailto:Xianming.Shi@wsu.edu)

<https://TriDurLE.wsu.edu/>

<https://ce.wsu.edu/>

**Go Cougs!**

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**From:** curriculum.submit@wsu.edu <curriculum.submit@wsu.edu>  
**Sent:** Monday, April 11, 2022 9:35 AM  
**To:** Shi, Xianming <xianming.shi@wsu.edu>  
**Cc:** Field, Dave <dfield@wsu.edu>  
**Subject:** 701940 Civil and Environmental Engineering Requirements New : Add Graduate Certificate

Xianming, Shi – Interim Chair – Civil and Environmental Engineering,  
Field, David - Assoc Dean - VCEA - Grad,

Kelly Caraher has submitted a request for a major curricular change.

**Request (from selection dropdown):** Add Graduate Certificate

**Department:** Civil and Environmental Engineering

**New Graduate Certificate:** Pavement Durability & Sustainability

**CIP Code:** 14.08

**Requested Effective Date:** Fall 2023

**Campus:** Global,

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Both Chair and Dean approval is required to complete the submission process. Please indicate that you have reviewed the proposal by highlighting one of the statements below and **reply all** to this email. ([curriculum.submit@wsu.edu](mailto:curriculum.submit@wsu.edu).) [Details of major change requested can be found in the attached supplemental documentation]

1. I approve this proposal in its current form.
2. I approve this proposal with revisions. Revisions are attached.

**From:** [Field, Dave](#)  
**To:** [curriculum.submit](#); [Shi, Xianming](#)  
**Subject:** Re: 701940 Civil and Environmental Engineering Requirements New : Add Graduate Certificate  
**Date:** Monday, April 11, 2022 9:44:42 AM

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I also approve this.

Dave

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**From:** curriculum.submit@wsu.edu <curriculum.submit@wsu.edu>  
**Sent:** Monday, April 11, 2022 9:35 AM  
**To:** Shi, Xianming <xianming.shi@wsu.edu>  
**Cc:** Field, Dave <dfield@wsu.edu>  
**Subject:** 701940 Civil and Environmental Engineering Requirements New : Add Graduate Certificate

Xianming, Shi – Interim Chair – Civil and Environmental Engineering,  
Field, David - Assoc Dean - VCEA - Grad,  
Kelly Caraher has submitted a request for a major curricular change.  
**Request (from selection dropdown):** Add Graduate Certificate  
**Department:** Civil and Environmental Engineering  
**New Graduate Certificate:** Pavement Durability & Sustainability  
**CIP Code:** 14.08  
**Requested Effective Date:** Fall 2023  
**Campus:** Global,

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Both Chair and Dean approval is required to complete the submission process. Please indicate that you have reviewed the proposal by highlighting one of the statements below and **reply all** to this email. ([curriculum.submit@wsu.edu](mailto:curriculum.submit@wsu.edu).) [Details of major change requested can be found in the attached supplemental documentation]

1. I approve this proposal in its current form.
2. I approve this proposal with revisions. Revisions are attached.
3. I do not approve this proposal. Please return to submitter.

If you do not respond within one week, you will be sent a reminder email. If no response is received within three weeks of the submission date, the proposal will be returned to the submitter.

Thank you for your assistance as we embark on this new process. If you have any questions or concerns, please let us know [wsu.curriculum@wsu.edu](mailto:wsu.curriculum@wsu.edu).

Blaine Golden, Assistant Registrar  
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April 7, 2022

RE: Justification for Online Graduate Certificate in ***Pavement Durability & Sustainability***

This certificate program will provide education and workforce development (E&WD) opportunities for practicing engineers and some on-campus graduate students, by specifically addressing a prioritized need identified by the Advisory Board members of the Department of Civil and Environmental Engineering (CEE) in a CY2021 survey. This program is designed to contribute to a skilled, diverse, informed and practice-ready transportation workforce, by offering mandatory and optional courses customized to bridge the gap between conventional CEE curriculum and emerging industry needs.

In addition, this program aligns with the third goal of the WSU System Strategic Plan, i.e., *Outreach, Extension, Service, and Engagement*. WSU is a national leader and currently leads an 11-university consortium, the National Center for Transportation Infrastructure Durability & Life-Extension (TriDurLE), which is the only National University Transportation Center with a focus on the USDOT strategic priority of “*Improving the Durability and Extending the Life of Transportation Infrastructure*”. According to the American Society of Civil Engineers (ASCE), the current rating of US roads is D (2021) and hundreds of billions of dollars are needed to improve the condition of the US surface transportation system. The recently passed Bipartisan Infrastructure Law responds to this urgent need and the proposed certificate program will contribute to the goal of developing WSU as “a national leader in advancing the quality of life, economic development, sustainability, and equity through meaningful engagement in discovery, education, and service with partners throughout the state, nation and world”.

The proposed certificate program requires students to take 12 credit hours in graded coursework relevant to pavement durability and/or sustainability, consisting of three 3-credit required courses and one of the three 3-credit elective courses (detailed later). The model of delivery will be asynchronous, online instruction. Specifically, each 3-credit course will consist of thirty modules of 75 minutes of lecture, pre-recorded by the instructor. Each course will consist of lecture by the instructor (and up to 2 guest lectures by industry experts), homework assignments, quizzes, group project, and mid-term exam(s) and final exam. ***All courses will be offered at least once every other year***, and each course could be finished in the typical timeframe of Spring or Fall semester (i.e., 15 weeks), or in an accelerated timeframe of summer semester (e.g., 8 weeks).

Once admitted as a part-time graduate certificate student, the student can take graduate certificate courses and/or graduate courses but must maintain a 3.0 GPA. Students currently enrolled in regular graduate degree programs (master’s or doctoral) may concurrently enroll in graduate certificate programs with the approval of their thesis advisory committee.

To help make the program run more smoothly, we have a contingency plan for when a student is unable to take a necessary course, due to rare cancelation of a course. On a case-by-case basis, one course may be allowed to be substituted. The following courses offered by the Department of Civil and Environmental Engineering (CEE) could be accepted as a substitution, and the student could attend either in person or synchronously through the online section of the in-person course.

- *eCE 476 Pavement Evaluation and Rehabilitation* → CE 476 Pavement Evaluation and Rehabilitation, or CE 425 Soil and Site Improvement
- *eCE 505 Decision-Making for Sustainable and Resilient Civil Infrastructure* → CE 531 Probability and Statistical Models in Engineering

*\*Note: e stands for “electronic” to differentiate from in-person courses. We will need a different course number to be approved later, once this proposal is approved by the CEE Graduate Committee.*

Overall, the program allows students to become familiar with mechanistic-empirical design and structural analysis of asphalt and Portland cement concrete pavements, decision-making for sustainable and resilient civil infrastructure, and life cycle assessment of transportation infrastructure, etc. Students earning the certificate will be able to keep up with advances in pavement engineering, especially the emerging topics relevant to durability, sustainability, and climate resilience. Upon receiving the certificate, students will have the ability and opportunities to explore pavement sustainability and pavement durability as a supplement to their existing skill set and credentials.

## **Proposal: Online Graduate Certificate in *Pavement Durability & Sustainability***

**Description:** This program allows students to become familiar with mechanistic-empirical design and structural analysis of asphalt and Portland cement concrete pavements, decision-making for sustainable and resilient civil infrastructure, and life cycle assessment of transportation infrastructure, as well as emerging topics relevant to durability, sustainability, and climate resilience.

**Prerequisite:** Enrolled in a Department of Civil and Environmental Engineering **certificate or non-degree** program at any campus of WSU. Exceptions can be requested by emailing the graduate coordinator. Applicants must have and maintain a cumulative GPA of 3.0, be in good academic standing, be admitted to the WSU non-degree program, and have a record consistent with the admissions guidelines for the Graduate School, including completing an undergraduate degree from an accredited post-secondary institution.

**Fees:** There is no additional certificate fee for this program beyond the Graduate certificate application fee.

### **Course Requirements**

Required Courses (9 credit hours total):

- **eCE 572 Advanced Pavement Design and Analysis** (3 credit hours). Required preparation must include CE 473 or equivalent. [Instructor: Dr. Haifang Wen, Associate Professor of CEE/WSU-Pullman]
- **eCE 505 Decision-Making for Sustainable and Resilient Civil Infrastructure** (3 credit hours). Required preparation must include MATH 172 or equivalent. [Instructor: Dr. Ji Yun Lee, Assistant Professor of CEE/WSU-Pullman, along with Ms. Jie Zhao (PhD expected by August 2022)]
- **eCE XXX Life Cycle Assessment of Transportation Infrastructure** (3 credit hours). Required preparation must include CE 211 or equivalent. [Instructor: Dr. Milena Rangelov at FHWA, Adjunct Faculty at CEE/WSU-Pullman]

Elective Courses (Choose one, 3 credit hours total)\*:

- **eCE 476 Pavement Evaluation and Rehabilitation** (3 credit hours). Course Prerequisite: CE 317 or equivalent. [Instructor: Dr. Yilong Liu at Louisiana Transportation Research Center, Adjunct Faculty at CEE/WSU-Pullman]
- **eCE 508 Concrete Durability** (3 credit hours). Course Prerequisite: CE 211 or equivalent. [Instructor: Dr. Xianming Shi, Professor of CEE/WSU-Pullman. This course has been developed as a Global Campus course and offered multiple times online]
- **eCE XXX Climate-Resilient Infrastructure Engineering** (3 credit hours). Course Prerequisite: CE 317 or equivalent. [Instructor: Dr. James Zhao at Oregon Department of Transportation and **another instructor to be identified**, both Adjunct Faculty at CEE/WSU-Pullman]

\*In exceptional cases one substitution will be allowed. Please contact the Program Director.

We understand that graduate courses can only be taught by individuals with a PhD degree. As detailed above, we have identified the “developer” and instructor for all courses. Specifically, eCE 508 is an existing Global Campus course. eCE 572 and eCE 505 will be developed into Global Campus courses by the instructors who are currently teaching them in person. In addition, eCE476, eCE XXX and eCE XXX are new courses that have gained the approval of the CEE Graduate Committee. These three online courses will be developed by qualified professionals we have identified and hired as part-time Adjunct Faculty members at the Department of Civil & Environmental Engineering, WSU-Pullman. The professionals we identified to develop each course have agreed to teaching the course in the foreseeable future. Once the course modules are developed (with the aid of Global Campus), WSU and the developer both own the intellectual property (IP), which is in line with the current practice by the WSU Global Campus. If there is personnel transition, we anticipate no difficulty in identifying and recruiting a qualified professional as instructor of any of the developed courses.

For quality assurance of this proposed graduate certificate program, the tenured and tenure-track faculty members in the Geotechnical and Transportation Engineering program area within the CEE Department will be responsible for evaluating the credentials of the instructors, assessing the syllabus and sample module of each course, and providing oversight of the overall program. To continually ensure the quality of online instruction, they will conduct such assessment and report the findings to the CEE Graduate Committee once in Spring and once in Fall each year.

If this proposal is approved by the WSU Faculty Senate, we anticipate to have all the courses developed with the assistance from Global Campus, before Nov. 2022. The plan is to then market it to the CEE industry connections, Washington State Department of Transportation, Washington State Transportation Improvement Board, and other stakeholders. We anticipate the kickoff of this online certificate program in Spring 2023.

Some additional note are provided as follows:

- All courses must be taken on a graded basis, and cannot be completed as S/F.
- Timeline to degree and other graduate school policies for full-time and part-time students will apply. Part-time students are eligible for the program.
- Students in academically deficient status (or on probation/suspension) may continue pursuing the certificate program upon reinstatement by their graduate department. To complete the certificate program, students must have a 3.0 GPA in all courses counted toward their certificate by the semester of anticipated completion.
- One course may be evaluated for transfer credit by the CEE Graduate Committee for a substitution of a course requirement.

Course Offerings:

<b>Course</b>	<b>Offered</b>
eCE 572	Even years (Spring)
eCE 505	Odd year (Spring)
eCE XXX	Every year (Fall)
eCE 476	Odd years (Fall)
eCE 508	Even years (Fall)
eCE XXX	Odd year (Spring)



## Sample Paths to Completion

The maximum time allowed for completion of the certificate is 6 years from the beginning date of the earliest course applied toward the certificate. Students may request an extension of this time as described in Chapter 6.F of the Graduate Policies and Procedures Manual. Assuming a student takes one course per semester, this certificate could be earned in four semesters.

If Enter: Fall (odd year)

Fall 2023 – eCE 476

Spring 2024 – **eCE 572**

Fall 2024 – (eCE 508); **eCE XXX**

Spring 2025 – (eCE 501.02); **eCE 505**

If Enter: Fall (even year)

Fall 2024 – eCE 508

Spring 2025 – (eCE 501.02); **eCE 505**

Fall 2025 – (eCE 476); **eCE XXX**

Spring 2026 – **eCE 572**

Note: **Bold** fonts indicate the required courses.