UNIVERSITY OF CALIFORNIA

Ahmet Palazoglu
Chair, Assembly of the
Academic Senate
Faculty Representative,
UC Board of Regents

Academic Senate

Office of the President
1111 Franklin Street
Oakland, CA 94607

senate.universityofcalifornia.edu



January 30, 2026

Katherine S. Newman
Provost and Executive Vice President
University of California

Re: Approval of Online Master of Engineering in Sustainable Transportation at UC Davis

Dear Provost Newman:

In accordance with the Universitywide Review Processes for Academic Programs, Units, and Research Units (the "Compendium"), and on the recommendation of the Coordinating Committee on Graduate Affairs (CCGA), the Academic Council has approved the UC Davis division's proposal to establish an online self-supporting Master of Engineering in Sustainable Transportation.

Because this is a new degree title, and the Assembly of the Academic Senate is not meeting within 30 days of CCGA's approval, Council must approve the program per Senate Bylaw 125.B.7.

I am enclosing CCGA's report on its review of the new program, and respectfully request that your office complete the process of obtaining the President's approval.

Please do not hesitate to contact me if you have additional questions.

Sincerely,

Ahmet Palazoglu
Chair, Academic Council

cc: Academic Council
UCD Division Chair Russ
UCD Senate Division Executive Director Arevalo
Institutional Research and Academic Planning Analyst Procello
Senate Executive Director Lin

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COORDINATING COMMITTEE ON GRADUATE AFFAIRS
Partho Ghosh, Chair
pghosh@ucsd.edu

January 9, 2026



Ahmet Palazoglu
Academic Senate Chair

Dear Chair Palazoglu,

At its December 3 meeting, CCGA reviewed the proposal for a self-supporting online Master of Engineering in Sustainable Transportation from the Davis Division. After discussion, the proposal was approved 9-0-2.

The program is designed to equip professionals with the advanced knowledge and skills required to contribute effectively to the development, implementation, and management of sustainable transportation systems. The field of Sustainable Transportation has evolved significantly over the past few decades, transitioning from a focus on efficiency and infrastructure development to a more comprehensive view integrating environmental, social, and economic sustainability. Davis' Civil and Environmental Engineering (CEE) department has been at the forefront of this evolving field, with its Transportation Engineering group embodying the multidisciplinary nature of contemporary sustainable transportation research and practice, while remaining rooted in fundamentals of the engineering discipline.

The program's initial start-up cost is approximately $735K with a goal of financial self-sufficiency and by year five. Program funds will support STE faculty, ASEs, and part time instructors as well as a staff graduate program coordinator (50 percent allocation), a staff accounts manager (estimated at one month), and the CEE Department Manager (estimated at half a month). Once the start-up costs are repaid to the campus risk pool, five percent of revenues will be allocated for scholarships providing financial aid based on need or merit. UCPB reviewed the proposal and found it financially sound (review attached).

Four reviewers considered the proposal. They highlighted program's primary strength: its distinguished faculty, who are recognized leaders in sustainable transportation both nationally and internationally. While the program will be housed in CEE, the students will also benefit from opportunities to collaborate with faculty and peers of the UC Davis Transportation and Technology Policy (TTP) graduate group and the UC Davis Institute for Transportation Studies. These experiences will provide students with direct access to innovative research and robust professional networks, enhancing students' career prospects. Additionally, three reviewers emphasized the strong and ongoing demand for graduates with expertise in engineering and sustainable transportation, reinforcing the market analysis presented in the proposal. The Lead Reviewer's report is attached.

CCGA's approval is the last stop of the Academic Senate side of the Systemwide review and approval process except when the new degree title must be approved by the Senate. I submit this proposal for your review; please do not hesitate to contact me if you have further questions regarding it.

Sincerely,

Partho Ghosh
CCGA Chair

cc: Academic Senate Chair Palazoglu
Academic Senate Vice Chair Scott
Academic Senate Executive Director Lin
Academic Senate Assistant Director LaBriola
Academic Planning and Research Analyst Procello
CCGA Members
UCD Dean of the Graduate Division Delplanque
UCD Senate Executive Director Arevalo
UCD Senate Analyst Adams

To: Partho Gosh, CCGA Chair
From: Dorota M. Dabrowska, Lead Reviewer
Re: UC Davis proposal for SSGPDP Master of Engineering in Sustainable Transportation
Date: December 11, 2025

The Department of Civil and Environmental Engineering (CEE) at UC Davis proposes a nine-month self-supporting Master of Engineering in Sustainable Transportation (STE) program. This an online program intended for working professionals with engineering background.

1. The program aims to enroll the first cohort of students in Fall 2027 with initial cohort size of 20-30 students. The projected steady-state enrollment for this program is 50-60 students/year. The applicants must meet the university graduate admission standards, including a minimum 3.00 cumulative GPA and a bachelor's degree in areas such as engineering, environmental science, economics, or a related field, along with foundational preparation in engineering, mathematics and statistics, basic transportation, and technical writing.

The program requires a minimum of 36 units: 24 units of graduate core coursework and 12 units of electives. This is a Master's Plan II program with a practical industry-driven capstone project. Students may complete the program in as little as 9 months or choose a slower pace up to 3 years.

Faculty participating in the STE program will teach on an overload basis, typically no more than one course per year, with significant initial investment in course development (120-300 hours per 4-unit course). Ongoing responsibilities include approximately 40 hours for annual material updates and 2-4 hours per week for synchronous discussion groups, office hours and asynchronous online engagement. The faculty will have an option to support their courses by Academic Student Employees and part-time industry expert lecturers.

The program's initial start-up cost is approximately $735K with a goal of financial self-sufficiency and by year 5. Program funds will support STE faculty, ASEs, and part time instructors as well as a staff graduate program coordinator (50% allocation), a staff accounts manager (estimated at 1 month), and the CEE Department Manager (estimated at 0.5 months) . Once the start-up costs are repaid to the campus risk pool, 5% of revenues will be allocated for scholarships providing financial aid based on need or merit.

2. The academic program was reviewed by two external and two internal reviewers from transportation and urban planning departments. The reviews were requested between October 10 -20 and all four reviewers completed their reports within 2 weeks.

3. The reviewers highlighted program's primary strength: its distinguished Senate Faculty, who are recognized leaders in sustainable transportation both nationally and internationally. While the program will be housed in CEE, the students will also benefit from opportunities to collaborate with faculty and peers of the UC Davis Transportation and Technology Policy (TTP) graduate group and the UC Davis Institute for Transportation Studies. These experiences will provide students with direct access to innovative research and robust professional networks, enhancing students' career prospects.

Additionally, three reviewers emphasized the strong and ongoing demand for graduates with expertise in engineering and sustainable transportation, reinforcing the market analysis presented in the proposal. One reviewer expressed concern about the potential difficulty of attracting out-of-state

students in the current climate but also noted that California's commitment to sustainable transportation remains strong and suggested continued local demand for graduates in this area.

4. The reviewers provided several suggestions regarding the delivery and scope the proposed STE program. They suggested considering a hybrid format that would allow STE students to participate in in-person classes via Zoom. They also suggested expansion of the program to include faculty from other disciplines and requested clarification of the overlap of the proposed program with UC Irvine's Master in Engineering program and UC's offerings in urban planning.

In response, the program team explained that previous experiments with hybrid courses revealed significant challenges in ensuring equitable participation among all students. As a result, the program is intentionally designed to be fully online, prioritizing flexibility and accessibility for working professionals across various time zones. This approach ensures that all students have equal opportunities to engage with course materials and participate in program's activities.

To foster a dynamic and supportive learning environment, the program will deliver lectures asynchronously, allowing students to access the content at their convenience. Faculty will offer weekly office hours at a variety of times throughout the week to accommodate diverse work schedules and time zones. In addition, students will benefit from interactive discussion forums, collaborative projects and assignments, and peer feedback sessions. As students advance to the capstone project, each will be paired with a dedicated capstone mentor who will provide ongoing guidance. Every student will also have an assigned faculty advisor, and program will actively monitor and adjust synchronous communication needs to ensure all students remain connected and supported.

The revised proposal highlights that STE faculty already include CEE members specializing in integration of sustainable transportation studies with engineering, management, social sciences, industrial ecology, and urban planning. The program's Steering Committee also includes a faculty from Environmental Science and Policy. As the program matures, students will have opportunities to gain experience from industry experts and professionals from state and regional agencies, who may serve as part-time instructors.

The proposers clarified that the STE program complements existing graduate programs of UC Davis CEE and TTP graduate group, both of which are primarily research oriented and more focused on doctoral students rather than working professionals. While there is some overlap with other UC programs, none currently offer a fully online degree dedicated to sustainable transportation engineering for working professionals. UC's urban planning programs may include transportation planning components, but they do not address the engineering dimension. The revised proposal also clarifies that the UC Irvine's in-person Master of Engineering program offers transportation-related content as one of several concentration paths within a broader engineering curriculum but does not provide a dedicated degree in sustainable transportation. The online description of the UC Irvine's program indicates that transportation concentration path is not offered every year.

5. This is a well written proposal for a program designed for working professionals who want to acquire new skills to address sustainable transportation challenges. The online format is well suited for this audience and has a good chance of attracting a large cohort of students. UC Davis consistently ranks among top institutions for transportation-related graduate studies and SSGPDP will complement its existing state-funded graduate programs in this area. I recommend approval of the program.

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Lawrence Berkeley
Lawrence Livermore
Los Alamos

UNIVERSITY COMMITTEE ON PLANNING AND BUDGET (UCPB)
Robert Brosnan
rjbrosnan@ucdavis.edu

September 24, 2025

Partho Gosh
Chair, CCGA

RE: UC Davis Master of Engineering (M. Eng.) in Sustainable Transportation Self-Supporting Graduate Degree Program Proposal

Dear Partho,

UCPB discussed the UC Davis proposed graduate program at its October committee meeting. The campus asserts the program will be rigorous and interdisciplinary, equipping working engineers to design, implement, and manage sustainable transportation systems. The curriculum addresses technical, policy, economic, and environmental dimensions. An industry-relevant curriculum plus a capstone project will be completely online, enabling working professionals to complete the program.

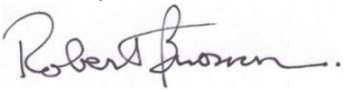
There are no directly comparable programs within the UC. The campus notes that the proposed program fulfills an unmet need. Some overlap with existing UC programs was noted in the proposal but petitioners maintain sufficient differentiation exists to justify approval. Formal plans to encourage a diverse student population are outlined in the proposal.

The online program will require little in the way of campus resources. Indirect cost is in line with campus norms, although the local budget office reminds the program to work with the Assistant Dean's office to solidify General Overhead Assessment estimates. The program plans to be self-supporting by year five, following repayment of the over $700k initial campus assessment.

After repayment, proposed uses of revenues are to pay for instruction by senate and non-senate professors, a Graduate Program Coordinator and partial time from both an accounts manager and CEE Department Manager, TAs, and five percent return to aid for scholarships. Note that the proposal cites both a five percent and eight percent RTA and should resolve that discrepancy.

UCPB noted that this is a well-designed proposal. Viability of the self-supporting degree hinges on attracting sufficient students and accurately estimating costs. Review of the program following initial years should focus on any unforeseen effects on state-supported programs, faculty time, and campus library facilities. With these minor caveats, UCPB recommends approval of the petition.

Sincerely,



Robert Brosnan
Chair

cc: UCPB

**UCPB Proposed Self-Supporting Professional Degree Program Review Template**

Name and Location of Program: Master of Engineering (M.Eng.) in Sustainable Transportation,

University of California, Davis

Lead reviewer(s): Oliver Schmidt, UCSD

Academic justification:

The petitioners justify the program academically by positioning it as a rigorous, interdisciplinary M.Eng. that equips working engineers to design, implement, and manage sustainable transportation systems across technical, policy, economic, and environmental dimensions. They spell out aims and learning outcomes (e.g., cultivating expertise, fostering innovation and leadership, applying advanced engineering methods, and communicating with diverse stakeholders) and emphasize an applied, industry-relevant curriculum (core plus electives and a capstone) delivered online to expand access for professionals who cannot attend full-time on campus.

Planning and Budget overview:

1. Proposed initial tuition and any rate of increase: $40,000 (=$1,111 per unit)

2. Target enrollments for years 1-3:

| | | |
|---|---|---|
| 20-30 | 50-60 | 50-60 |

3. Projected net revenues for years 1-3:

| | | |
|---|---|---|
| $0 (balanced by $735,497 campus investment) | $354,118 | $892,131 |

4. Proposed indirect cost rate (IDC):

SSGPDP assessment at about 3.5% of gross program fees (e.g., Year 1: $15,128 on $432,222 in fees, hence 15,128/432,222 ≈ 0.035 but percentage not explicitly stated) is included in the revenue chart.

The campus office of Budget and Institutional Analysis notes that the budget already includes the program's estimated share of the campus General Overhead Assessment. They advise coordinating with the Assistant Dean to keep these estimates accurate, since General Overhead Assessment costs vary by school or college. No percentage is specified.

Detailed areas of review:

5. How was the proposed IDC rate determined? Does the proposed rate appear to cover all indirect costs (facilities, IT, etc.)? What are the space needs of the program?

Program-specific IT for instruction (Canvas) is not an added direct cost; access costs are recovered through the standard SSGPDP fee.

As an online program, "the use of on-premise space and facilities will be little to none; students will be engaging in distance learning and therefore will not be accessing classroom space."

6. What are the proposed uses of net revenues? How will they supplement [enhance] state-funded programs? Are there other ways that the program, if successful, will benefit the UC mission (e.g., filling a need not covered by state-supported programs)?

Proposed uses of net revenues:

- Instructional labor: Compensation for senate and non-senate instructors (including overload/buyout per college policy).
- Staffing & administration: Supports a Graduate Program Coordinator plus partial effort for an accounts manager and CEE Department Manager).
- Academic Student Employees (ASEs): TAs/Readers funded by program revenues.
- Student financial aid ("return to aid"): Petitioners set aside 5% of fees for scholarships once start-up costs are repaid.
- Revenues managed via Graduate Group/CEE/College with an MOU on revenue sharing
- No use of state funds.

Petitioners argue that the program fills a UC-system gap. Petitioners state no other UC campus offers a graduate degree specifically in Sustainable Transportation Engineering, so this program addresses an unmet need.

7. How are any potential negative impacts on state-funded programs and the research mission of the UC mitigated?

No reliance on state funds; program is self-supporting. The degree is designed to be self-supporting by the end of Year 3; the initial "jump-start" uses allowable non-state funds, and ongoing instructional costs (faculty, lecturers) are paid from program revenue.

8. Describe disposition and compensation of **faculty** serving the program. What is the proposed ratio of UC Senate faculty to non-UC adjunct faculty? For the former category, differentiate between ladder rank and P/LSOE. How will UC Senate faculty be compensated? On-load (i.e., course buyout), overload, or some combination thereof?

Senate faculty are expected to teach in the program primarily as overload under APM-025 limits (typically no more than one course), with payment as salary or, at the instructor's option, discretionary funds. On-load (buyout) teaching is allowed case-by-case when compatible with department needs and chair approval, priced at roughly 1/8 of AY salary + benefits per course, with online equivalencies (e.g., 1.0 for new-course development, 0.5-0.67 for established asynchronous offerings, 0.67 for substantial refresh) determining what counts toward load. The pay schedule used for budgeting is:

- $30k for developing a new 4-unit course
- $20k to offer a course ($15k if a TA/Reader is assigned)), plus $100 per student over 50
- up to $20k for a substantial refresh (typical half-course refresh $10k

The program supplements Senate capacity with about 5 industry lecturers per year.

9. Describe how the program will ensure accessibility and encourage diversity. Note: these concerns may be addressed through return-to-aid used for need-based fellowships, although programs may address accessibility and diversity in a variety of ways and UCPB does not set a standard return-to-aid percentage.

Fully online format with negligible on-campus space needs to serve working professionals, students in remote locations, and learners needing accommodations. The program reserves 5% of fees as “return-to-aid” for scholarships once start-up costs are repaid.

A formal “Contributions to Diversity” plan to identify, recruit, and retain underrepresented students and faculty is part of the program. The plan is detailed with and emphasizes that advancing diversity is central to the program’s aims and aligned with UC Davis strategic goals.

10. Describe the market analysis used to justify demand and price point for the proposed program. Will the program compete with others in the system? What are projected percentages of California resident, domestic non-resident, and international students in the program?

The petitioners justify demand with a formal market analysis that combines federal degree-completion data (mapped to the target and adjacent CIP codes), employer demand indicators, and a competitor scan. They model three enrollment scenarios indicating sufficient appetite for an online, practice-focused program and conclude the market remains unsaturated, especially for fully online offerings aimed at working professionals. Pricing is benchmarked against peers: the analysis situates the proposed total fee around the peer median-to-upper range and the main petition pegs it at roughly $40,000—positioning it between online engineering degrees at UCLA and Berkeley.

Regarding UC system competition, the proposal acknowledges overlap with existing UC programs but argues differentiation via a fully online modality, professional orientation, and the specific Sustainable Transportation Engineering focus. Finally, the petition does not provide projected percentages for California residents, domestic non-residents, and international students; the analysis emphasizes U.S. workforce demand and comparable-program dynamics rather than residency mix forecasts.

11. Describe relevant consultation and assessment from lower levels of review, external assessments of the proposal, and the like.

Consultation & lower-level reviews

- The UC Davis Graduate Council approved the proposal
- The Library Committee recommended approval but flagged long-run library cost pressures from online programs and advised building a funding model beyond the stated per-student charge, adding a database/orientation module, and prioritizing e-books for remote students.
- The CPB committee reviewed the proposal and supported creation of the program, highlighting its alignment with college/department strategy, clarity on revenue use, and the commitment that no state funds would cover program costs.

For external assessments / inter-UC consultation, the petitioners collected letters of support:

- UC Berkeley CEE wrote that the proposed online M.Eng. would complement, not overlap with its degrees and would serve students unable to attend in person.
- UC Irvine CEE similarly supported the proposal, noting the fully online modality should draw a different student audience than existing programs.

12. Any other planning and budget concerns?

This review has not identified any concerns beyond those articulated in the appended campus committee reviews/external support letters, reproduced here:

Budget and Institutional Analysis memo:

- Must budget for SSGPDP assessment and a share of the General Overhead Assessment; amounts can change and should be coordinated with the Assistant Dean.
- Keep state-supported and self-supporting activities separately accounted (PPM 200-26) and periodically re-estimate costs/chargebacks; consider the STE budget within the College's overall budget during annual fee reviews.
- Build a program reserve to cover low-enrollment years, unforeseen costs, and wind-down.
- Fee approval (AY 2025–26) will require strong pricing justification; if academic-review changes affect finances, budget will be re-reviewed at the fee stage.
- Enrollment sensitivity: viability hinges on 20–30 students in Year 1 and reaching 50–60 steady-state; the non-cohort model makes sustainability harder to evaluate.
- Start-up financing & long-run sustainability: central non-state start-up support; plan projects break-even/payback by Year 5 and >$800k net/year thereafter (contingent on enrollment).
- Return-to-aid alignment: narrative cites 8%, budget shows 5%; UCOP fee approval will expect a more robust aid plan (e.g., employer support, reasonable debt-to-salary).

Library Committee letter:

- Expect added library costs beyond current collections: $5k–$8k/yr for industry standards and $5k–$25k/yr for data/policy resources, with 3–12% annual inflation on licenses; cumulative effects from multiple online programs are a concern

13. Any academic-quality or related concerns to flag for CCGA? N/A

14. Are there specific areas of concern that the mandated review after the third year of operation ought to capture? N/A

Conclusions and recommendation:

The petitioners present a well-constructed, academically justified, and operationally thoughtful proposal. Their commitment to fund all program costs without drawing on state resources is commendable and aligns with UC policy expectations for self-supporting programs. That said, the ultimate success of the program will hinge on execution: enrollment, cost control, and the balance of Senate/lecturer teaching must be closely monitored to ensure

the program remains financially sustainable without adverse effects on state-supported instruction or faculty research time.

A Proposal for a Self-Supporting Graduate Professional Degree Program

Master of Engineering (M.Eng.) in Sustainable Transportation

University of California, Davis

**Date of Preparation: October 24, 2024**

Revised Phase 1 Academic Senate Review: January 2025

# Proposal Contact Information

## A. Lead Faculty Sponsor(s)

1. Kari Watkins, ~~Associate~~ Professor, Civil & Environmental Engineering, kewatkins@ucdavis.edu
2. Alan Jenn, ~~Assistant~~ Associate Professor, Civil & Environmental Engineering, ajenn@ucdavis.edu

## B. Steering Committee

1. Miguel Jaller, Professor, Civil & Environmental Engineering, mjaller@ucdavis.edu
2. Yueyue Fan, Professor, Civil & Environmental Engineering, yfan@ucdavis.edu
3. Alissa Kendall, Professor, Civil & Environmental Engineering, amkendall@ucdavis.edu
4. Somayeh Nassiri, Associate Professor, Civil & Environmental Engineering, snassiri@ucdavis.edu
5. John Harvey, Distinguished Professor, Civil & Environmental Engineering, jtharvey@ucdavis.edu
6. Michael Zhang, Professor, Civil & Environmental Engineering, mzhang@ucdavis.edu
7. Susan Handy, Professor, Environmental Science & Policy, slhandy@ucdavis.edu

## C. Staff Contact(s)

1. Chris Cappa, Department Chair (Civil & Environmental Engineering) and Associate Dean of Graduate Studies and Online Education (College of Engineering), cdcappa@ucdavis.edu
2. Lauren Worrell, Graduate Coordinator, Civil & Environmental Engineering, lkworrell@ucdavis.edu
3. Alin Wakefield, Research & Graduate Studies Development Coordinator, College of Engineering, amwakefield@ucdavis.edu

## Executive Summary

The faculty of the College of Engineering (COE) and especially the Department of Civil and Environmental Engineering are excited to submit a proposal to create a new self-supporting professional one-year Master of Engineering (M.Eng.) degree in Sustainable Transportation, which is part of a bold move of COE, and more broadly UC Davis, into the online space. Some of the key features of the program include:

1. **Comprehensive Curriculum** : The program covers a wide range of topics essential for understanding and advancing sustainable transportation. The curriculum is designed to provide a deep and broad understanding of the field and covers topics from the integration of electric vehicles and smart infrastructure to the implications of transportation policies and practices on urban development and environmental sustainability.

2. **Expert Faculty**: Learners will benefit from the knowledge and expertise of distinguished faculty, renowned for their contributions to transportation engineering and related disciplines. The faculty's research and professional activities inform their teaching, ensuring that course content is relevant, current, and guided by the latest advancements in the field.

3. **Flexible Online Format** : The program is designed to accommodate the needs of working professionals, offering flexibility through its online format and allowing students to engage with course materials, participate in discussions, and complete assignments on their own schedule without compromising their professional or personal commitments.

4. **Interactive and Supportive Learning Environment** : Despite being an online program, emphasis is placed on student engagement and interaction. Students will have opportunities to collaborate with peers, engage in discussions with faculty, and access a range of support services designed to facilitate their academic and professional growth.

5. **Industry-Relevant Skills**: The curriculum is designed with a focus on practical and applied learning, ensuring that graduates are well-equipped with the skills and knowledge required to address real-world challenges in sustainable transportation. The program emphasizes problem-solving, critical thinking, and the application of theoretical knowledge to practical scenarios.

6. **Global Perspective**: The program incorporates a global perspective on sustainable transportation, reflecting UC Davis's commitment to global engagement and preparing students to navigate and contribute to the field in their own geographical region and in an increasingly connected world.

This new M.Eng. degree in Sustainable Transportation represents an exciting opportunity for professionals seeking to advance their careers and make meaningful contributions to a critical and rapidly evolving field.

# 1. Introduction

## 1.1. Aims and Objectives

*Program Aims*

The online Master of Engineering (ME) program in Sustainable Transportation is designed to equip professionals with the advanced knowledge and skills required to contribute effectively to the development, implementation, and management of sustainable transportation systems. The program aims to:

1. **Cultivate Expertise**: Develop a deep understanding of the interdisciplinary aspects of sustainable transportation, encompassing technical, policy, economic, and environmental perspectives.
2. **Foster Innovation**: Encourage innovation and critical thinking in addressing transportation sustainability challenges, with a focus on emerging technologies, policy frameworks, and best practices.
3. **Promote Leadership**: Prepare graduates to assume leadership roles in the field of sustainable transportation, capable of driving change and making informed decisions that contribute to the sustainability goals of their organizations and communities.
4. **Global Perspective**: Provide a global perspective on sustainable transportation issues, preparing students to address challenges and opportunities in diverse geographic and socio-economic contexts.
5. **Ethical Responsibility**: Instill a sense of ethical responsibility and a commitment to promoting equity, diversity, accessibility, and environmental stewardship in transportation systems.

*Program Learning Objectives*

Upon completion of the program, graduates will be able to:

1. Analyze and evaluate transportation systems using a sustainability framework, considering environmental, economic, and social dimensions.
2. Apply advanced engineering principles and methodologies to design, implement, and manage sustainable transportation solutions.
3. Develop and assess policies and strategies that promote sustainable transportation, incorporating regulatory, technological, and behavioral considerations.
4. Utilize quantitative and qualitative methods to conduct analysis in transportation systems, informing decision-making and policy development.
5. Communicate effectively with diverse stakeholders, including policymakers, engineers, planners, and the public, advocating for sustainable transportation initiatives.
6. Demonstrate leadership in interdisciplinary teams, guiding efforts toward sustainable transportation goals and fostering collaborative problem-solving.

*Distinctive Features of the Program*

- Flexible Online Format: Designed for working professionals, offering asynchronous coursework and virtual collaboration, enabling students to balance their studies with professional and personal commitments.
- Global Classroom: Leverages a diverse student body, including in-state, out-of-state, and international students, facilitating cross-cultural learning and networking opportunities.

- Industry Engagement: Incorporates real-world case studies, teaching and guest lectures from industry leaders, and opportunities for industry-sponsored projects, ensuring practical relevance.
- Interdisciplinary Approach: Draws on a core focus in engineering, with additional expertise in urban planning, economics, and environmental sciences integrated to provide a holistic perspective on sustainable transportation.

*Target Audience Profile*

- Educational Background: Bachelor's degree in engineering
- Work Experience: Professionals in the transportation sector, urban planning, government, or related industries seeking to advance their knowledge and career prospects in sustainable transportation.
- Student Demographics: A diverse cohort with a mix of in-state, out-of-state, and international students, fostering a rich learning environment with varied perspectives.

The proposed program aims to help engineers expand their knowledge of their discipline or develop knowledge of a new discipline through advanced study in Sustainable Transportation.

## 1.2. Historical Development

The field of Sustainable Transportation has evolved significantly over the past few decades, transitioning from a focus on efficiency and infrastructure development to a more comprehensive view integrating environmental, social, and economic sustainability. This evolution reflects a global recognition of the need to address the environmental impacts of transportation, promote social equity, and ensure economic viability.

*Historical Development of Sustainable Transportation*

The genesis of Sustainable Transportation as a distinct field can be traced back to the growing environmental awareness of the 1970s and 1980s, when the impacts of vehicular emissions and urban sprawl became prominent concerns. This period marked the beginning of efforts to reduce the carbon footprint of transportation, enhance public transit systems, and promote non-motorized forms of travel. The subsequent decades witnessed a gradual but steady expansion of the field, incorporating advancements in technology, a stronger emphasis on policy and planning, and an increased focus on the interconnectivity of transportation with urban design, energy systems, and public health.

In recent years, the field has embraced an interdisciplinary approach, integrating insights from engineering, urban planning, environmental science, economics, and social sciences to develop holistic and sustainable transportation solutions. This approach is reflected in the growing emphasis on electric vehicles, smart cities, and the role of transportation in combating climate change.

*Departmental Strength in Sustainable Transportation*

The Civil and Environmental Engineering (CEE) department has been at the forefront of this evolving field, with its Transportation Engineering group embodying the multidisciplinary nature of contemporary sustainable transportation research and practice, while remaining rooted in fundamentals of the engineering discipline. The group's diverse expertise is a testament to the department's strength and its significant contributions to the field:

- The integration of engineering, management, and social sciences in Professor Jaller's research reflects a holistic approach to understanding and addressing the complexities of sustainable transportation.
- Professor Fan's focus on systems modeling and computational methods exemplifies the field's shift towards leveraging advanced mathematics and engineering to enhance infrastructure resilience and sustainability.
- The emphasis on pavement technology and sustainable materials by Professors Harvey and Nassiri highlights the department's commitment to advancing sustainable infrastructure practices.
- Professor Jenn's work on electric vehicles and their integration with the grid represents the department's engagement with cutting-edge solutions to transportation energy challenges.
- Professor Kendall's application of industrial ecology and environmental assessment methods to transportation underscores the department's role in advancing environmental sustainability in the field.
- The policy and mobility research led by Professor Watkins demonstrates the department's influence on shaping sustainable transportation practices and policies.
- Contributions to transportation system dynamics and intelligent transportation by Professor Zhang align with the field's direction towards smarter and more efficient systems.
- Professor Handy's research on transportation-land use interactions embodies the department's strength in addressing the complex interplay between urban planning and transportation.

The department's expertise not only mirrors the historical development of Sustainable Transportation but also positions it as a leader in shaping the future trajectory of the field, with a strong commitment to sustainability, innovation, and multidisciplinary research. With the ties between the department and the Institute for Transportation Studies, UC Davis has established itself as the preeminent university in the country for Sustainable Transportation research and this program solidifies that reputation as the preeminent university in the country in terms of education.

## 1.3. Timetable for development

The program aims to enroll the first cohort of students in Fall 2026 (Year 1) with an initial cohort size of 20-30 students. The projected steady-state enrollment for this program is ~50-60

students/year adjusted based on demand, industry trends, and the capacity to maintain program quality.

To accomplish this timeline for matriculation, the program will need to receive final system-level approval by Summer 2025 in order to open admissions by Fall 2025. In parallel with the academic review process for this proposal, the department will partnerwith UC Davis Continuing and Professional Education (CPE), the campus service provider for the online program management platform, to establish the online program infrastructure and prepare the coursework approved by UC Davis Divisional Academic Senate fo online delivery (see Section 4.3 for details on delivering online instruction).

## 1.4. Relation to Existing Programs and to campus academic plan

We do not anticipate any negative effects on existing graduate and undergraduate programs. The reason for this is that faculty who are teaching in the SSGPDP will primarily do so on an overload basis and thus will continue to teach at their current expected load. Additionally, the courses developed and offered will be delivered in an asynchronous mode. Consequently, the major time impact on faculty will be associated with the initial development of a course, with only a moderate time commitment when the courses are delivered. The estimated time commitment for development of a 4-unit (quarter system) course is 120-240 hours, depending on the extent to which instructors can leverage existing resources. Any materials or assets developed as part of this program may be used in teaching in our state-supported program and can thus enhance student learning for our traditional master's students. As faculty are compensated for development of courses in the proposed SSGPDP, their efforts here could be considered similar to those associated with typical summer-salary generating activities. The time commitment equals approximately 3-6 weeks of effort over the summer for development. For course delivery, we estimate a time commitment of approximately 20 hours for ensuring materials are up-to-date and then 2-4 hours per week for office hours and asynchronous communication. This level of commitment falls within the accepted 312 hours of outside work allowed during the academic year. Most of the faculty involved in the program do not currently use anything close to the 312 hours of allowable outside work.

Moreover, we expect that the revenue from the SSGPDP will ultimately benefit our existing graduate and undergraduate programs.

The proposed program is highly complementary to existing graduate programs in Civil & Environmental Engineering (CEE), which has as a focus area transportation engineering, and Transportation & Technology Policy (TTP). While both programs enroll masters students, both focus more on education of PhD students, and a preponderance of the enrolled masters students engage in research and completing a thesis.

Moreover, as an online program focused on working professionals we expect to attract students from different audiences.

The proposed program aligns with various campus and COE initiatives and goals. Sustainable transportation is critical to ensuring that we are able to address the worst impacts of climate change through Climate Solutions, which is one of the four UC Davis Grand Challenges Sustainable transportation engineering also aligns directly with the COE Strategic Research Vision area of Transforming Mobility, especially, but also with the Strengthening Climate Resilience and Revolutionizing Energy Systems areas. The COE Strategic Education Vision has three principles: that our efforts be Inspired, Inclusive, and Impactful. Currently, our graduate programs are designed for and tailored to students who are able to attend full time. As such, we are leaving out many learners, specifically (i) those working professionals who would like to advance their education but cannot leave their jobs to attend school full time and (ii) those who otherwise require a remote learning environment due to living in remote locations and/or the need for accommodated learning.

As the challenges of climate change continue to mount and transportation issues become ever more complex to address it is critical that we establish a program like this now—one that can inclusively address the needs of this excluded population of learners.

These aspects of transforming mobility in sustainable ways and meeting the educational needs of a diversity of individuals, which are designed into the proposed program, align with the UC Davis Strategic Vision 'To Boldly Go'. The program parallels the UC Davis Strategic Vision Goal 4 to "*support our community, region, state, nation and world through mutually beneficial and impactful partnerships that reflect a firm commitment to our mission and increase the visibility and reputation of the university*". Specifically, the proposed degree program is a collaborative effort with industry and state/regional agencies in terms of course delivery and curriculum development. We anticipate many of the students will be working professionals in those and similar institutions, which will strengthen the existing ties between UC Davis and companies and agencies in the State. Since California leads the nation in developing and demonstrating sustainable transportation technologies and policies that shape national policy, the program will have wide-ranging impacts on State and national goals.

## 1.5. Contributions to Diversity

The proposed Master of Engineering (M.Eng.) degree in Sustainable Transportation is committed to advancing UC Davis's goals for diversity, equity, and inclusion. The program recognizes the value of diverse perspectives in fostering innovation and excellence in the field of sustainable transportation. As such, the program is dedicated to creating an inclusive environment that supports the identification, recruitment, and retention of underrepresented minority students and faculty.

The program's vision for advancing diversity is twofold: to cultivate a diverse academic community that reflects the broader society and to integrate principles of diversity and inclusion into the curriculum and research initiatives. By achieving these objectives, the program aims to empower students from all backgrounds to contribute to the field of sustainable transportation and to ensure that diverse perspectives are represented in shaping the future of transportation.

*Plan for Recruitment and Retention*

Year 1-2: Establishing Foundations

- Develop partnerships with organizations and institutions that serve underrepresented groups, such as the Institute of Transportation Studies' Environmental Justice Leaders Program and the Transportation Equity and Environmental Justice Advisory Group (TEEJAG), to raise awareness of the program and to identify potential students.
- Implement targeted recruitment strategies, including scholarships, fellowships, and outreach programs, to attract a diverse student body.
- Foster an inclusive program culture through diversity training for faculty and staff and by ensuring representation in program governance.

Year 3-5: Building and Evaluating

- Monitor and evaluate the diversity of the student and faculty populations, setting specific targets for improvement based on baseline data.
- Assess the integration of diversity-focused content into the curriculum to ensure that issues related to equity and inclusivity in transportation are addressed.

*Evaluation of Diversity Goals*

- The program will regularly assess its progress towards achieving its diversity goals through annual reviews of enrollment and retention data for students and faculty.
- Surveys and feedback mechanisms will be implemented to gather insights from students and faculty on the program's inclusivity and effectiveness in promoting diversity.

To enhance the proactive effectiveness of the program's diversity evaluation, we will consider metrics such as enrollment, retention, and graduation rates disaggregated by demographic categories. Based on these insights, the program will develop targeted interventions, such as outreach initiatives for underrepresented groups, tailored support services, or curriculum adjustments to address specific barriers.

The commitment to diversity within the M.Eng. program in Sustainable Transportation is central to its aims and is expected to contribute significantly to the broader goals of UC Davis in promoting an inclusive and equitable academic environment. By taking deliberate steps to enhance diversity and by evaluating its progress rigorously, the program aims to set a standard for inclusivity and representation in the field of engineering education.

## 1.6. Interrelationship with other UC Institutions

To our knowledge, there are self-sustaining online master's degree programs in engineering at three other UC's: UC Riverside, UCLA, and UC Berkeley. In the development of this proposal the UC Davis College of Engineering Associate Dean of Graduate Studies met with the program directors for each of these programs, who shared their experiences in creating and managing their programs. These programs operate in distinct ways.

The UC Riverside program (msol.ucr.edu) offers a single M.Eng. in which enrolled students complete a common set of four core courses along with courses in their area of specialization. Relevant to this proposal, the UCR M.Eng. recently introduced a new specialization in mobility engineering. Our proposed program is distinct through its specific focus on sustainable transportation engineering for the duration of the degree, rather than having transportation as a specialization area within a broader curriculum.

-The UCLA program (msol.ucla.edu) offers multiple online M.Eng. degrees in which enrolled students engage in study in a particular area, but can take elective courses in other areas. Relevant to this proposal, the UCLA program does not offer an M.Eng. in transportation.

-The UC Berkeley program is a Master of Advanced Study (MAS) in which students' complete sets of 1-unit courses across their five interdisciplinary themes, with their course of study comprising a technical foundation, depth, and breadth. Each of these programs include a capstone project. There is no overlap with this program.

The UC Irvine program (https://engineering.uci.edu/graduate/masters/engineering) offers an in-person Master of Engineering that emphasizes technical depth combined with professional skill development. Students complete a set of core courses in engineering leadership and management alongside advanced technical coursework in their chosen concentration. While UCI offers concentrations related to energy systems and mobility, it does not offer a dedicated degree focused specifically on sustainable transportation. UCI's M.Eng. treats transportation-related content as one of several possible pathways within a broader professional engineering framework.

No other UC campuses offer a graduate degree specifically in Sustainable Transportation Engineering, although like UC Davis some have transportation embedded in CEE as a specialization, as is the case at UC Davis. Our effort has the support of Chair's of relevant UC departments (see Appendix F).

## 1.7. Program Administration

The Master of Engineering (M.Eng.) degree in Sustainable Transportation will be administered by the new Sustainable Transportation Engineering Graduate Group associated with the Department of Civil and Environmental Engineering (CEE) and the College of Engineering, UC Davis. The

faculty of the CEE Department voted unanimously in support of the creation of this new program, with a vote turnout of 71%. This group comprises a diverse team of faculty members who are renowned for their expertise in various facets of transportation engineering, making it a strong administrative body for the program.

The group will be responsible for overseeing the program's curriculum development, faculty teaching assignments, student admissions, and the coordination of resources necessary for the delivery of the online program. They will also handle the annual evaluation of the program's effectiveness, incorporating feedback to ensure continuous improvement.

Graduate Program Coordinators and other staff will be hired and formally supervised by either CEE or COE. We expect that it will be necessary to hire one new staff (a Graduate Program Coordinator) to help administer the program; such program staff may be shared across other online programs, depending on enrollment and need. Revenue earned by the program will be used to offset some of the salary for other staff (e.g., Account Managers) according to the time they spend helping to administer the program.

## 1.8. Plan for Evaluation of the Program

Academic and Administrative Evaluation

As a UC Davis graduate program, the department is committed to upholding the standard of academic quality and excellence that is characteristic of a UC degree. The program will be evaluated on a regular basis in compliance with the UC Davis Graduate Council policy and process for academic program review. In addition, as an SSGPDP, the program will undergo regular administrative review by the UC Davis Provost-appointed Committee on Graduate Professional and Online Self-Supporting programs to ensure that the program continues to comply with the campus and UC policies for SSGPDP programs, such as maintaining a self-supporting status and proper accounting for the use of any resources supported by state funds. The program will also undergo external evaluation to establish and maintain the necessary ABET accreditation.

State Authorizations

Lastly, as an online degree program, state authorization will be required in order for the program to be able to enroll students who are not residents of California[1]. The program will work closely with UC Davis Graduate Studies to establish and maintain any necessary state authorizations.

The Master of Engineering (M.Eng.) degree in Sustainable Transportation will implement a comprehensive evaluation plan to ensure its effectiveness and alignment with the academic standards of UC Davis. The evaluation plan will encompass assessments within the offering

[1] See the UCOP Webpage for State Authorization of Distance Education for additional information.

department, by the Academic Senate, and campuswide, ensuring a holistic review of the program's impact, quality, and outcomes.

*Departmental Evaluation*

- Annual Reviews: The Transportation Engineering group within the Department of Civil and Environmental Engineering will conduct annual reviews of the program, focusing on curriculum relevance, student performance, graduation rates, and faculty engagement.
- Stakeholder Feedback: Regular feedback will be solicited from students, alumni, and industry partners to gauge the program's relevance, effectiveness, and areas for improvement.

*Academic Senate Evaluation*

- Periodic Program Review: In line with UC Davis policies, the program will undergo a comprehensive review by the Academic Senate every five to seven years, assessing academic quality, program structure, and compliance with accreditation standards.
- Faculty Contributions: An assessment of faculty contributions to teaching, research, and service will be conducted, ensuring that faculty are meeting the high standards expected by the Academic Senate.

*Campuswide Evaluation*

- Student Success Metrics: The program's impact on student success will be evaluated through metrics such as employment outcomes, student satisfaction, and professional achievements of graduates.
- Diversity and Inclusion: Progress towards the program's diversity and inclusion goals will be assessed, evaluating efforts to recruit and retain underrepresented minority students and faculty.

*Continuous Improvement Process*

- Data-Informed Adjustments: The program will implement a continuous improvement process, using data from evaluations to inform adjustments in curriculum, teaching methods, and program policies.
- Benchmarking: Regular benchmarking against comparable programs at peer institutions will be conducted to ensure that the program remains competitive and innovative in the evolving field of sustainable transportation.

# 2. Program

## 2.1. Admission Requirements

a) University Requirements

Applicants for admission to the graduate program in Sustainable Transportation must meet the minimum university requirements for admission to graduate study, including: a minimum 3.00 cumulative GPA and a bachelor's degree from an accredited institution. In addition, applicants must submit a resume, at least two letters of recommendation, and a written statement of purpose.

Consistent with Davis Division Regulation (DDR) 503 and the UC Davis Policy on Admissions Requirements and Exceptions, applicants who did not receive their bachelor's or graduate degree from an regionally accredited U.S. college or university, or from an institution where English is the sole language of instruction, are required to earn a passing score on an approved English language examination in order to be considered for admission.

b) Prerequisites

Applicants to the M.Eng. program in Sustainable Transportation should possess a bachelor's degree in engineering, environmental science, economics, or a related field. The ideal undergraduate preparation includes:

- Fundamental Engineering Knowledge: Courses in basic engineering principles, such as mechanics, energy, and/or materials. (e.g., ECI 100)
- Mathematics and Statistics: Proficiency in mathematics, including calculus, linear algebra, and statistics, is crucial for understanding and applying engineering concepts. (e.g., MAT 21A, MAT 21B, MAT 21C, MAT22A, ECI 114)
- Basic Transportation Knowledge: Exposure to transportation principles, urban planning, or environmental science, providing a foundational understanding of the field's context.
- Technical Writing: Experience in technical writing to prepare for the communication requirements of the program.

## 2.2. Foreign Language

There will be no foreign language requirement for this program. This is consistent with the requirements for existing graduate degrees in the College of Engineering at UC Davis.

## 2.3. Program of Study

This proposed program of study was developed in consultation with key faculty in the UC Davis Civil & Environmental Engineering, as well as faculty in the Transportation Technology and Policy graduate group and the Energy Systems graduate group who provide expertise in areas related to the program's fields of emphasis. In addition, the faculty steering committee for this proposed

program consulted with industry experts to ensure the proposed curriculum and training will adequately prepare students for successful careers in industry. The requirements for the degree are compliant with established university policies for a Master's degree and also meet the standard and expectations for accreditation. Below is a summary of the key academic components of the M.Eng. in Sustainable Transportation degree. A full description of the program requirements can be found in Appendix B: Degree Requirements.

a) Fields of Emphasis

The program emphasizes sustainable transportation, and integrates approaches from engineering, urban planning, environmental studies, and policy analysis to address the challenges of creating transportation systems that are environmentally friendly, economically viable, and socially equitable.

b) Plan (Master's Plan II)

The program will be structured as a Master's Plan II with a capstone. This is consistent with the requirements for an M.Eng. degree at UC Davis per Davis Division Regulation (DDR) 503

c) Unit Requirements (36 units)

The program requires a minimum of 36 units of graduate coursework consistent with campus policy (DDR 503). The curriculum consists of 24 units of graduate-level core coursework, including the capstone courses (4 units), and the remaining 12 units of elective coursework. A detailed breakdown of these units is described in the sections below.

d) Required Courses (24 core units: 36 units total)

*Core Courses (all required)*

- **Sustainable Transportation Infrastructure and Planning** - This course explores the principles and practices involved in designing and planning transportation infrastructure that promotes sustainability. Emphasizing the integration of environmental, economic, and social considerations, the course covers a range of topics including sustainable roadway design, multimodal transportation systems, land-use planning, and infrastructure resilience. Students will learn about the planning processes, policies, and engineering techniques that contribute to the development of sustainable transportation networks.
- **Energy and Emissions in Transportation** - This course examines the energy use and emissions associated with transportation systems. It includes a focus on Life Cycle Assessment (LCA) methodologies to evaluate the environmental impacts of different transportation modes, fuels, and technologies.
- **Sustainable Transportation Technologies** - This course explores the development and application of sustainable transportation technologies, including low-emission vehicle technology such as electric vehicles (EVs), hydrogen fuel cells, and

alternative fuels as well as how technology is used in other aspects of engineering and planning to create a more sustainable transportation system. Students will discuss benefits and challenges regarding engineering technology innovations.

- **Transportation Economics and Finance** - This course introduces the economic principles and financial models relevant to transportation systems. Topics include cost-benefit analysis, funding mechanisms, and economic evaluations of sustainable transportation projects.
- **Applied Data Analysis** - This course provides students with the skills needed to analyze and interpret transportation data. Emphasizing practical applications, the course covers statistical methods, machine learning techniques, and data visualization tools.
- **Capstone Experience Course -** Students enroll in this course while completing their capstone experience (see Section 2.6).

*Electives (3 needed*)*

- **GIS and Spatial Transportation Modeling** - This course covers the use of Geographic Information Systems (GIS) and spatial analysis techniques in transportation planning and management. Students will gain hands-on experience with tools and methods for analyzing transportation networks and spatial data.
- **Optimization Techniques in Transportation Engineering** - This course focuses on the application of optimization methods to transportation engineering problems. Students will learn about mathematical modeling, network optimization, and resource allocation strategies to improve transportation system efficiency.
- **Sustainable Materials and Pavement Engineering** - This course explores the use of sustainable materials in road construction and pavement engineering. Students will learn about the lifecycle impacts of materials, innovations in sustainable design, and techniques for improving pavement longevity and performance.
- **Sustainable Freight and Logistics** - This course examines the sustainability challenges in freight transportation and logistics. Topics include supply chain management, emissions reduction strategies, and the role of technology in creating more sustainable logistics networks.
- **Public Transportation Systems** - This course explores the design, operation, and management of public transportation systems. Students will learn about strategies for increasing public transit efficiency, accessibility, and sustainability in urban and rural settings.
- **Transportation Systems Risk and Reliability** - This course focuses on assessing and managing risks in transportation systems. Students will explore methodologies for improving system reliability, safety, and resilience, particularly in the face of environmental and operational uncertainties.
- **Sustainable Demand and Traffic** - This course focuses on the strategies and methodologies for managing transportation demand and traffic flow in a sustainable manner. Students will explore concepts such as demand-responsive transportation, congestion management, and the use of smart technologies to optimize traffic systems. The course also delves into the impacts of various transportation policies on demand and traffic, including pricing mechanisms, land-use planning, and the promotion of alternative modes of transport.

- **Weekly Seminar Series** - This is a weekly 1 unit seminar series on Sustainable Engineering topics. ~~Taking four quarters (equivalent to 4 total units) can be used as a substitute for one elective course.~~ Students can take four quarters of seminar to substitute an elective course. We will also allow students to take a culminating integrative assignment that synthesizes content across three quarters of seminars to earn an extra unit to allow for completion within one academic year.

e) Teaching Requirement

None.

f) Capstone Requirement

The capstone project is a critical component of the Master of Engineering, Plan II (Capstone Project) degree. It is designed to ensure that students not only grasp theoretical concepts but also demonstrate their ability to apply these concepts in practical, real-world situations. The capstone is an essential requirement for the degree, as it provides a culminating experience that synthesizes the knowledge and skills developed throughout the program. By completing the capstone, students validate their readiness to address complex challenges in the field of Sustainable Transportation, proving their capability to transition from academic learning to professional practice.

g) Licensing Requirements

Not applicable.

## 2.4. Field Examinations

Not applicable.

## 2.5. Qualifying Examinations

Not applicable. As a Master's degree objective, no Qualifying Examination is required.

## 2.6. Capstone Requirement

a) Capstone Format

The capstone project for the Master of Engineering, Plan II (Capstone Project) is designed to be a flexible yet structured experience that allows students to apply their acquired knowledge in a practical setting. The capstone can take various forms, including but not limited to, a design project, a comprehensive analysis, or a case study addressing a specific issue within the realm of Sustainable Transportation.

Students typically work individually, though collaboration with industry partners or faculty advisors may be encouraged depending on the nature of the project. The capstone format centers on a comprehensive written report that must thoroughly document theproject's objectives, methodologies, findings, and conclusions. This report serves as the primary means for students to demonstrate their ability to conduct rigorous analysis, apply theoretical concepts to practical problems, and communicate their resultseffectively.

The evaluation of the capstone project will be carried out by a fixed committee, established on an annual basis, which will be responsible solely for grading the final submissions. This committee will not be involved in advising or guiding the students during the project development. Instead, students are required to pair with an academic advisor who will primarily approve the capstone topic. The advisor's role is limited to ensuring that the proposed project is appropriate and feasible; students are expected to independently manage the research and execution of the project without continuous oversight or direction from the advisor.

The capstone project is generally completed in the final quarter of the program, following the completion of all required coursework. It represents the culmination of the student's learning journey, integrating the technical, analytical, and problem-solving skills developed throughout the degree program.

b) Capstone Experience Committee

Each year, a Capstone Experience Committee will be established from faculty involved in the program, consisting of faculty who are advising Capstone projects as outlined above. The Capstone Experience Committee is approved by the Programs Chair or Department Chair.

The Capstone Experience committee's unanimous vote is required to pass a student on the Capstone Experience. Students are expected to provide their Committees with their reports 1-2 months prior to anticipated graduation to allow time for necessary revisions.

c) Degree Completion

Once passed, the Master's Report Form is signed by the Program Graduate Advisor and then forwarded to the Office of Graduate Studies. The deadlines for completing this requirement are listed in the campus General Catalog (available online at the website of the Office of the Registrar). A candidate must be a registered student or in Filing Fee status at the time the program submits the form, with the exception of the summer period between the end of the Spring Quarter and the beginning of Fall Quarter. The program must file the report with Graduate Studies within one week of the end of the quarter in which the student's degree will be conferred.

## 2.7. Final Examination

Not applicable. As described above, the capstone requirement will be fulfilled through the completion of a capstone project that will be used to assess the student's comprehensive mastery of the course material.

## 2.8. Requirements Over and Above Graduate Division Minimum Requirements

Not applicable. Other than the stated prerequisite course requirements for admission into the program, the program does not require any additional requirements over and above the minimum requirements established by UC Davis Graduate Studies or the Davis Division Academic Senate and Graduate Council.

## 2.9. Relationship with Doctoral Program

None.

## 2.10. Special Preparation for Careers in Teaching

None.

## 2.11. Sample Program Timeline

As a substantially online program targeted to working professionals, a typical timeline is more difficult to define. A motivated individual with few other responsibilities might opt to take three courses per quarter and complete the degree in one year. An individual with family responsibilities might opt to take one to two courses per quarter and complete the degree over a longer timeframe. The program does not require that courses are taken in any particular order, with the exception of the Capstone Experience Course, which students are expected to take at the end of their studies. The chart below illustrates when courses might be offered and gives an example of two extremes of how a student might choose to take courses at the more extreme schedules over one year or spread with only one course per quarter. Many examples exist between the two extremes.

| **1 Year, Full-Time (12 units/quarter)** | | |
|---|---|---|
| **Fall** | **Winter** | **Spring** |
| Infra and Planning | Energy and Emissions | Technology |
| Economics and Finance | Applied Data Analysis | *Elective (choose 1)* |
| *Elective (choose 1)* | *Elective (choose 1)* | Capstone |

| 3 Year, Part-Time (4 units or 1 course/quarter) | | |
|---|---|---|
| **Fall (Y1)** | **Winter (Y1)** | **Spring (Y1)** |
| Infra and Planning | Energy and Emissions | Technology |
| **Fall (Y2)** | **Winter (Y2)** | **Spring (Y2)** |
| Economics and Finance | *Elective (choose 1)* | *Elective (choose 1)* |
| **Fall (Y3)** | **Winter (Y3)** | **Spring (Y3)** |
| *Elective (choose 1)* | *Elective (choose 1)* | Capstone |

### 2.12. Normative Time to Degree

Assuming a student is enrolled full-time, with a load of 12 units per quarter, the normative time to degree is expected to be 9 months. Students completing the program taking one course at a time will take 8 or 9 quarters, depending on their use of STE 281-V seminars towards their degree requirements. Students may accelerate their progress by taking more than one course per quarter. However, the program is primarily targeted at and designed for working professionals, many of whom may choose to enroll part-time. For part-time students, the expectation is to complete one 4-unit course per quarter, with a total time to degree of approximately 3 years.

To support timely completion for both full-time and part-time students, the program will offer core courses every academic year. Electives and skills courses will be offered on a rotating basis, with each course being available at least once every two years. This structure ensures that students, whether full-time or part-time, have access to the necessary courses to complete their degree within the expected timeframe.

## 3. Projected Need

### 3.1. Student Demand

The rising global emphasis on sustainability has sparked significant interest among students in careers that contribute to environmental and social well-being. The M.Eng. program in Sustainable Transportation aligns with this interest, offering specialized knowledge in a field that is crucial for addressing contemporary challenges in urban planning, energy, and environmental stewardship. The program's focus on cutting-edge, interdisciplinary approaches to sustainable transportation is expected to attract students who are eager to engage in meaningful work that has a positive impact on society.

Market research conducted by UCD's Continuing and Professional Education (CPE) indicates that there is potential demand for a master's in Sustainable Transportation Engineering at UC Davis. While the number of completions of master's degrees with this specific CIP code (Transportation and Highway Engineering) has been modest, many programs (including most of the UC's) offer degrees in Civil and Environmental Engineering or Civil Engineering with a specialization in Transportation Engineering rather than offering degrees in Transport Engineering specifically. In addition, the program leads have personal knowledge of a successful online graduate program in Sustainable Transportation at the University of Washington. Although the marketing specifically to engineers differs here, the ranking and prestige of the UC Davis program will allow us to compete preferably to other similar online programs.

The table below shows a snapshot of master's degree demand nationally across engineering subdisciplines. The table is ranked by the average yearly degree completions (column 1) and also shows how completions have grown over the last decade (column 2). Growth figures are not available (n/a) for categories that were only introduced in 2020. The highlighted categories include those that are possibly (or likely) appropriate classifications for Transportation Engineering programs, within the parent category "1400 Engineering". There are relevant categories in other parent categories too; these are considered in detail in the Market Analysis (Appendix A).

| CIP Code | Description | Masters Completions, Nationwide Total, Yearly Average (2019-2023) | Avg % change in completions over last 10 yrs (2013-2023) |
|---|---|---|---|
| 14.1001 | Electrical and Electronics Engineering | 8,635 | 0.0% |
| 14.1901 | Mechanical Engineering | 7,366 | 2.1% |
| 14.0801 | Civil Engineering, General | 4,588 | -1.0% |
| 14.0501 | Bioengineering and Biomedical Engineering | 3,147 | 7.5% |
| 14.0101 | Engineering, General | 2,957 | 7.4% |
| 14.0901 | Computer Engineering, General | 2,672 | 8.1% |
| 14.3501 | Industrial Engineering | 2,480 | 4.5% |
| 14.2701 | Systems Engineering | 2,158 | 0.7% |
| 14.0903 | Computer Software Engineering | 2,017 | 7.5% |
| 14.0201 | Aerospace, Aeronautical, and Astronautical/Space Engineering, General | 1,966 | 6.2% |
| 14.0701 | Chemical Engineering | 1,595 | 1.2% |
| 14.9999 | Engineering, Other | 1,455 | 4.7% |
| 14.1801 | Materials Engineering | 1,121 | 3.2% |
| 14.3701 | Operations Research | 1,028 | 4.6% |
| 14.1401 | Environmental/Environmental Health Engineering | 811 | -0.6% |
| 14.4701 | Electrical and Computer Engineering | 567 | n/a |

| | | | |
|---|---|---|---|
| 14.4201 | Mechatronics, Robotics, and Automation Engineering | 474 | 35.0% |
| 14.3601 | Manufacturing Engineering | 355 | 6.3% |
| 14.1301 | Engineering Science | 348 | 3.0% |
| 14.3301 | Construction Engineering | 320 | 26.2% |
| 14.2501 | Petroleum Engineering | 271 | -8.5% |
| 14.2301 | Nuclear Engineering | 247 | -2.1% |
| 14.1099 | Electrical, Electronics, and Communications Engineering, Other | 233 | 33.8% |
| 14.0301 | Agricultural Engineering | 221 | 0.3% |
| 14.0401 | Architectural Engineering | 176 | 4.7% |
| 14.0803 | Structural Engineering | 159 | -4.6% |
| 14.1201 | Engineering Physics/Applied Physics | 153 | 5.0% |
| 14.1004 | Telecommunications Engineering | 120 | 4.0% |
| 14.3901 | Geological/Geophysical Engineering | 107 | -3.6% |
| 14.3201 | Polymer/Plastics Engineering | 95 | -0.9% |
| 14.0804 | Transportation and Highway Engineering | 92 | 1.5% |
| 14.0899 | Civil Engineering, Other | 80 | 36.6% |
| 14.0999 | Computer Engineering, Other | 78 | 74.1% |
| 14.2101 | Mining and Mineral Engineering | 78 | 9.1% |
| 14.0103 | Applied Engineering | 77 | n/a |
| 14.2401 | Ocean Engineering | 71 | -4.2% |
| 14.1101 | Engineering Mechanics | 67 | -4.1% |
| 14.2801 | Textile Sciences and Engineering | 64 | 5.3% |
| 14.0702 | Chemical and Biomolecular Engineering | 52 | 18.0% |
| 14.4501 | Biological/Biosystems Engineering | 42 | 18.7% |
| 14.4801 | Energy Systems Engineering, General | 41 | n/a |
| 14.0902 | Computer Hardware Engineering | 39 | 3.0% |
| 14.0805 | Water Resources Engineering | 39 | -7.1% |

The data show that Transportation and Highway Engineering, specifically, has only 92 degree completions recorded each year on average, while its growth is a modest 1.5%. However, other categories with higher volume and growth figures include civil engineering and systems engineering, which rank 3rd and 8th, respectively. With a conservative estimate that even 10% of master's degrees in Civil Engineering are earned by students focused on transportation issues, the estimated number of master's degrees awarded in Transportation Engineering is around 550 per year. Students from disciplines outside of engineering may also have interest in a program focused specifically on Sustainable Transportation Engineering. These include City/Urban, Community, and Regional Planning (~1,400 degrees/yr), Sustainability Studies (~1,900 degrees/yr), Logistics, Materials, and Supply Chain Management (~,1200 degrees/yr), and Transportation/Mobility Management (~140 degrees/yr). Collectively, this suggests a strong demand by students for programs in sustainable transportation engineering.

UC Davis holds a top national and global ranking in transportation related undergraduate and graduate education and research, with major efforts in the CEE and Environmental Science & Policy departments, the Transportation and Technology Policy graduate group, and the UC Davis Institute for Transportation Studies. Although transportation is not separately ranked by US News, the CEE program is ranked #11 and transportation is a major component of the overall program. Furthermore, the Institute for Transportation Studies is widely considered the preeminent sustainable transportation research program in the nation, including leading the National Center for Sustainable Transportation, a USDOT university transportation center. The initiation of a Sustainable Transportation Engineering degree program that is separate from other areas (e.g., Civil and Environmental Engineering) will be a program differentiator, as will the potential to earn a degree online in as little as 9 months.

## 3.2. Opportunities for Placement of Graduates

This program targets professionals working in Transportation Engineering or related fields. As such, there is no plan for a formalized placement program. However, the program curriculum has been discussed with agency and industry professionals and most courses will have some involvement from these professionals through guest lectures or teaching courses. These connections help expand students' professional networks. We anticipate these interactions will expand employment opportunities.

The job market looks promising for graduates, according to CPE market research (Appendix A). Demand for roles in this field is projected to grow 10-24% over the next decade, outpacing the average. In 2023 alone, there were just over 19,000 new job postings nationwide, a 12.3% increase from a decade ago. In California, there were approximately 4.3 job openings for every new Master's graduate, indicating a strong need for these skills. The coursework for the proposed M.Eng. aligns with the qualification's employers are seeking. Starting salaries for Master's graduates are around $8,000 more than those for Bachelor's graduates, and this difference grows to around a $20,000 advantage in senior roles. This program would put students in great positions to capitalize on these opportunities.

## 3.3. Importance to the Discipline

Sustainable transportation is a critical area within civil and environmental engineering, reflecting an evolving discipline that integrates traditional engineering expertise with emerging technologies and sustainability principles. The program contributes to the discipline of active and practicing professionals at a high level.

## 3.4. Meeting the Needs of Society

The program addresses urgent societal needs for sustainable development, particularly in the context of urbanization, climate change, and resource conservation. By training professionals who can design, implement, and advocate for transportation systems that minimize

environmental impact, promote social equity, and support economic development, the program directly contributes to the advancement of sustainable and livable communities.

### 3.5. Relationship to Research and Professional Interests of the Faculty

The program is closely aligned with the research and professional interests of the faculty within the Transportation Engineering group (under the broad umbrella of the Institute of Transportation Studies), leveraging their expertise in areas such as electric vehicles, smart city infrastructure, public transportation systems, and environmental impact assessments. This alignment ensures that the program is grounded in the latest research and best practices, enhancing the educational experience and research opportunities for students.

### 3.6. Program Differentiation

What sets this M.Eng. program apart is its comprehensive focus on sustainable transportation, supported by UC Davis's renowned expertise in this area. Unlike more general engineering programs, it offers a targeted curriculum that integrates the latest technologies, policy perspectives, and environmental considerations. The program's online format, designed to accommodate working professionals, further differentiates it, providing accessibility and flexibility that are essential for meeting the needs of today's students and professionals.

## 4. Faculty

### 4.1. Current Faculty

As a departmentally based graduate program, ladder rank faculty will participate in the oversight of the program (e.g., academic curriculum, admissions, etc.), in addition to teaching the majority of the courses. As a professional program, some courses will benefit from having experts from industry, governmental agencies, and NGOs with experience in Sustainable Transportation serving as instructors and/or involved in the development of courses. This is consistent with the acknowledgement in UC SSGPDP policy that, "The nature of certain practice-oriented degree programs may warrant a higher proportion than usual of non-Senate faculty (e.g., clinical faculty, adjunct faculty, lecturers, and visitors)." In finding such experts we will leverage our existing strong relationships with outside organizations, such as Caltrans, that have been built through both the UC Davis Institute of Transportation Studies and direct faculty engagement via research, teaching, and policy activities. The program will also leverage the practical expertise of professional researchers in the UC Davis Institute of Transportation Studies, many of whom already teach within existing in-person graduate programs. Below, we present a table with general information about the faculty who expressed interest in participating. Please see Appendix E for the CVs for all faculty who plan to participate. Please also see Appendix E for letters of commitment to the M.Eng. program from these individuals as well as other relevant faculty.

| Faculty Name | Rank | Highest Degree | Department | Expertise | Google Scholar |
|---|---|---|---|---|---|
| Kari Watkins | ~~Associate~~ Professor* | PhD | CEE | Travel Behavior, Public Transport, Infrastructure Design | link |
| Alan Jenn | ~~Assistant~~ Associate Professor* | PhD | CEE | Electric Vehicles, Energy | link |
| Miguel Jaller | Professor | PhD | CEE | Freight Transport, Operations Research | link |
| Yueyue Fan | Professor | PhD | CEE | Energy, Dynamic Programming | link |
| Alissa Kendall | Professor | PhD | CEE | Life Cycle Assessment, Industrial Ecology | link |
| Somayeh Nassiri | Associate Professor | PhD | CEE | Pavement Engineering, Concrete Materials | link |
| John Harvey | Distinguished Professor | PhD | CEE | Asphalt and Concrete Materials, Pavement | link |
| Michael Zhang | Professor | PhD | CEE | Traffic Flow, Networks | link |
| Susan Handy | Distinguished Professor | PhD | ESP | Travel Behavior, Transportation and Land Use | link |

Faculty will primarily teach in the new program as an overload and will be compensated either through salary or discretionary funding (see Appendix D: Compensation Plan). Faculty may be able to teach in the WRE program via buyout of other course commitments; the extent to which this will be possible in a given year will depend on existing needs of the CEE program in terms of undergraduate and graduate education and will be determined in consultation with the CEE chair (or the relevant chair should senate faculty outside of CEE participate). Most faculty will teach no more than one course in the STE program as an overload. The default teaching expectations for faculty in the CEE department (from which most program faculty come) are available in Appendix I. The CEE department has historically been flexible in terms of allowing faculty to teach courses in load within other relevant graduate groups (specifically the Transportation and Technology Policy (TTP) Graduate Group and Energy Graduate Group (EGG), which demonstrates adeptness in our approach to instruction. We do not anticipate needing to hire additional faculty in the STE area for this program. We expect a need to hire around ~5 part-time lecturers (i.e., committed industry experts) annually to offer the program to act as instructors of record in the future once courses have already been taught and fully developed. Faculty involvement in the program beyond teaching (e.g., admissions, oversight, advising) will either be considered part of their regular service activities or compensated relative to the level of activity. While faculty involvement in the new program may take time away from other activities, some of the impacts will be offset through the ability of faculty to receive compensation via discretionary funds that can be used to support their research programs. For some of the courses, it may also be possible for faculty to offer them concurrently with equivalent in-person courses, which will help to limit the additional time necessary. Additionally, the asynchronous nature of the program means that, while there will be a substantial up-front investment of time required to create the course content and resources, subsequent offering of the courses should only require a modest time investment. This can be further offset through the use of TA's and Readers to support the courses. As other online programs also come to fruition, we will also be looking towards efficiencies through the offering of courses that appeal to students across programs, allowing for fewer total courses to be developed and offered.

## 4.2. Pending and Future Appointments

No additional academic appointments are anticipated at this time. Qualified industry instructors and faculty from other universities or departments may teach courses in the STE program and will be appointed at that time. The faculty involved in the program have strong pre-existing relationships with industry professionals and faculty from other programs who would be well qualified to develop and/or teach the courses listed.

# 5. Courses

## 5.1. Present Courses

Much of the content for the courses in the program will come from the existing courses taught by transportation faculty as part of the CEE and TTP degree programs, including content from ECI 244A (Life Cycle Assessment for Sustainable Engineering), ECI 251 (Transportation Demand Analysis), ECI 252 (Sustainable Transportation Systems), ECI 253 (Dynamic Programming & Multistage Decision Processes), ECI 254 (Exploring Data from Built Environment Using R), ECI 155 (Transit System Planning & Design), ECI 256 (Urban Traffic Management & Control), ECI 257 (Flow in Transportation Networks), ECI 282 (Pavement Design & Rehabilitation), TTP 210 (Transportation Technology), TTP 220 (Transportation Policy), and TTP 201 (Applied Data Analysis), as well as more advanced content from ECI 161 (Transportation Systems Operations), ECI 162 (Transportation Infrastructure Design), ECI 163 (Energy & Environmental Aspects of Transportation), ECI 164 (Introduction to Electric Vehicles), ECI 165 (Transportation Policy), ECI 178 (Pavement Engineering & Design) and ECI 179 (Pavement Management, Evaluation & Rehabilitation). However, these courses do not necessarily focus on sustainability at their core and some content will be repackaged for the new focus and new online format.

## 5.2. Proposed/New Courses

Due to the online modality and the focus on sustainability, all courses listed in this proposal will be considered new courses specific to the program with new syllabi and new course numbers, consistent with campus policy that virtual courses require distinct approval even if their content is effectively identical to existing in person courses. As noted above, the courses developed for the STE program will derive substantial content from existing courses. However, owing to their online nature they are formally considered new courses. Depending on the specific course, we estimate that anywhere from 10% to 50% of the content will need to be redeveloped from an existing course to bring in a greater focus on sustainability. All courses will be restructured from their existing in person format for an online learning experience, done in partnership with instructional designers.

**Commented [1]:** EPC highlights one major issue in the Sustainable Transportation proposal that Graduate Council should seriously consider before further review. In contrast to state-supported programs where faculty course development and instruction is on-load, faculty who choose to participate in self-supporting programs must do so in overload. EPC members expressed serious concern about the large number of courses that need to be developed and go through the campus approval process. As stated in the proposal, "all courses listed in this proposal will be considered new courses specific to the program with new syllabi and new course numbers" (p. 27). Looking at the degree requirements, there appear to be 12 courses that would need to be developed and approved by faculty in overload. It is unclear how Senate faculty will have time to devote to creating these courses in overload; anecdotally, other self-supporting programs in the system are reportedly having similar problems securing faculty to create courses.

## 5.3. Plan for Delivering Online Instruction

### 5.3.1. Platform and Delivery Partner

The courses will be hosted on Canvas, the campus learning management system, with any synchronous engagement occurring via the Zoom feature within the Canvas platform. The main learning platform and related educational technologies are supported by technological professionals in the central campus Information and Educational Technology (IET) unit and the Canvas Help support system. CPE's instructional design

team will work within that campus system to support the design and development of the courses delivered from that system.

### 5.3.2. Initial Creation of Online Content

The College of Engineering faculty will work in partnership with CPE's instructional design to create meaningful, high-quality learning experiences. Each instructor will consult with a CPE instructional designer to design assessments that align with course outcomes, strategize and produce active learning content, creating opportunities for instructor-student and student-student engagement, and execute on an overall student experience that is consistent throughout the program. The instructional designer will also recommend appropriate technologies and instructional approaches, train instructors as needed, and help design an evaluation and continuous improvement plan that aligns to the lifecycle management of the program.

### 5.3.3. Periodic Content Refresh

In collaboration with CPE, a lifecycle management plan will be developed for post-launch management of courses that make up the program. The current budget incorporates an annual refresh of 33% of content.

### 5.3.4. Synchronous vs. Asynchronous contact

The courses will be entirely asynchronous to allow the greatest flexibility for working adults with varied schedules. There will be regular and effective contact between instructors and peers through discussion forums, collaborative projects, and peer-to-peer engagements. In addition, students can direct instructor engagement through office hours, which will be offered at a variety of times throughout the day/week to accommodate a variety of work schedules.

### 5.3.5. Provisions for Cohort -Formation and Peer Learning

Although the program will be fully online, fostering a sense of community and peer collaboration is a critical component of the student experience. To this end, students will participate in peer feedback sessions, and discussion forums as part of their coursework and for their capstone project course, promoting teamwork and mutual learning. Collaborative tools, such as video conferencing platforms (e.g., Zoom) and communication platforms (e.g., Discord, Slack), will be integrated to facilitate asynchronous or real time interaction for group work and peer connection as needed, and students will be encouraged to form study groups and peer networks. Though the program is not designed as a lock-step cohort-based program to allow for greater flexibility for working professionals, these efforts aim to echo the collaborative environment of an in-person program and help build a professional network that extends beyond graduation.

### 5.3.6. Provisions for Security or Identity Authentication

Students will have to login to Canvas and other campus systems and platforms using Shibboleth federated single sign-on authentication service, which is standard for the UC Davis campus. At the point of enrollment, students will have to go through the same verification process as students in in-person programs. This identity management system leverages multi-factor authentication to grant access to the campus platform that will be utilized for delivery of the program. For those courses with high-stakes assessment, the campus will supply academic integrity tools for online proctoring or will apply security protocols present at in-person testing facilities.

# 6. Resource Requirements

In compliance with the UC Policy on SSGPDP, the program is designed to be self-supporting by the end of the third year of enrolling students into the program. The program worked closely with the department, college, Budget & Institutional Analysis (BIA), and Continuing and Professional Education (CPE) to conduct a thorough financial analysis of the program's projected revenue (based on market predictions) and costs. Based on this assessment, the initial program cost to students is proposed to be $40,000, equivalent to $1,111 per unit. This is slightly lower than the cost of the recently launched online Master of Advanced Study in Engineering at UC Berkeley ($42,000) and slightly higher than the online Master of Science in Engineering at UCLA ($38,500).

As an online program, an initial investment from central campus will be needed to "jump start" the development of the program (e.g., establishing the online program infrastructure, instructional design and preparation of courses, marketing and recruitment, etc.). The central campus funding will leverage other forms of allowable funds (i.e., not utilizing state funding) to cover the initial expenses incurred in the establishment of this online degree. As noted in the 5-year budget (see Appendix G), payback for this initial campus investment will take place within the first 5 years of the program's establishment.

## 6.1. FTE Faculty

As a departmentally-based program, the program will leverage the expertise of existing ladder-rank faculty within the department to develop the course curriculum and oversee and selectively develop content for online delivery. In compliance with policy, the faculty will be compensated for their efforts supporting the SSGPDP program using allowable funds (e.g., program revenue). An example teaching compensation plan is included in Appendix D. Overload teaching will be compensated according to the Faculty Compensation Plan (Appendix D). Relevant departments will be compensated for on load teaching by faculty in the STE program according to the Compensation Plan and consistent with the COE course buyout policy. Faculty compensation will be funded directly from the revenues of the program. The cost analysis provides for the ongoing costs of faculty specifically hired for the program.

## 6.2. Library Acquisition

None.

## 6.3. Computing Costs

None. Expenses associated with access to the campus learning and management system, Canvas, will be recovered through the standard SSGPDP fee that is assessed to all such programs.

## 6.4. Equipment

None.

## 6.5. Space and other capital facilities

As an online program, the use of on-premise space and facilities will be little to none. Students will be engaging in distance learning and therefore will not be accessing classroom space for online resources.

## 6.6. Academic Student Employees

Courses may be supported with Academic Student Employees (ASEs) in the form of TA's or Readers, with Reader's likely to be more common. The existing state-supported CEE program currently enrolls about 180 students, with about half of these students earning their PhD and half their MS degrees, while the TTP graduate group enrolls about 40 students. The need for specific disciplinary expertise is higher with TA's than Readers, and thus it should be possible to hire Readers from outside of CEE or TTP. The expected need for ASEs in the STE program is about 10 per year. Within CEE and TTP, we typically have more students looking for ASE positions than we have available. As such, there is capacity within CEE and TTP and the broader campus to provide TA and Reader support for the STE program.

## 6.7. Other operating costs

A portion of the generated fees will be reserved for financial aid on need or merit basis. The budget plans to set aside 58% of fees for scholarships once initial costs for development are paid back to the campus risk pool.

Program funds will be used to support a staff graduate program coordinator. This position will likely be shared with other online programs and for planning purposes, based on enrollment estimates, we assume 50%. Program funds will also be used to pay a portion of a staff accounts manager (estimated at 1 month) and the CEE Department Manager (estimated at 0.5 months) to account for time spent helping administer this program.

**Commented [2]:** The Committee recommends a funding model be built into the proposal (for new databases, industry standards, etc.) in addition to $37.50 per student. With regard to staffing, it is suggested that a module be included that reviews Library databases pertinent to the field and access/use so that students will have an introduction to materials in the Library without having to rely on Library staff for all questions. As the Library analysis notes, people in the workforce will need extra support since they are not coming directly out of the university setting. Regarding shipping issues for Library materials being sent to individual students, the Committee points out that the program should be aware of this issue and make sure eBooks are available for necessary course and capstone related materials.

**Commented [3]:** BIA Review Comment: While the proposal states that the program plans to set aside 8% of fees for financial aid, the proposed budget only reflects 5%. The proposal states that low-cost government Stafford and Grad Plus loans as well as private loans are available to students. Although there is no minimum financial aid requirement for SSGPDPs, we note that fee approval by UCOP will require a more robust financial aid plan, for example considering factors such as whether fees are covered in part or in whole by students' employers (or other sponsors) and how much debt is reasonable for students to assume compared to their expected salaries upon graduation.

Make sure this is consistent with the updated BIA budget (https://docs.google.com/spreadsheets/d/13loQEMCXPH1-QaDSB_vJxiJO5J_EoQgh/edit?usp=drive_link&ouid=117146036538026962501&rtpof=true&sd=true).

# 7. Graduate Student Support

## 7.1. Return to Aid

Funds set aside as return to aid (see Section 6.7) will be allocated as financial aid to students based on demonstrated need, merit, or contributions to the program.

## 7.2. Other forms of Financial Aid and Financial Support

In addition to the financial aid provided, graduate students in the program may be eligible to receive federal financial aid. Low-cost government Stafford and Graduate Plus loans are available to US Citizens and Permanent Residents. Stafford loans are available up to $20,500 per year, and Graduate Plus and private loans are available for amounts up to the cost of attendance (less financial aid). International students with a US co-signer, may be eligible for private loans.

SSGPDP students are also eligible to apply for external fellowships offered through UC Davis. The program advisors will work closely with students to make sure opportunities for additional financial aid are known and that students receive guidance on eligibility for these forms of financial support.

Some engineering consulting firms and agencies often provide support to employees to continue their education, including covering fees in whole or in part. Conversations with members of both the CEE and ITS advisory boards indicate that this is often the case in the transportation engineering space. Also, as noted in Section 3.2, starting salaries for Master's graduates are around $8,000 more than those for Bachelor's graduates, and this difference grows to around a $20,000 advantage in senior roles. As such, the expected payback period for students who complete this program is around 2-4 years.

# 8. Governance

The STE program will be administered as a new Graduate Group with the Bylaws available in Appendix C. Financial oversight of the program will be a shared responsibility between the STE Graduate Group, the CEE department, and the College of Engineering, with guidelines over revenue sharing detailed in the MOU in Appendix H.

# 9. Changes in Senate Regulations

This proposed program does not require any changes to divisional or systemwide senate regulations. As confirmed by the UC Davis Graduate Division, the program is compliant with existing policies related to the requirements for awarding and administering Master's degrees.

## 10. Impact on Existing Programs

As is currently the case, teaching assignments for the existing, state-supported program in the Department of Civil and Environmental Engineering are assigned at the discretion of the Department Chair. The SSGPDP lead faculty and Program Chair will coordinate with the CEE Chair (and other relevant Department Chair's, should the list of faculty expand to other Departments) to ensure that teaching requirements for all programs are met. CEE faculty also regularly teach courses for the TTP graduate group. The inclusion of instructors from industry in the proposed SSGPDP means that the teaching does not need to come at the expense of the existing B.S. or M.S. programs. Additionally, once the original course content and assessment materials are created, much of the course administration and office hours may be led by Ph.D. students or postdocs, as needed. Faculty participating in the SSGPDP may choose to teach courses as buyouts or as an overload with financial compensation (see Appendix D: Compensation Plan). Additional details regarding expected impacts on faculty are discussed in Section 4: Faculty.

Given that the proposed STE graduate program focuses on working professionals and is offered via an online modality we do not anticipate that it will have a major adverse effect on our existing state-supported program that focuses on transportation in CEE nor on the existing TTP program. There are no specifically transportation-focused online programs offered across the UC and thus neither do we anticipate major impacts on other campuses. UC Riverside does offer Mobility Engineering as a specialization area within its more general Master of Engineering online program, however as the proposed STE program focuses entirely on sustainable transportation issues we expect our programs to attract students from different audiences.

## Appendices

***Note**: Appendices "A" through "K" are located in a share Box folder. The links below (as well as throughout the proposal) direct you to the document.*

A. Market Analysis

B. Degree Requirements

C. Bylaws

D. Teaching Compensation Plan

E. Faculty Support Letters and CVs

F. Letters of Support from Other UCs

G. Budget

H. Memorandum of Understanding (MOU)

I. Teaching Load Policy