LA4781 Urban Green Infrastructure
Instructor: Barry Lehrman
Associate Professor of Landscape Architecture
Office: 7-101C Hours: Tu/Fr 10am-Noon & by appointment
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COURSE CATALOG DESCRIPTION
Focus on the technical attributes of the design and deployment of green infrastructure to address numerous environmental issues in Southern California. Green Infrastructure is the integration of ecological and technical systems to enhance the resilience and sustainability of our communities - at the same time providing habitat and beauty. Projects explore connections between natural and technical resource flows in the landscape from a systems perspective. Introduces design practices such as Low Impact Development (LID) and Best Management Practices (BMPs) that can optimize the built environment to restore degraded ecosystem services.

CLASS SCHEDULE
- Section -01 Monday Noon- 2:45pm 7-235 [MLA + BSLA students]
- Section -02 Wednesday Noon- 2:45pm Lyle Center Commons [BSLA Students]

Course Prerequisites or Requisites
4th Year standing in the BSLA major (intended to be taken concurrently with LA4621)
or
Graduate standing in the MLA program
or
Permission of the Instructor.

EXPANDED COURSE DESCRIPTION
This seminar provides a foundation in the technical arts of integrating hydrological and air quality landscape systems into the urban fabric, that optimize ecosystem services, enhancing resilience and the wellbeing of the entire planet. Using a system-based approach, LA4781 explores the connection between ecology and technical systems to evaluate and optimize the design of natural and technical resource flows in the landscape. These practices are essential to reduce human impacts and optimize the built environment to restore degraded ecosystem services, mitigate climate change, and enhance the resilience of our communities.

Activities will expand students’ ability to evaluate quantitative and qualitative performance aspects of the landscape through conducting post-occupancy studies of built landscapes around Southern California.

Class sessions will feature case studies and examples of built works to illustrate fundamental concepts and methods, with scaffolding and practice applying the formulas conducted through in-class/take-home exercises, and reviewed through group discussion and peer evaluation of work. Readings will provide in-depth technical methods and processes that are then practiced in class. Other instructional methods used in LA4781 include demonstrations/tutorials, lectures, and guided site visits.

Students will work individually and in small groups on exercises and assignments.
**COURSE COMPONENTS + ORGANIZATION**

Material in this course will be presented in the form of readings, class discussions, lectures, in-class activities, projects, student and guest presentations. This course aims to create a collaborative learning environment in which students can engage in the issues critical to the topic of the course. Weekly lectures will be complimented by class time dedicated to practice applying methods or visiting local examples of urban green infrastructure.

**Field Trip[s]**

At least one self-directed field trip outside of class time is required. We will potentially a few office visits during class-time to firms around southern California – to be announced. Students are encouraged to car pool or take public transit when possible.

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**EVALUATION OF STUDENT WORK**

Learning activities in LA4781 will be graded individually, but may have collaborative elements. Evaluation will be a mix of qualitative and quantitative rubrics. MLA students will have additional requirements.

**Weighting of Learning Activities:**

Grades will be determined as follows:

**Term Project (choose one):**

40%


- **Option 1: Studio Project Green Infrastructure Design** – development of green infrastructure strategies, features, and details as part of your Spring LA studio project that optimize ecosystem services, sustainability, and resilience. Deliverables: ~20-page report with a written narrative, calculations, diagrams, details, and renderings.

- **Option 2: Speculative Green Infrastructure Study** – researches and estimates the benefits/performance for large-scale deployment of a green infrastructure system in southern California. Deliverables: ~20-page report including literature review, analysis, calculations, and diagrams.

- **Option 3: EPA 2019 Campus RainWorks Competition** – this is a team effort to design an integrated rainwater and ecological system for Cal Poly Pomona or a local K-12 School. Teams need the instructor’s permission to proceed past the proposal stage. Deliverables complete competition entry per the 2018 competition rules and details, available at: [https://www.epa.gov/green-infrastructure/campus-rainworks-challenge-0](https://www.epa.gov/green-infrastructure/campus-rainworks-challenge-0)

**Case Study 1: Global Green Infrastructure Precedents**

10%

Critical review of a significant built example of green infrastructure from around the world in the form of a blog post. Pass/Fail.

**Case Study 2: Local Green Infrastructure Case Study**

10%

Case Study of a built project located in Southern California in the form of a blog entry. Pass/Fail.

**Case Study 3: Green Infrastructure Policy Inventory**

10%

Assessment of policies/initiatives by Municipalities and NGOs across SoCal supporting green infrastructure, and climate-change adaptation/mitigation. Pass/Fail.
Reading Blog 10%
Five entries about the readings and topics covered in class. Pass/Fail

Homework 10%
Short design exercises/charrettes, and more. These activities may be started/completed during class. Due the next class period.

Quizzes 10%
A variety of assessment activities/formats will be utilized to track learning and development of skills. Many will be open book, all will be conducted on blackboard.

Grades

Weighting of the coursework may shift depending upon changes to the schedule and assigned coursework. Evaluation of assignments will consider the following criteria:

-Completeness and professional appearance of assignments.
-Timeliness of assignment completion.
-Clarity and accuracy of solutions.
-Individual progress and growth.
-Graphic and Verbal presentations as required.

The following is the grading system for the University and the system that is in effect for this course:

A Superior Work: Indicates originality and independent work and a thorough mastery of the subject matter/skill; achievement so outstanding that it is normally attained only by students doing truly exemplary work.

B Very Good Work: Indicates clearly better than adequate competence in the subject matter/skill; achievement of quality higher than adequate, but not of exemplary quality.

C Adequate Work (BSLA)/Less than Acceptable Work (MLA): Indicates that classroom work, outside assignments, and examinations have been completed at a level indicating adequate competence in the subject matter/skill for BSLA Students. This is not a passing grade for MLA students.

D Less than Acceptable Work: Indicates achievement which meets the minimum requirements of the course, but at a level indicating less than adequate competence in the subject matter/skill.

F Unacceptable Work: Indicates achievement that fails to meet the minimum requirements of the course and is clearly below university quality; not a passing grade.

Grades posted to Blackboard are not your official grades and are subject to revision at any time during the semester.

Attendance & Your Grade

Participating in class is essential for students to master the course content, so any absences will be self-inflicted penalties. Please notify the instructor before any anticipated absences for academic activities, or as soon as possible for serious issues that emerge (such as health issues). Arriving late is an unwelcome disturbance, so please make sure to get to class on time.
Only serious and documented reasons will be considered for make-up exams. If a student has an ongoing or extenuating circumstance that interferes with attending class, it is the student’s responsibility to discuss this with the instructor.

If at any point you need to discuss a grade, please make an appointment to see the instructor during their respective office hours. Discussion of grades will not be conducted during class time.

**COURSE STUDENT LEARNING OBJECTIVES**

Upon completion of this course, students will be introduced to the following student learning outcomes:

**Critical Thinking**
- Demonstrate critical thinking skills and creatively apply them to resolve ecological, social and spatial problems, while advancing current disciplinary concerns within the context of environmental design.

**Professional Responsibility**
- Show a sense of responsibility, integrity and ethical concern as related to ecological, social, and cultural issues related to the professional practice of landscape architecture.

**Design Foundations**
- Demonstrate a strong understanding of design theory, history and methods of communication based on the principles of sustainability, regeneration, and ecosystematic design.

**Cultural Processes**
- Identify and interpret cultural and historical patterns and processes at multiple scales as needed for designing for a diverse society.

**Multi-cultural Perspectives**
- Pursue challenging educational and service opportunities to the public within the diverse and evolving multicultural regional context of southern California.

**Professional Development**
- Demonstrate teamwork and leadership skills in a variety of professional roles and contexts, including individual and team projects, as well as interdisciplinary collaboration and participatory settings.

**Disciplinary Knowledge**
- Creatively apply theories, techniques, skills and tools necessary for landscape architecture, with explicit regards to ecological sustainability, resiliency, and the protection of public health, safety and welfare.

**Digital Skills**
- Apply hands-on computer skills and information technologies in planning and design

**Communication**
- Effectively express and deliver design ideas, information and solutions visually, verbally, and in writing to a variety of audiences.
Research

- Pursue scholarly or practical research with appropriately developed research questions, qualitative or quantitative methods, and documentation in the context of environmental design.

**KNOWLEDGE + SKILLS + VALUES**

In addition to the explicit and assessable student learning outcomes, this course aims to empower students with an expanded personal knowledge base, further develop and expand skill sets and ultimately provide an opportunity to examine deeper personal values of landscape architecture.

**KNOWLEDGE**

- Awareness of the ecosystem services that can be provided by green infrastructure, including water and air quality, energy generation, biodiversity and wildlife habitat, urban climate mitigation, climate adaptation, food production, and recreation.
- Apply concepts of urban metabolism, ecosystem services, and other landscape performance metrics to evaluating and designing green infrastructure systems.
- Evaluation of issues, challenges, and limitations for traditional engineering approaches to manage rainwater and urban water supply, mitigate air pollution, and other topics covered by the course.
- Identification and evaluation of significant contemporary and historic examples of green infrastructure.
- Evaluation of cultural uses, meanings, and symbolism of infrastructural systems.

**SKILLS**

- Evaluate and apply urban performance metrics to policies/regulations to select appropriate Green Infrastructure strategies and design tactics.
- Calculate hydrological and water quality performance to design green infrastructure features and systems.
- Evaluation of financial benefits/ecosystem services provided by green infrastructure, including water and air quality, biodiversity and wildlife habitat, and recreation or cultural uses.
- Effective verbal/written/graphic communication about benefits of Green Infrastructure, the requirements and range of tools for effective rainwater management, local water supply, air quality improvements, adaptation and resilience, and benefits to human health to various audiences.
- Evaluation of aesthetics, historical, and cultural significance of green infrastructure strategies.

**VALUES**

- Develop a critical ethic of awareness, care and stewardship that recognizes the needs and demands of human users and our responsibility to the planet.

**INSTRUCTIONAL MATERIALS**

**Required Text for LA4781:**

- NACTO. 2017. Urban Street Stormwater Guide. Island Press. [Available at the CPP Bookstore or online retailers: $34-$45]
Supplemental Texts (available online or as PDFs on Blackboard):

- EPA. 2012. Green Infrastructure Opportunities and Barriers in the Greater Los Angeles Region. EPA 833-R-13-001. [PDF on Blackboard]

Plus additional readings as selected by the instructor.

References for the Course:


Online Resources & Digital Tools:

- Hydrology formulas and calculators: http://onlinecalc.sdsu.edu/
**Required Supplies for in-class activities and other assignments:**

- Sketchbook or digital drawing app on a tablet
- Selection of pens, pencils, markers, and hand drafting tools
- Simple calculator
- Digital Camera with GPS/location logging capabilities
- Infrared Thermometer
- Environmental sensors, dataloggers, water quality meters, et cetera
- Rain Gear + Waterproof Boots (any class sessions that it is raining will be spent conducting field work around campus)

**Computer and Software:**

Students must have and maintain access to a computer with the following software:

- Adobe Creative Suite
  - Photoshop, InDesign, Illustrator, Acrobat Pro
- AutoCAD or Rhino (for quantitative design of non-rectangular areas)
- Microsoft Office
  - Word, Excel, PowerPoint
- ESRI ArcGIS or other geospatial application and tools
DEPARTMENT POLICIES + RESOURCES

Safe and Welcoming Learning Atmosphere

Mastering new concepts and skills is difficult enough, so it is everybody’s responsibility to contribute to a healthy and supporting learning atmosphere in LA4781.

Safety

Students are expected to abide by all University, College and Department safety protocols at all times. Students are direct to the University catalog and the department webpage: [https://env.cpp.edu/la/la](https://env.cpp.edu/la/la).

Office Hours

Tenured and tenure-track faculty shall maintain a minimum of four office hours per week. Two of the hours must be face to face and conducted over at least two days.

Full time temporary faculty shall maintain a minimum of four office hours per week over at least two days. The department faculty may develop its own policy on the mode (online vs. face to face) for temporary faculty office hours.

For part time faculty (tenured track/tenured or temporary), the number of hours will be adjusted in proportion to the time base of the appointment.

ENV Website Project Posting and Archiving of Student Work

Students are required to add/create a ‘project’ post on their personal profile on the department website. Students must also attach full-size project files as PDF file types. This project post will serve as the archival record of the course for both individual and team efforts. This is a requirement to maintain ongoing LAAB accreditation.

The ENV website is provided through an individual student profile; profile access is provided to each student individually. Upon graduation, student profiles become alumni profiles.

GENERAL POLICIES

Academic Misconduct

All University standards on unethical behavior apply. Please refer to the University catalog statement on plagiarism and acceptable student behavior for clarification. Misconduct of any kind will not be tolerated. Do not cut and paste files or any portion of a drawing that you did not personally draft, draw, solve or otherwise produce and if in doubt, reference your source material. Penalties may range from a zero on the assignment, to academic sanction and debarment. Do your own work. Your education is your responsibility, so take initiative.

E-Mail is the Official Method of Communication

The university has established E-Mail as an official method of communication between Students and Faculty. Students will be notified of important dates, deadlines, requirements, processes, services and programs via e-mail to their Cal Poly Pomona e-mail account. Students are responsible for all communications sent to their e-mail account and to stay current and informed with the up-to-date information provided. Because some of the information is time-sensitive, the university strongly recommends that students check their e-mail accounts daily.
**Religious Observances and University Activities Causing Missed Class(es)**

As a general rule, a student missing a class or laboratory assignment because of observance of a religious holiday shall have the opportunity to make up missed work. Students must notify the instructor of anticipated absences by the last day of late registration to be assured of this opportunity. Faculty may give students an additional week, but are encouraged to set a clear deadline.

NOTE: Students who represent the university at any official extracurricular activity shall also have the opportunity to make up assignments, but the student must provide official written notification to the instructor no less than one week prior to the missed class(es).

This policy shall not apply in the event that completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the university that could reasonably have been avoided. There should be good faith effort by both faculty and student to come to a reasonable resolution. When disagreements regarding this policy do arise, they can be appealed to the department chair/unit director or college/school dean.

For purposes of definition, extracurricular activities may include, but are not limited to; band, drama, intercollegiate athletics, recruitment, and any other activity sanctioned by a college/school dean, and/or the Executive Vice President and Provost.

**Disability Resources**

Cal Poly Pomona complies with the provisions set forth in Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, offering reasonable accommodations to qualified students with documented disabilities. If you have a documented disability that may require accommodations, you will need to arrange the coordination of services. Accommodation begins when the instructor receives copies of your paperwork. Consideration cannot be provided prior to receipt of official documentation.

**Student Services**

Students are encouraged to take full advantage of university provided resources. These include health and wellness resources, employment resources, study and research resources and student life organizations. These resources can be accessed at [http://www.cpp.edu/~studentsuccess/](http://www.cpp.edu/~studentsuccess/)
### COURSE SCHEDULE

See Blackboard for updates and details. Please complete assigned readings before class.

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<thead>
<tr>
<th>Mon</th>
<th>Tue</th>
<th>Class/Topics/Activity</th>
<th>Readings / Assignments due:</th>
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</thead>
<tbody>
<tr>
<td>1/28</td>
<td>1/23</td>
<td><strong>01</strong> Green Infrastructure, Ecosystem Services, and the Future</td>
<td></td>
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<tr>
<td>1/28</td>
<td>1/23</td>
<td><strong>02</strong> Hydraulics and Hydrology 101: Units, and Formulas</td>
<td>Bai et al 2015 + Windhager et al 2010 + NACTO Ch 1-2, 5-7, Reading Blog 1 Due</td>
</tr>
<tr>
<td>2/4</td>
<td>1/30</td>
<td><strong>03</strong> Water Quantity - Issues and Solutions BMPs: Retention &amp; Detention, Gardens &amp; Ponds</td>
<td>NACTO Ch 3 + LACo DPW 2006 Ch 1-3 &amp; 5-7 Case Study One Blog Due</td>
</tr>
<tr>
<td>2/18</td>
<td>2/19</td>
<td><strong>04</strong> BMPs in Practice</td>
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<tr>
<td>2/25</td>
<td>2/26</td>
<td><strong>05</strong> Water Quality - Issues and Solutions BMPs: Bioswales, Filters, and More</td>
<td>NACTO pp127-139 + Milburn et al 2009 Green Infx Proposal Due</td>
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<tr>
<td>3/1</td>
<td>3/2</td>
<td><strong>06</strong> Air Quality - Issues and Solutions Trees &amp; More</td>
<td>Lehrman.xls N.D. + Nowak 2010 + Abhijith et al 2017 Reading Blog 3 Due</td>
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<tr>
<td>3/1</td>
<td>3/2</td>
<td><strong>07</strong> Urban Heat Island - Issues and Solutions</td>
<td>Gober et al 2010 + Lehmann 2014</td>
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<td>4/8</td>
<td>4/10</td>
<td><strong>09</strong> Ecological Infrastructure - Issues and Solutions</td>
<td>CEHCP + choice of: Popper &amp; Popper 1999, Finkelman 2018, or Lundgren et al 2018 Case Study Two Blog Due</td>
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<tr>
<td>4/22</td>
<td>4/24</td>
<td><strong>11</strong> Sea Level Rise, Climate Change, Resilience, &amp; Mitigation</td>
<td>OCP 2017 (or Erikson et al 2018 + LA402L 2016 Green Infx Preliminary Calcs Due</td>
</tr>
<tr>
<td>4/29</td>
<td>5/1</td>
<td><strong>12</strong> Maintenance, Operations, Financing, and Deployment</td>
<td>NACTO pp115-126 + LIDG 2010 pp4 + Geffel 2013 Case Study Three Blog Due</td>
</tr>
<tr>
<td>5/6</td>
<td>5/8</td>
<td><strong>13</strong> Advanced Topics Term Project Workshop</td>
<td>No Readings Assigned Reading Blog 5 Due</td>
</tr>
<tr>
<td>5/13</td>
<td>5/13</td>
<td><strong>14</strong> Maintenance, Operations, Financing, and Deployment</td>
<td>Final Green Infx Project Due</td>
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No class: CPPLA’s Field Trip Week 2/11 & 2/13, + Wednesday 3/4 (Barry will be at CELA 2019 in Sacramento)

AY 2018/19 Academic Calendar:
- MLK Day 1/21
- Spring Break: 3/30 – 4/5
- Cesar Chavez Day 4/1 (observed)
- Last Day of Classes: 5/10
- Finals Week: 5/11 – 5/17
- Final Grades Due: 5/22