

# Course Change Request

Date Submitted: 12/18/19 10:41 am

Viewing: **EVPP 542 : Urban Ecosystems & Processes**

Last edit: 12/18/19 10:41 am

Changes proposed by: slister1

**Catalog Pages referencing this course** [Department of Environmental Science and Policy](#)  
[Environmental Science and Policy\\_\(EVPP\)](#)

**Programs referencing this course** [SC-MS-EVSP: Environmental Science and Policy, MS](#)  
[SC-MS-CLIS: Climate Science, MS](#)

Select modification type:

**Substantial**

Are you completing this form on someone else's behalf?

**No**

**Effective Term:** Fall 2020

**Subject Code:** EVPP - Environmental Science & Policy

**Course Number:** 542

**Bundled Courses:**

**Is this course replacing another course?** No

**Equivalent Courses:**

**Catalog Title:** Urban Ecosystems & Processes

**Banner Title:** Urban Ecosystems & Processes

**Will section titles vary by semester?** No

**Credits:** **3** ~~4~~

**Schedule Type:** Lecture ~~w/Lab~~

**Hours of Lecture or Seminar per week:** 3

**Repeatable:** May only be taken once for credit (NR)  
\*GRADUATE ONLY\*

**Default Grade Mode:** Graduate Regular

## In Workflow

1. **ESP Chair**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

## Approval Path

1. 12/18/19 11:24 am  
A. Alonso Aguirre (aaguirr3):  
Approved for ESP Chair

**Recommended****Prerequisite(s):**

CHEM 211 ~~and 213~~; ~~MATH 113~~ or **213 General Chemistry, Math 113 (calculus) equivalent**; ~~BIOL 308~~ or **equivalent, BIOL 307 or EVPP 302, 302**; PHYS 243 or **equivalent**, or permission of instructor.

**Recommended****Corequisite(s):****Required****Prerequisite(s) /****Corequisite(s)****(Updates only):****Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):**

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

**Registration****Restrictions****(Updates only):****Registrar's Office Use Only - Registration Restrictions:****Field(s) of Study:****Class(es):**

Include

Limited to students with a class of Senior Plus. (SCRRCLS\_ONLY\_SP)

Limited to students with a class of Non Degree (SCRRCLS\_ONLY\_ND)

Limited to students with a class of Advanced to Candidacy. (SCRRCLS\_ONLY\_DC)

Limited to students with a class of Graduate. (SCRRCLS\_ONLY\_GR)

**Level(s):**

Include

Enrollment limited to students with a level of Non-Degree (SCRRLVL\_ONLY\_ND)

Limited to undergraduate level students. (SCRRLVL\_ONLY\_UG)

Limited to graduate level students only. (SCRRLVL\_ONLY\_GR)

**Degree(s):**

Exclude

Non-Degree Undergraduate Degree students may not enroll. (SCRRDEG\_NO\_NDU)

**School(s):****Catalog****Description:**

Provides an overview of the challenges and opportunities that urban environments present to the plants and animals inhabiting cities and the ways that those organisms and entire ecosystems respond. Includes

ecosystem ecology for engineered ecosystems, along with reviews of urban metabolism, energy budgets, water cycles, and soil ecology. Students design and conduct a small-scale green infrastructure experiment/project on campus.

**Justification:**

The reason is to split the four-credit course into two (three-credit lecture and one-credit lab/field) so that the course lecture portion (three-credit) can be listed as a course for the new Graduate Certificate in Environmental and Sustainability Management.

**Does this course cover material which crosses into another department?** No

**Learning Outcomes:**

- 1) A firm grasp of ecological principles for the built environment by studying relevant contemporary issues through peer-reviewed journal articles and other literature;
- 2) An understanding of ecological processes to create and restore ecosystem services with water, energy, and food and/or;
- 3) Designing and conducting a small-scale ecological experiment/project on the campus or in local areas throughout the semester with a relevant theme

**Attach Syllabus**

[EVPP 542 syllabus.pdf](#)

**Additional Attachments**

**Specialized Course Categories:**

- Natur
- Natural
- Oral
- Quantitati
- Social and
- Capstone
- Synthesis

**Additional  
Comments:**

**Reviewer  
Comments**

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## Urban Ecosystems and Processes

**INSTRUCTOR:** Dr. Changwoo Ahn  
Professor of Environmental Science and Policy  
**OFFICE:** 3034 David King Hall (office hour: by appointment)  
**PHONE:** (703) 993-3978  
**E-MAIL:** cahn@gmu.edu  
**WEBSITE:** <http://www.changwooahn.com>  
**CLASS TIME:** Lecture/discussion: Tuesdays 4:30 -7:10 pm  
**CLASS LOCATION:** IN 317  
IN205/EXPL L502/Ahn Mesocosm Compound/Field Sites

**CREDIT HOURS:** 3

**PREREQUISITE:** CHEM 211 or 213 General Chemistry, Math 113 (calculus) or equivalent, EVPP302, PHYS 243 or equivalent. In case of not meeting prerequisite requirements permission of instructor is required to take the course. Please see me if you have any questions concerning this. EVPP 544 is not a co-requisite to take this course.

### COURSE DESCRIPTION:

This undergraduate/graduate course will provide students with the overview of system ecology of urban ecosystems. Ecologically engineered systems and/or engineered ecosystems in urban environments. The course focuses on scientific understanding urban metabolisms of energy, water, soil, and food along with cultural and historical context. The course also aims to review and discuss numerous cases of urban coupled natural and human (social) processes and their relationship with design elements that can be incorporated into creating functional urban landscape (e.g., green infrastructure), both locally and globally. Students will gain a good deal of understanding of the ecological principles for the built environment through the course.

**COURSE OBJECTIVES:** the course is intended to involve students in:

- 1) A firm grasp of ecological principles for the built environment by *studying* relevant contemporary issues through peer-reviewed journal articles and other literature;
- 2) An understanding of ecological processes to create and restore ecosystem services with water, energy, and food and/or;
- 3) Designing and conducting a small-scale ecological experiment/project on the campus or in local areas throughout the semester with a relevant theme

### TEXTBOOK

Robert I. McDonald. 2015 Conservation for Cities – How to plan & build natural infrastructure. Island Press

### **RECOMMENDED TEXT**

Kate Orff SCAPE2016. Toward an Urban Ecology. The Monacelli Press –Examples of “Engage” in the learning of your city as a place

Frederick R. Alder and Colby J. Tanner, 2013. Urban Ecosystems –Ecological Principles for the Built Environment

Travis Beck.2013. Principles of Ecological Landscape Design. Island Press (PDF available)

### **RECOMMENDED PEER-REVIEWED JOURNAL SOURCES (e.g., Web of Science)**

Urban Ecosystems, Journal of Urban Ecology, Ecological Engineering, Sustainability, Landscape and Urban Planning, Journal of Environmental Management, Building and Environment and more. Each paper to review will be provided by the instructor ahead of time electronically.

**COURSE FORMAT:** Class will be a mixture of lecture, intensive paper reading and discussion, case studies presentation, field trips/visits, and an urban ecosystem and/or process design project with presentations. I expect you to complete the assigned readings prior to each class. Each class participant will be required to participate in a class project and prepare presentations on the outcomes of the project. Grades will be based on paper review summary, field trip report, mid-term, group activities for design project, final project presentation. The course might also involve one longer, field trip, depending on logistics and class discussion in that particular semester (To be determined later).

### **READING ASSIGNMENT FOR CLASS AND PAPER DISCUSSION:**

Each student is required to read papers or book chapters assigned before class, submit a summary of the paper (2 pages, 800-900 words limit, single spaced, 1' for all margins –DO NOT copy and paste from the paper for your summary), and get ready for lecture and/or group discussion (please hand your summary of the article to the instructor before class). Your summary of the chosen paper should include **two** questions minimum of yours at the end of the summary on terminology, concepts and interpretation of the results presented in each paper. This will require you to do some research on-line or through library materials to share the answers with the rest of the class. One group will present the summary of the paper chosen for your review (individual or group activity) in class for 15 minutes (ppt presentation) to be followed by guided discussion. The ppt file should be sent to the instructor before class presentation. The group that presents a paper summary will lead a discussion session after the presentation with instructor’s moderation. In addition, we will read some papers together more thoroughly along with lectures in an investigative mode.

### **URBAN CLASS PROJECT:**

Students will work as a small group (e.g., 2-3 students per group) to conduct an urban ecological experiment, including studying and investigating certain functions of green infrastructure and/or ecosystems to be created or restored. The instructor will provide and discuss the themes of potential projects each semester. The final project for each student can be to develop a **research paper (undergraduate)** or a **grant proposal (graduate students)** (following NSF

Environmental Sustainability proposal format). Students will be required to complete the following on their project:

1. an oral presentation of their project concepts and design
2. An electronic copy (via emails) of written manuscript (either for a paper or a proposal)  
\*There will be a lecture on the styles and formats to strictly follow on the final project material for both proposals and research papers.

The project proposal should include the topic, a conceptual model, and on-going literature review (for graduate students).

### **FINAL PAPER AND PRESENTATION:**

Each student is required to write a research paper on a specific subject of urban ecosystem processes with literature review as part of the class for grades. Specifics on the subject and the format will be explained and discussed during the course of the class. Power point presentation of each paper is also required (15-20 minute presentation and 5 minutes Q &A). Students are allowed to use a variety of media, including photos, videos, and web blog to be created to tell a story of the project with further discussion with the instructor. Email me ppt files at least a day or earlier before final presentation (**December 5**) for my feedback. Your final paper (& ppt)/proposal is due by **December 13 (to be emailed by noon)**. Late assignment will not be accepted.

**HANDOUTS:** Copies of papers and other documents will be handed out in conjunction with class lectures. Unless otherwise noted, students are generally responsible for material contained in these handouts for course examinations.

**COURSE POLICY AND EXPECTATIONS:** Class attendance is strongly recommended. Be punctual. Lateness is disruptive and disrespectful to your peers and to me. There will be strong emphasis on active and effective **participation** in class discussions, not only during the class presentations and discussion periods following these presentations, but also throughout all the other class periods. I expect each of you to be present and prepared for each class. This will involve having read the assigned material before each class. I strongly recommend not to use your cell phones during the class. *Academic dishonesty* will not be tolerated (honor code responsibilities). *Minor changes in course organization and content* may be required throughout the semester, thus students will be made aware and asked for input if such actions are needed. Late assignments will not be accepted.

**LET ME KNOW** if you have any documented learning or other disability and wish to discuss academic accommodations. The Disability Resource Center can also help you or direct you toward help with a wide range of learning, studying, mental health, career, and physical disability issues (located in Student Union Building I, Room 2500; Tel: 703- 993-2474; <http://ods.gmu.edu/>).

### **CLASS E-MAIL AND COMMUNICATING WITH ME:**

I will frequently e-mail to remind you of deadlines or to clarify points from a lecture. Please use GMU e-mail (\*\*@gmu.edu) to facilitate any communication or discussion. Please check your e-mail **daily**. When you email your assignments be sure to label your file with your last name, date, and course number (e.g., ahn0205-490). If you email a question of general interest, I will likely

send my response to the entire class list. Be sure to take full advantage of your classmates, the library, and the web as learning resources. Finding answers and solutions among yourselves by tapping into the multitude of resources available to you is generally a more gratifying and educationally valuable approach than seeking answers from a single authority.

**GRADING: (subject to minor changes)**

**% of Grade for Graduates**

Reading summary and presentation (I)	30 (20/10)
Mid-term (I)	30
Final Project Proposal (I) and presentation (I)	40
TOTAL POINTS	<u>100</u>

Your course will be determined using the following straight scale: A (94-100), A- (90-93), B+(86-89), B (80-85), C (70-79), F (< 70)

Failure to meet deadlines for reading assignment and final paper submission will result in losing 5% of total points for letter grade. \* **Please note that there will be occasional small assignments throughout the semester.**



**LECTURE COURSE CONTENT AND SCHEDULE: SUBJECT TO CHANGE\***

\*class content and timing for the content are subject to change.

<b>Date</b>	<b>Topic</b>
<b>Aug 29</b>	Syllabus orientation, Research tools (library sources), Class blog, OSCAR-URSP Memory of my city (prepare laptop or other writing tools) Student backgrounds, group assignment, research topics & sites, lab space checking
<b><u>Urban Ecology Literature</u></b>	
Sep 5	Cities are the future (Special section in Science, 2016), Ecological future of cities (McDonnell, 2016), LTER urban ecosystems (Baltimore vs. Phoenix) – <b><u>Paper review 1, Chap 1</u></b>
Sep 12	Urban Ecology paradigm (In, Of, and For Urban Ecology), Ecology of and for Cities (McPhearson et al., 2016, Steiner et al., 2013). <b><u>Paper review 2</u></b>
<b><u>Urban Water, Soil, Biodiversity and Green Infrastructure</u></b>	
Sep 19	Urban Stormwater - <u>The case of the Rain Project</u> and its application - urban stormwater management & Campus green infrastructure, <b><u>Paper review 3 and/or Chap 4</u></b>
<b><u>Sep 26</u></b>	***Visit ASLA Greenroof tour (Keith- to arrive by 5 pm sharp tour ( <a href="https://www.asla.org/greenroof/index.html">https://www.asla.org/greenroof/index.html</a> ); <a href="http://www.javitscenter.com/about/live-green-roof-cam/">http://www.javitscenter.com/about/live-green-roof-cam/</a> )
Oct 3	Urban Soils, Healthy Soils (Biogeochemistry of soils overview) & The Dirt Project
Oct 10	<u>No Class (Columbus Day Recess)</u>
Oct 17	Urban Soils and Healthy Soils for Foods , <b><u>Paper review 4</u></b>
Oct 24	Mid-term (4:30 pm- 5:30 pm, TBD), guest lecture-Dr. Dianna Hogan, USGS on urban stormwater management
Oct 31	Sustainable urban green infrastructure- approaches and cases-from SCAPE, urban biodiversity <b><u>Paper review 5</u></b>
<b><u>Urban Green Landscape Design/Art/Communication</u></b>	
Nov 7	<b>Rob McDonald</b> (Director of Urban Ecosystem Division, The Nature Conservancy, Arlington, VA) <i>URSP deadline for undergraduate research and scholarship (for SP 2018)</i>
Nov 14	Novel ecosystems and artistic intervention for urban ecology (Levy, Mattingly, Ball, and Johanson), Jihyun Lee's Kitchen project (TEDx talk), – <b><u>Paper review 6 and/or Chap 9</u></b>
<b><u>Ecological Sustainability and Resilience for Cities</u></b>	
Nov 21	Ecological Resilience and resilient cities (Pickett et al., 2014), Stormsurge wetland project –Resilient coastal communities plan – <b><u>Paper review 7 and/or Chaps 5 and 6</u></b>

### **Urban Farming and Food Sustainability-Gorden article?**

- Nov 28 Urban Farming- Green Homestead (TBA, Lenna Storm) & GMU Organic Garden–**Paper review 8**, Green Space vs. Housing in the city (Peter Watt article) & “Seeds” film watching
- Dec 5 Class final project presentation

### **Dec 13 FINAL PAPER/PRODUCT DUE (to be emailed by noon)**

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### **Literature and References**

**\*\*The Nature of Cities blogs to read and to study on theme of choice:**

- Andersson E and Barthel S. 2016. Memory carries and stewardship of metropolitan landscapes. *Ecological Indicators* –in press.
- Bergey EA and Figueroa LL. 2016. Residential yards as designer ecosystems: effects of yard management on land snail species composition. Accepted article for *Ecological Applications*.
- Biophilia and Biophilic Design –Two Reports (copies available).
- Brendan Borrel. 2015. The Urban Water Crisis- and what we can do about it. *Nature Conservancy August/September Issue*
- Childers DL et al. 2011. Sustainability challenged of phosphorus and food: Solutions from closing the human phosphorus cycle. *BioScience* (61):117-124.
- Childers DL et al. 2015. An ecology for Cities: A transformational nexus of design and ecology to advance climate change resilience and urban sustainability. *Sustainability* 7:3774-3791.
- Delgado-Baquerizo et al., 2016. Carbon content and climate variability drive global soil bacterial diversity patterns. *Ecological Monograph* 86(3) : 373-390.
- Edmondson JL et al. 2012. Organic carbon hidden in urban ecosystems. *Scientific Reports* 2:963.
- Ellis, EC. 2016. Cultures of nature: What does it mean to be native in the city?
- Finger F et al. 2016. Mobile phone data highlights the role of mass gatherings in the spreading of cholera outbreaks. *PNAS* 113 (23): 6421-6426.
- Foderado LW. 2014. In a Queens Forest, Compiling a Picture of Urban Ecology. *The New York Times*. Dec. 2.
- Gorden LJ. 2017. Rewiring food systems to enhance human health and biosphere stewardship (accepted MS).
- Green TL et al. 2016. Insurance value of green infrastructure in and around cities. *Ecosystems*.
- Hahs AK et al. 2009. A global synthesis of plant extinction rates in urban areas. *Ecology Letters* 12: 1165-1173.
- Jon Cartwright 2016. Smartphone science. *Nature* 531 (March 31):669-671.
- Jon Chistensen. 2016. Ecological Urbanism for the 21<sup>st</sup> Century. *The Chronical of Higher Education (the Chronical review)*
- McDonald R. 2008. Global urbanization: can ecologists identify a sustainable way forward? *Front Ecol Environ* 2008; 6(2): 99–104, doi:10.1890/070038
- McDonald R. 2014. Water on an urban planet: Urbanization and the reach of urban water infrastructure. *Global Environmental Change* 27 (2014) 96–105.
- McDonald R et al. 2016. Estimating watershed degradation over the last century and its impact

- on water-treatment costs for the world's large cities. PNAS 113 (#2): 9117-9122.
- McDonnell MJ and McGregor-Fors I. 2016. The ecological future of cities. Perspective. Science 352 (6288): 936-938.
- McPhearson TM et al. 2016. Advancing urban ecology toward a science of cities. BioScience 66 (3): 198-212.
- McPhearson T. 2016. Scientists must have a say in the future of cities, Nature 13 OCTOBER 2016 | VOL 538 | NATURE | 165
- Menno Schilthuizen. 2016. Evolution is happening faster than we thought. Sunday Review. The New York Times (July 23, 2016).
- Pickett STA et al. 2014. Ecological resilience and resilient cities. Building Research and Information 42 (2): 143-157.
- Pollack K. 2016. Urban physics. Nature 531:S64-S66.
- Seto KC et al. 2012. Global forecasts of urban expansion to 2030 and direct impacts on diversity and carbon pools. PNAS 109 (4): 16083-16088
- Smith RM and Kaushal SS. 2015. Carbon cycle of an urban watershed: exports, sources, and metabolism. Biogeochemistry DOI 10.1007/s 10533-015-0151-y
- Steiner F et al. 2013. The ecological imperative for environmental design and planning. Frontiers in Ecology and environment 11(7): 355-361.
- University Landscapes Teach, too. 2016. DIRT, (<http://dirt/asla.org>)
- Urban health and well-being – *Nature* special issue [531 (7594): ppS49-S96]
- Watts, P. 2017. Green space v. social housing: the fight for the future of London's oldest allotments, The Guardian, August 2, 2017.
- Wigginton NS et al. 2016. CITIES are the future-rapid urbanization is overtaxing the planet but it may not have to. 20 May, VOL 352 (Issue 6288). Science (Sciencemag.org).