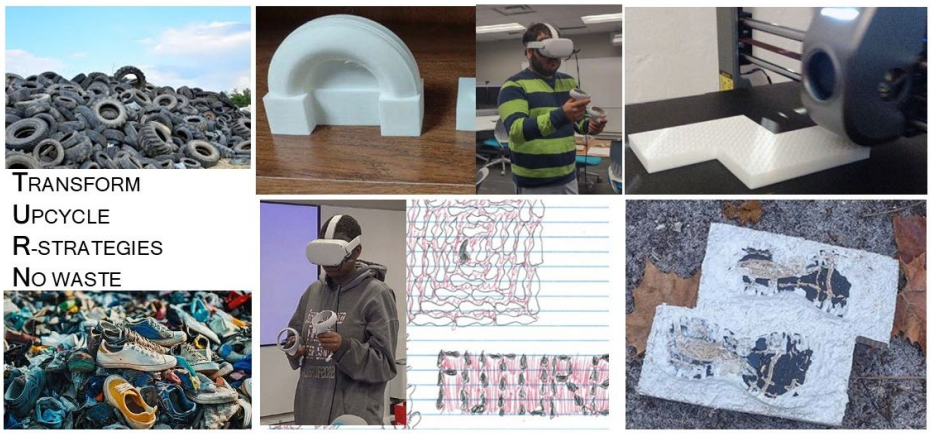
CIRCULAR ECONOMY

🌿 Welcome to Circular Economy! This course invites you to explore how design, policy, and innovation can shape a more sustainable future. We're excited to learn with you and build a collaborative learning environment together.



Title and Number:	**DCP4930/EUS4930/DCP6931: Circular Economy**
Term/Section:	**Fall 2025 | 3 Credits**
Course Time & Location:	**Blended/Hybrid: Monday** 12:50 – 1:40 PM (Online) | Wednesday 11:45 AM – 1:40 PM (In-person at RNK 106)

INSTRUCTOR INFORMATION

Name:	**Dr. Patricia Kio**
Instructor's Office:	AH 132 (Antevy Hall) | Phone: 352 294 1425
Email Address:	p.kio@ufl.edu
Office Hours:	Tuesdays (12:00 PM –2:00 PM) and Thursdays (10:00 AM –12:00 PM)
Other times:	By appointment (virtual & in-person)

Co-requisite: None | **Prerequisite**: Junior Standing or higher (student should have completed at least 60 semester credit hours).
General Education Credit: None
Final Exam Schedule: No final exam for this course.

Patricia N. Kio, PhD is an Assistant Professor in the School of Architecture at the University of Florida. Her research focuses on designing for a changing climate, utilizing cutting-edge technologies to create more sustainable and resilient environments. Dr. Kio investigates how artificial intelligence can enhance decision-making in ecological design, how emerging

technologies can enable circular construction practices, and how digital twin infrastructure can support long-term urban sustainability.
Before joining academia, Dr. Kio worked with architectural firms in Nigeria, bringing a global perspective to her teaching and research. She earned her PhD from Texas A&M University, and both her MSc and BTech from Rivers State University. She also serves on the Editorial Board of the Technology | Architecture + Design journal.
Dr. Kio is passionate about helping students connect design with real-world impact, and she looks forward to exploring these ideas with you throughout the semester.

COURSE DESCRIPTION

This course will introduce students to the principles and practices of a circular economy, with a focus on the European Union's Circular Economy Action Plan, and the United States Environmental Protection Agency's Circular Economy Plan. Through a combination of lectures, case studies, and group projects, students will learn how to design and implement circular economy strategies that promote sustainable growth, reduce waste, and minimize environmental impacts.

Target Audience
Undergraduate and graduate students in design, construction and planning; European studies, or related fields, or motivated learners interested in sustainable innovations. The course will integrate artificial intelligence tools with prompts; conduct comparisons and aid students towards innovation.

COURSE OBJECTIVES

- State the principles and benefits of a circular economy
- Recognize the European Union's Circular Economy Action Plan and the United States Environmental Protection Agency's Circular Economy Plan
- Discover opportunities for circular economy innovation and implementation
- Develop skills to design and implement circular economy strategies
- Evaluate the environmental, social, and economic impacts of circular economy initiatives.

STUDENT LEARNING OUTCOMES (SLO)

Upon completion of this course, the students will be able to:

- Integrate knowledge and principles from sustainability-related disciplines (SLO 2).
    - Understand the role of policy and regulation in promoting the circular economy.
    - Analyze the challenges and opportunities in transitioning to a circular economy.
    - Evaluate different business models that promote circularity and how they can be implemented in different industries and sectors.
    - Create circular products with circular design principles to promote circularity.

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- Describe the role of the built environment in sustainability (SLO 3).
  - Describe the importance of sustainable consumption and production.

The learning outcomes for electives can be viewed here.

ACCESSIBILITY & DISABILITY-RELATED ACCOMMODATIONS

Here is a link to academic policies and resources: https://go.ufl.edu/syllabuspolicies

UF is committed to creating an inclusive environment. Students requiring accommodations should contact the University's Disability Resources Center (DRC) at https://disability.ufl.edu/ as early as possible.
Please inform me during office hours or via email about any access needs so we can work together to provide appropriate supports. Course materials are available in accessible formats upon request.

REQUIRED TEXT/READING

- McDonough, W., and Braungart, M. (2010). *Cradle To Cradle: Remaking The Way We Make Things*. North point press.

Recommended Readings:

- Charter, M. (2018). Circular economy innovation and design: setting the scene. In *Designing for the circular economy* (pp. 23-34). Routledge.
- Lihammar, R., Olofsson, K. G., Rydberg, T., Ghasemi, A., Willskytt, S., Häggström, M., ... & Pinlova, B. (2023). The international ecosystem for accelerating the transition to Safe-and-Sustainable-by-design materials, products and processes.
- Eurostat, 2020. Database - Eurostat [WWW Document]. online database. URL https://ec.europa.eu/eurostat/data/database (accessed 11.13.24).
- EUROPEAN COMMISSION. (2020). *A new Circular Economy Action Plan: For a cleaner and more competitive Europe* (Document 52020DC0098).
- United States Environmental Protection Agency's Circular Economy Plan (2020)
- Circular Construction for Urban Development: A System by Søren Nielsen and Kasper Guldager Jensen

INSTRUCTIONAL METHODS AND EXPECTATIONS

This course includes lectures, readings and reflections, multimedia materials, in-class engagement activities (individuals and groups), research/writing and two projects. The following is a summary of expectations:

- Student expectations of instructor: enthusiasm for the course; engaging lectures; application of knowledge through classroom activities and fieldwork; easy to access course materials; clear guidance and assessment rubric; openness and encouragement of critical thoughts and new ideas; constructive feedback, and reasonable flexibility to meet with students outside of class.

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- Instructor expectations of students: compassionate curiosity; positive attention and intention; enthusiasm about learning new ideas and contribution to the learning environment, consistent attendance; punctual arrival; active participation in class discussions and activities; advance-reading and note preparation of assigned reading; on-time completion/submission of all assignments; proper citation management; professional attitude, adherence to proper netiquette and all University rules and regulations.

COURSE COMMUNICATIONS AND E-LEARNING/ CANVAS PORTAL

This class will be delivered through hybrid instructions. The instructor will utilize the UF Canvas e-Learning portal as the primary medium to send announcements and to distribute course information assignments, reading materials, resources, and grading. Students are responsible for checking Canvas portal regularly for announcements, course content, access to all supplemental readings, and to submit assignments and projects. Lecture slides will be posted on Canvas in advance of each scheduled lecture. Reviewing materials online is not a substitute for class attendance. Lectures posted on Canvas by the instructor are not intended to be a complete study aid and should be viewed as supplementary to personal notes.

METHODS BY WHICH STUDENTS WILL BE EVALUATED OUT OF 1000

	Item	**Points (Percentage)**	**Description**	**Deadlines**
1.	Attendance	50 (5%)	For regular class attendance	Every class
2.	Participation & Discussions	200(20%)	Contribute to discussion threads on Canvas and in class discussions	24 hours
3.	Reading Reflections (flexible modes)	200 (20%)	2-page reflections on the 6 textbook chapters	On Canvas
4.	Project 1- Midterm Presentation (Individual)	200 (20%)	Transform industrial byproducts into alternate/secondary resources for the construction/manufacturing industry.	Sept 18, 2025 Deliverable- Poster
5.	Project 2- Final project (Group Project)	250 (25%)	Develop a circular product	Dec 3, 2025 Deliverable- Poster and Presentation serves as the final exam
6.	Quizzes	100 (10%)		• Quiz 1- Sep 3 • Quiz 2 - Sep 24 (Grad)

			Four quizzes for undergraduate students; Six quizzes for graduate students (Online and open book)	• Quiz 3 – Oct 1 • Quiz 4 - Oct 15 • Quiz 5 – Oct 29 (Grad) • Quiz 6 – Nov 12
	Total	**1000(100%)**		

ATTENDANCE

Attendance will be kept. Students are expected to attend classes regularly. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

MAKE-UP POLICY

Students shall be permitted a reasonable amount of time of one week to make up the material or activities covered during absence from class or inability to engage in class activities because of the acceptable reasons for absence stated in the university policy. https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx. However, students are to present a legitimate reason for late work. There will be a deduction of 10% of the points for every day that work is late. The maximum deduction is 50%. This is to be fair to other students who turned in their work by the deadline.

DISCUSSION SCALE

Your participation in Canvas and class discussions will be evaluated using this percentage scale for points towards your final grade for the semester.

1. 100 = Student often contributes thoughtful comments and insights based on class materials and has been a catalyst for other student comments as well as instructor response; listens to the comments and insights of others with respect and attention.
2. 80 = Student regularly contributes thoughtful comments and insights based on class materials, which results in student as well as instructor response; listens to the comments and insights of others with respect and attention.
3. 60 = Student sometimes contributes comments and insights based on class materials, more often at instructor's prompting; generally polite but could be more engaged in class discussions.
4. 40= Student seldom contributes comments and insights of her/his own volition; comments are not always relevant to materials or discussion at hand; needs to pay more attention to the contributions of the instructor and peers.
5. 0= Student rarely and reluctantly contributes to class discussions; comments minimal and/or disrespectful; often noticeably disinterested in instructor's and peers' contributions.

REFLECTIONS

Students will submit a 2-page summary of a chapter from the textbook *Cradle To Cradle: Remaking The Way We Make Things* on Canvas. Students agree that by taking this course all required papers may be subject to submission for a textual similarity review to Turnitin.com via Canvas for the detection of plagiarism. All submitted papers will be included as source

documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Students who do not agree should contact the course instructor immediately. The maximum Turnitin similarity index report of submissions is 20%.

PROJECT 1 (INDIVIDUAL PROJECT)

Students will demonstrate the application of the knowledge needed to transform industrial byproducts into alternate/secondary resources for a product in the built environment and submit final individual projects in a poster format. Templates for posters will be provided on Canvas.

PROJECT 2 (TEAM PROJECT)

Student teams will collaborate to develop a circular product towards substituting traditional building envelope components or a physical circular product in the built environment. Students will integrate a digital element for biotechnology and/or to track user behavior on the backend. Group submissions comprise a poster and a presentation as the final exam. The presentation should be 7–10 minutes long. Templates for the poster can be found here.

QUIZZES

Quizzes will be made available on Canvas and they are open-book. Students are expected to take quizzes individually and not collaborate with others. The quizzes are worth a total of 100 points.

GROUP WORK RULES

You will work as a team with folders in Canvas. Your final grade for this assignment will depend on your team's grade, as well as that of your teammates' evaluation of your performance and contribution to the team project. The contribution of team members will be assessed with this rubric.

FLEXIBILITY & CHOICE

Students may choose between different formats for assignments (e.g., written essays, presentations, visual projects, oral reports) to express their understanding and engagement.

ENGAGEMENT & SUPPORTS

• Multiple means of engagement are provided, such as group discussions, creative activities, and technology-supported collaborations.

• Students are encouraged to share their preferred modes of participation; I am available to support diverse engagement strategies.

• Additional resources include tutoring, writing centers, counseling, and peer support

networks, accessible via UF's Student Resources page.

GUIDANCE FOR STRUGGLING STUDENTS

If you encounter challenges, contact me early! Resources available include:

• Academic coaching

• Accessibility services
• Peer study groups
• Recorded lectures and accessible transcripts
• Visual, auditory, and kinesthetic learning supports
Please inform me of your needs so we can tailor support.

GRADING

Grading Scale

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
93–100	90–92.99	87–89.99	83–86.99	80–82.99	77–79.99	73–76.99	70–72.99	67–69.99	63–66.99	60–62.99	0–59.99
4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0

OTHER IMPORTANT COURSE INFORMATION

Late Work Policy

Students are to present a legitimate reason for late work. There will be a deduction of 10% of the points for every day that work is late. The maximum deduction is 50%. This is to be fair to other students who turned in their work by the deadline. Once Canvas assignment closes, we do not accept any assignments, unless you have a legitimate reason for late or missed work.

Classroom Etiquette

Talking to each other and disrupting the class violates your fellow students' right to have a good learning experience in the class. If a student must say something to another person or persons besides the instructor, that student is free to leave the room. Students need to be considerate that others must be able to hear the instructor clearly without being disturbed by unnecessary conversations or disruptions. Cell phones and all noise-making devices must be silent during class times as well. Cell phones and all noise-making devices must be silent during class times as well.

Email Policy

E-mail is appropriate only for quick messages and replies. You are welcome to e-mail me with brief questions or comments (e.g., a request for an appointment, a question that can be answered in a sentence or two). I will answer your messages as I have the opportunity but cannot guarantee immediate responses. Note also that e-mail messages (particularly last-minute e-mail messages) cannot be accepted as fulfilling class obligations or providing excuses for failing to do so.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://disability.ufl.edu/ by providing appropriate

documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with any disability should follow this procedure as early as possible in the semester.

University of Florida Student Honor Code, Original Work, And Plagiarism

UF students are bound by The Honor Pledge which states "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. See the UF Conduct Code website for more information. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:

- The email they receive from GatorEvals,
- Their Canvas course menu under GatorEvals, or
- The central portal at https://my-ufl.bluera.com/

Guidance on how to provide constructive feedback is available at https://gatorevals.aa.ufl.edu/students/ . Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/ .

Materials and Supplies Fee

There are no additional fees for this course.

COURSE MODULES AND TOPICS*

Detailed weekly plans, readings, quizzes, and course content will be available on Canvas throughout the semester and will be announced in class.

CAMPUS RESOURCES

- Health and Wellness U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352-392-1575 so that a team member can reach out to the student.
- Counseling and Wellness Center: https://counseling.ufl.edu/, 392-1575 Sexual Assault Recovery Services (SARS): Student Health Care Center, 392-1161.
- University Police Department: 392-1111 (or 9-1-1 for emergencies). http://www.police.ufl.edu/ UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

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- Academic Resources E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learningsupport@ufl.edu. Visit the website at https://training.it.ufl.edu/services/elearning-tools--services/
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. https://career.ufl.edu/
- Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. http://teachingcenter.ufl.edu/
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/
- On-Line Students Complaints: https://distance.ufl.edu/student-complaint-process/

COURSE ACTIVITIES AND MAJOR ASSIGNMENTS

NOTE: This is a tentative schedule and is subject to change at the discretion of the instructor.

Week/ Date	**Topics & Readings**	**Activities & Assignments**	**Accessibility & Support Notes**
1 8/25	Introduction & Course Overview (Syllabus) - Concept of Circular Economy	Icebreaker activity: share interests via video or discussion posts	Materials in accessible formats; Circular Economy
2 9/2	History and evolution of circular economy thinking	**9/1 - Holiday** Reflection 1; Book Chapter 1 – A Question of Design; Quiz 1 on 9/3/25	Flexible submission modes; alternative media support The evolution of design thinking
3 9/8	European Union Circular Economy action plans and case studies Midterm Review & Workshop - Review sessions	**Project 1**- Transform industrial byproducts at Levada Brown Environmental Park & Transfer Station. into alternate/secondary resources for products in the construction/manufacturing industry. Due- 09/18/25; Present creative or analytical work in preferred formats; Discussion on product ideas, value definition,	Transcripts, audio descriptions, multiple engagement options Circular opportunities

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4 9/15	United States Environmental Protection Agency's Circular Economy action plans and case studies; Midterm Project Submission & Presentations	Discussion on AI Cookbook activity; Reflection 2, Book Chapter 2 – Why being "Less Bad" is no Good.	Materials in accessible formats; captions on videos Systems guide Learn from nature
5 9/22	Design thinking and circular economy design principles	Literature review with librarian-Ann Baird Location - Library; Date: 9/24/2025; Time: 11:45 AM – 1:40 PM Topic: Digital feedback mechanisms for circular economy products; Quiz 2 on 9/24/25	Flexible submission modes; alternative media support Circular economy design guide Regenerative thinking
6 9/29	Circular Economy Business Models	**Final project**: Develop a circular product using biotechnology and Internet of things (IoT). Discussion: How to integrate circular economy principles, biotechnology, and IoT into novel circular products; Quiz 3 on 10/01/25 for graduate students only	Choice of artistic formats; accessible presentation tools Tools of a systems thinker System mapping
7 10/6	Circular Economy and IoT	Reflection 3 (25 points), Book Chapter 3– Eco-effectiveness; Group discussion: Case studies of circular products.	Flexible submission modes; alternative media support Service flip Feedback mechanisms
8 10/13	Circular Economy and Materials Management; Final project review session; discuss project ideas	Assignment 3: Material flows with Sankey diagram; Discussion: How to implement circular economy materials management strategies; Quiz 4 on 10/15/25	Choice of artistic formats; accessible presentation tools-Sankey

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9 10/20	Circular Economy and Product Design	Reflection 4 (25 points), Book Chapter 4 – Waste Equals Food	Flexible submission modes; alternative media support
10 10/27	Circular Economy and Supply Chain Management; Project review session; Virtual Reality sessions (optional)	Discussion: House of quality for decision making on circular building product. Quiz 5 on 10/29/25	Materials in accessible formats; captions on videos
11 11/3	Circular economy implementation challenges and opportunities.	Reflection 5 (25 points), Book Chapter 5 – Respect Diversity; Discussion: How to address common circular economy implementation challenges	Flexible submission modes; alternative media support
12 11/10	Material Circularity Indicator; Project review session; discuss project ideas; Virtual Reality sessions (optional)	Evaluate product circularity with Material Circularity Indicator; Quiz 6 on 11/12/25	Materials in accessible formats; captions on videos
13 11/17	Sustainability Reporting Standards; Final project review session	Reflection 6 (25 points), Book Chapter 6 – Putting Eco-effectiveness into Practice; Evaluate impacts with the USEPA Waste reduction Model	Flexible submission modes; alternative media support
14 11/24	**Holiday**		
15 12/1	Final presentation	Final submissions	Multiple formats and deadlines accommodated

INCLUSIVE & EMPOWERING PRACTICES

• Multiple means of representation: Readings available in different formats; visual and auditory supports.

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• Multiple means of action & expression: Options for essays, creative projects, presentations, blogs.

• Multiple means of engagement: Varied activities, choice in assignments, flexible deadlines where appropriate.

Final Note

This syllabus embodies the principles of Universal Design for Learning, seeking to create an equitable, engaging, and supportive learning community. Please reach out with questions or requests for further accommodations.

📺 Recommended Educational Videos:

🔗 Circular Economy Explained: https://www.youtube.com/watch?v=V0FrY31ZxZc

🔗 Ellen MacArthur Foundation – Circular Design: https://www.youtube.com/watch?v=VxPjTzYqKxI

🔗 Sustainability in Architecture: https://www.youtube.com/watch?v=3aKfKxvU1zI

🔗 Design Thinking for Sustainability: https://www.youtube.com/watch?v=U-hzefHdAMk

🔗 Circular Cities and Urban Innovation: https://www.youtube.com/watch?v=KzHqXzvLZyI