

# Introduction of ChemE 143-144 Topics 2022

30 Nov 2021

Sustainable Food  
& Water Solutions

Clean  
Transportation

# What we do

## VISION

SPaRC will be a hub for collaborative activities that enable businesses, consumers and policy makers to create sustainable actions and strategies



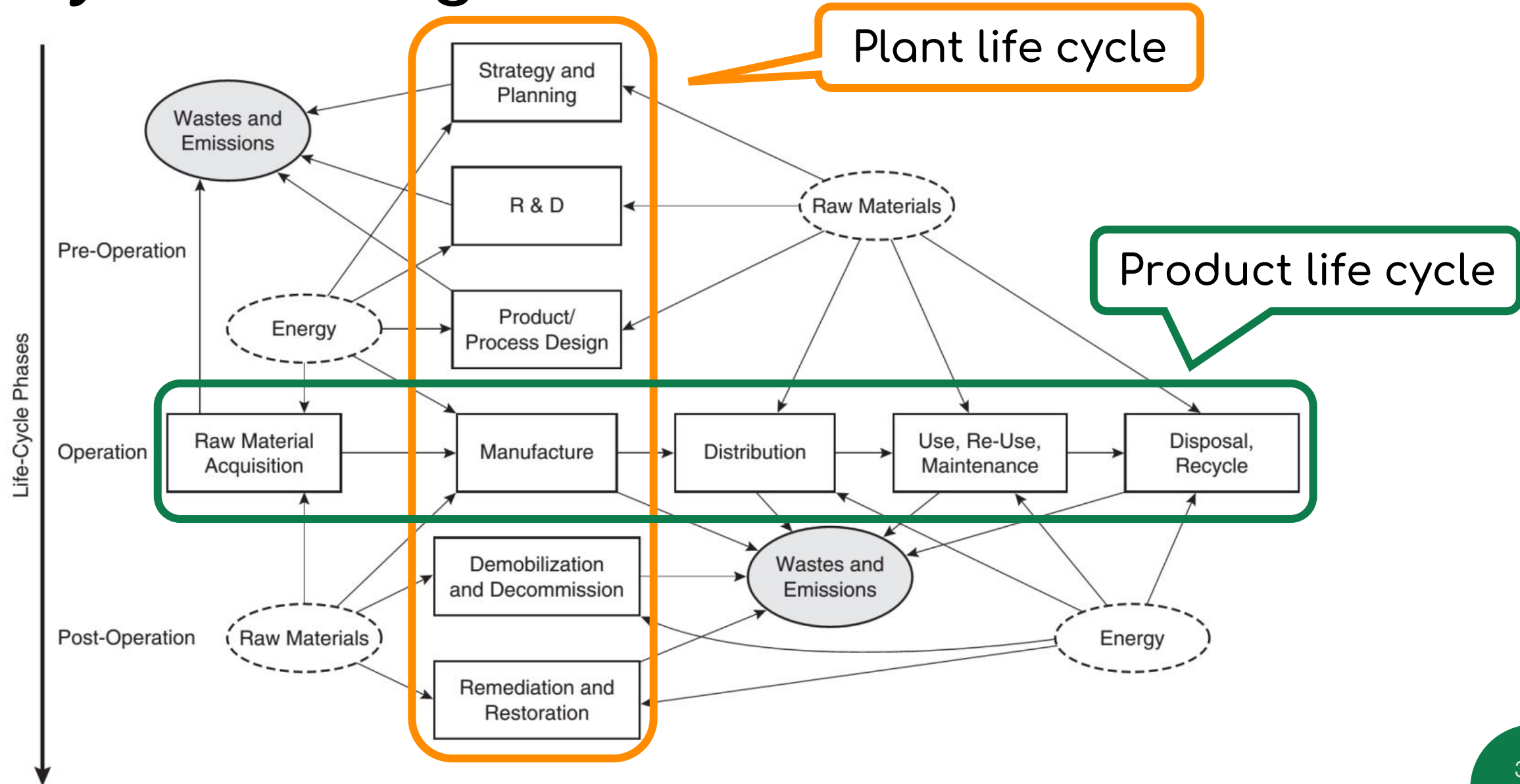
Life cycle sustainability assessment

Systems modeling and decision analysis



Sustainability in engineering education and policy

# Life Cycle Thinking in ChE



# For ChemE 143 Applications

- Read through the slides to gain an overview of the topic
- Using the starting references, find related papers and include a short review in the application essay
- Fill in the specific details of the topic proposal [marked in green here] based on your interests and initial literature review

# Topic 1: Water reclamation and reuse

- General objectives
  - Identify the quantity and quality of wastewater streams in a specified urban area/water district that can potentially be used for water reclamation/reuse
  - Develop a basic process design for water reclamation/reuse
  - Evaluate the sustainability of the proposed system for water reclamation/reuse
- Guide questions
  - What **types of wastewater streams** can be reclaimed/reused?
  - What **technologies** can be used for water reclamation?
  - For **an urban area/water district**, how much wastewater can be reclaimed?

# Topic 1: Water reclamation and reuse

- Recommended reading

- Gao, X., Zeng, Y., Ji, F., & Jiang, L. (2021). Ecological Network Analysis for Water Pollution Metabolism in Urban Water Use System: Case Study of Fuzhou, China. *Water* 2021, Vol. 13, Page 834, 13(6), 834. <https://doi.org/10.3390/W13060834>
- Jaramillo, M. F., & Restrepo, I. (2017). Wastewater Reuse in Agriculture: A Review about Its Limitations and Benefits. *Sustainability* 2017, Vol. 9, Page 1734, 9(10), 1734. <https://doi.org/10.3390/SU9101734>
- Canaj, K., Mehmeti, A., Morrone, D., Toma, P., & Todorović, M. (2021). Life cycle-based evaluation of environmental impacts and external costs of treated wastewater reuse for irrigation: A case study in southern Italy. *Journal of Cleaner Production*, 293, 126142. <https://doi.org/10.1016/J.JCLEPRO.2021.126142>
- Lam, K. L., Zlatanović, L., & van der Hoek, J. P. (2020). Life cycle assessment of nutrient recycling from wastewater: A critical review. *Water Research*, 173, 115519. <https://doi.org/10.1016/J.WATRES.2020.115519>

# Topic 2: Environmental footprint of UP

- General objectives
  - Compile the material and energy flows of UPD campus
  - Develop metrics for evaluating and monitoring environmental impacts of UPD
  - Propose options to improve sustainability in campus
- Guide questions
  - How much **materials and energy** are consumed in UPD?
  - What are the **environmental, economic and social impacts** of UPD's material and energy use?
  - What **policies or actions** can UPD adopt to improve its sustainability?

# Topic 2: Environmental footprint of UP

- Recommended reading

- Li, Z., Chen, Z., Yang, N., Wei, K., Ling, Z., Liu, Q., Chen, G., & Ye, B. H. (2021). Trends in research on the carbon footprint of higher education: A bibliometric analysis (2010–2019). *Journal of Cleaner Production*, 289, 125642. <https://doi.org/10.1016/J.JCLEPRO.2020.125642>
- Clabeaux, R., Carbajales-Dale, M., Ladner, D., & Walker, T. (2020). Assessing the carbon footprint of a university campus using a life cycle assessment approach. *Journal of Cleaner Production*, 273, 122600. <https://doi.org/10.1016/J.JCLEPRO.2020.122600>
- Leon, I., Oregi, X., & Marieta, C. (2018). Environmental assessment of four Basque University campuses using the NEST tool. *Sustainable Cities and Society*, 42, 396–406. <https://doi.org/10.1016/J.SCS.2018.08.007>
- Barros, M. V., Puglieri, F. N., Tesser, D. P., Kuczynski, O., & Piekarski, C. M. (2020). Sustainability at a Brazilian university: developing environmentally sustainable practices and a life cycle assessment case study. *International Journal of Sustainability in Higher Education*, 21(5), 841–859. <https://doi.org/10.1108/IJSHE-10-2019-0309/FULL/XML>



# SPaRC is looking for affiliates!

Get in touch via email: [joaberilla\[at\]up.edu.ph](mailto:joaberilla@up.edu.ph)  
Visit our website: [pages.upd.edu.ph/jmaberilla](http://pages.upd.edu.ph/jmaberilla)



# Who are we looking for?

- Strong interest in sustainability
- Strong background in material and energy balances (ChemE 101 and 102)
- Familiarity with process industries related to the topic
- Understanding of environmental, economic and social issues
  - Preferably with advanced study of ChemE 145 and 151
- Excellent communication skills
  - Comes handy when dealing with external partners and stakeholders
- Preferably can work during the midyear term
  - Preferably can apply to intern in a related industry