**CHBE 3890**  **Sustainable Engineering** **S23**

1. **Catalog Description**

CHBE 3890: Sustainable Engineering. This seminar will introduce first- and second-year students to the design and operation of systems for sustainable use of energy and materials. Topics will include plastics recycling, renewable energy production, energy storage, biotechnology, sustainable water and food production, digitization, decarbonization, and the contributions of public policy and the social sciences. Engineering’s unique perspective on achieving sustainability goals will be highlighted throughout the course. Prerequisite: First- or second-year standing.

1. **Class Meeting Times**

MWF 12:20 – 1:10

135 Olin

1. **Instructors**

Scott Guelcher (Instructor)

412 Olin Hall, 615-322-9097. Scott.guelcher@vanderbilt.edu

Each seminar will be presented in person by a VU faculty member and via zoom by an engineer from industry. This approach will connect teaching and research at Vanderbilt with sustainability efforts in industry.

1. **Textbook**

No textbook is required for this course. Reading materials will be assigned a week prior to each seminar to familiarize students with the topic.

1. **Grading Policy**

Attendance will be taken and participation credit given for each seminar. Excused absences must be obtained in advance. Students will submit a 1-page written summary of each seminar based on the speakers’ presentations and the reading materials that addresses the societal impact of the problem, the current state of technology, and technological advances required to meet sustainability goals.

1. **Honor System**

**7** **Course Syllabus**

List of Speakers and Topics. Each seminar will feature contributions from both Vanderbilt faculty and external speakers. This approach will connect research and teaching at Vanderbilt with pressing needs in industry.

Accepted speakers are listed in Black type

Speakers who have agreed and are seeking confirmation from their employer are listed in Brown type

Invited speakers who have not accepted are listed in Green type

Speakers who have not yet been identified are listed in Red type

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| --- | --- | --- | --- | --- |
| Date | Speaker  (VU) | Speaker  (External) | Topic | Reading |
| 1/09/23 | Guelcher | N/A | Careers in chemical engineering and engineering in society | <https://issues.org/penumbra-engineering-perspective-hammack-anderson/> |
| 1/16/23 | No class | | | |
| Plastics Recycling | | | | |
| 1/23/23 | Guelcher | Don Wardius (Covestro) | Mechanical recycling of plastics | <https://www.aiche.org/resources/publications/cep/2021/july/transforming-science-and-technology-plastics-recycling> |
| 1/30/23 | Guelcher | Zak Wilgus (Eastman Chemical) | Molecular recycling of PET and the circular plastics economy | <https://www.eastman.com/Company/Circular-Economy/Solutions/Documents/Molecular-Recycling-Facility-Presentation.pdf> |
| Renewable Energy Production and Storage | | | | |
| 2/06/23 | Jennings | Miles Barr (Ubiquitous Energy) | Solar panel technology | <https://www.aiche.org/resources/publications/cep/2022/june/new-era-solar-and-storage-partnering-continued-success> |
| 2/13/23 | Jiang | Yiming Lou (Apple) | Batteries and energy storage | <https://www.aiche.org/resources/publications/cep/2020/may> |
| 2/20/23 | Kidambi | John Slack (Nikola Motors) | The hydrogen economy | <https://www.aiche.org/sites/default/files/cep/20190826-53a.pdf> |
| Sustainable Water and Food Production | | | | |
| 2/27/23 | Lippmann | Patrick Brown (Impossible Foods) | Sustainable meat production | TBD |
| 3/06/23 | Guelcher | Jason Ballengee (Just Answers) | Artificial intelligence and big data analysis across the consumer packaged goods industry. | <https://www.aiche.org/resources/publications/cep/2020/september>; |
| 3/13/23 | No class | | | |
| 3/20/23 | Lin | Ryan Kirkland (Burns & McDonnell) | Protecting the water supply | <https://www.aiche.org/resources/publications/cep/2022/august> |
| Biotechnology | | | | |
| 3/27/23 | Lippmann | Margarita Prieto-Ballengee (Abbott Diagnostics) | Scale-up and commercialization of biomedical devices | TBD |
| 4/03/21 | Young | TBD (DuPont) | Industrial biocatalysts | <https://www.aiche.org/resources/publications/cep/2021/may> |
| Decarbonization | | | | |
| 4/10/23 | Kuhl (VU Law) | Mary Ellen Ternes (Earth & Water Law) | The role of policy in achieving sustainability goals | <https://www.aiche.org/resources/publications/cep/2022/june/sustainability-policy-update-big-changes-biden-administration> |
| 4/17/23 | Guelcher | Connie Smith (ExxonMobil) | Decarbonization in the Chemical Process Industry | TBD |
| 4/24/23 | Kidambi | TBD (TBD) | Carbon capture and storage (CCS) | <https://www.aiche.org/resources/publications/cep/2022/september> |