

GREEN ARCHITECTURAL ENGINEERING

Spring 2024

Green architectural engineering methods for residential, commercial, and industrial architectures and land development in industrialized countries. Green building design methods for active and passive heating and cooling including solar design. Natural daylighting. Illumination engineering. Acoustical engineering. LEED standards for green buildings and neighborhoods. Regional and College Master plans. Case studies from the US, EU, and Asia. Related thermodynamics, fluid mechanics, optics, and acoustical fundamentals.

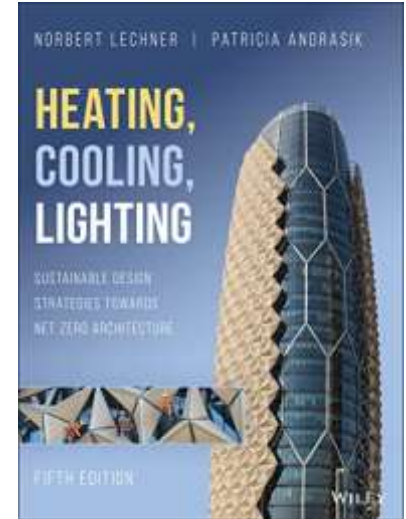
Joseph T Wunderlich PhD

Mondays and Wednesdays 2:00pm-3:20pm

TEXTBOOK

Norbert M. Lechner and Patricia Andrasik, **Heating, Cooling, Lighting: Sustainable Design Strategies Towards Net Zero Architecture 5th Edition**, Wiley 5th edition (Oct 26, 2021). ISBN-10: 1119585740 ISBN-13:978-1119585749

Required Purchase!



PROFESSOR

Joseph T Wunderlich PhD, Associate Professor of Engineering & Computer Science,
Program Coordinator for Architecture

A&E PORTFOLIO (Including A&E relevant to COVID)

- Website: <http://users.etown.edu/w/wunderjt>
- Office Hours:
 - <http://users.etown.edu/w/wunderjt/schedules/Wunderlich%20Schedule%20Card%20Spring%202024.pdf>
- Offices: E284e, E273, or remote
- Cell: 717-368-9715 Office: 717-361-1295
- Email: wunderjt@etown.edu

GRADING

- 400 points Assignments and Attendance/Participation
- 400 points Final Semester Architecture Design shown in a well-written paper AND video.
- 200 points Comprehensive Final Exam

Course Grade:

(60-62)=D-, (63-67)=D, (68-69)=D+, (70-72)=C-, (73-77)=C, (78-79)=C+, (80-82)=B-, (83-87)=B, (88-89)=B+, (90-92)=A-, (93-100)=A
(with any fractional part rounded to the nearest integer)

LEARNING OUTCOMES

- LEED (Leadership in Energy and Environmental Design) **standards**
- AIA (American Institute of Architects) **standards**
- Site analysis, land development, landscape architecture, Master Plans, Climate
- A&E Thermodynamics and Comfort
- A&E for Public Health (COVID, Mold, Asbestos, VOC's, fresh-air-exchange rates, etc.)
- Passive solar design
- Natural Daylighting
- Illumination Engineering
- Active solar design
- Passive cooling design
- Passive heating design
- The building Thermal Envelope
- HVAC (Heating Ventilating & Air Conditioning)
- Acoustical Design
- Domestic and International Case Studies
- Decision Analysis / Project Feasibility

ACADEMIC HONESTY

Elizabethtown College Pledge of Integrity: *"Elizabethtown College is a community engaged in a living and learning experience, the foundation of which is mutual trust and respect. Therefore, we will strive to behave toward one another with respect for the rights of others, and we promise to represent as our work only that which is indeed our own, refraining from all forms of lying, plagiarizing, and cheating."* See the 2016-17 Elizabethtown College Catalog, "Standards of Academic Integrity" http://catalog.etown.edu/content.php?catoid=10&navoid=507#Academic_Judicial_System or Academic Integrity at Elizabethtown College, 11th ed. <https://www.etown.edu/offices/dean-of-students/files/academic-integrity-handbook.pdf>

ARTIFICIAL INTELLIGENCE USE

"In this course, students shall give credit to AI tools whenever used, even if only to generate ideas rather than usable text or illustrations. When using AI tools on assignments, add an appendix showing (a) the entire exchange, highlighting the most relevant sections; (b) a description of precisely which AI tools were used (e.g. ChatGPT private subscription version or DALL-E free version), (c) an explanation of how the AI tools were used (e.g. to generate ideas, turns of phrase, elements of text, long stretches of text, lines of argument, pieces of evidence, maps of the conceptual territory, illustrations of key concepts, etc.); (d) an account of why AI tools were used (e.g. to save time, to surmount writer's block, to stimulate thinking, to handle mounting stress, to clarify prose, to translate text, to experiment for fun, etc.). Students shall not use AI tools during in-class examinations, or assignments unless explicitly permitted and instructed. Overall, AI tools should be used wisely and reflectively with an aim to deepen understanding of subject matter."

Source: <https://ctl.utexas.edu/chatgpt-and-generative-ai-tools-sample-syllabus-policy-statements>

OUTLINE

Content duplicated for fault-tolerance, variable-access (software & device), and public availability, on my [website](#) and [YouTube channel](#)

1. Syllabus, and Wunderlich **A&E PORTFOLIO** (with complimentary Hi-Tech) [PPTX-w/audio MP4 YouTube PDF](#) [Student Portfolios](#)
2. **A&E PARTICIPANTS & STANDARDS** [PDF PPTX-w/audio MP4 YouTube](#)
3. **U.S. Green Building Council** USGBC, **LEED** (Leadership in Energy & Environmental Design)
4. **ANCIENT ROMAN A&E** [PDF PPTX-w/audio MP4 YouTube](#)
5. **Text-CH 1 Integrated Design concepts 1,2**
6. **REAL ESTATE DEVELOPMENT** [PDF](#)
7. **Text-CH 3 A&E THERMODYNAMICS, AIR QUALITY & HEALTH** [PDF PPTX-w/audio MP4 YouTube](#)
 - a. Pollution: PM2.5, OZONE, Outdoor-Air-Quality, ASBESTOS, MOLD, Volatile-Organic-Compounds (VOC's); One solution: [Energy-Recovery-Ventilator](#)
 - b. **STANDARDS: ASHRAE** (U.S, international), **ANSI** (U.S.,Int'l), **ISO** (Int'l), **LEED** (~Int'l), **AIA** (U.S.), **CSI** (U.S.), **EPA** (U.S.), **DEP** (PA), **OSHA** (U.S.), **CDC** (U.S.), **WHO** (Int'l)
 - i. **ASHRAE standard 52.2 versus ISO 16890** for rating dust collector filter efficiency
 - ii. **ANSI / ASHRAE Standard 62.1-2022**, Ventilation and Acceptable **Indoor Air Quality (IAQ)**
 - iii. **ANSI / ASHRAE Standard 62.2-2022**, Ventilation and Acceptable Indoor Air Quality in Residential
 - c. [2020 Indoor Air Quality Webinar by a DESIGN-BUILD HVAC Contractor](#) (part 1)
8. **Text-CH 5 A&E THERMAL COMFORT & HEALTH** [PDF PPTX-w/audio MP4 YouTube](#)
 - a. **STANDARD: ANSI / ASHRAE standard 55-2017**, Thermal Environmental Conditions for Human Occupancy
9. **Text-CH 4 & 10 CLIMATE & SITE DESIGN** [PDF PPTX MP4 YouTube](#)
10. **ITALIAN ARCHITECTURE & URBAN DESIGN** [Page MP4 YouTube PDF PPTX-w/audio](#)
11. **MASTER PLANS: Etown College, Etown Borough, Lancaster County** [MP4 YouTube](#)
12. [Revit Model of Past & Present Etown Campus, into Virtual Reality](#) [MP4 YouTube](#)
13. **JAPANESE URBAN DESIGN (Paths, Edges, Nodes, Landmarks, Districts) & ARCHITECTURE** [PDF PPTX-w/audio MP4 YouTube](#) [Japanese Gardens](#)
14. **"Comparison of Building Certifications and STANDARDS (LEED, WELL, Living Building Challenge, RESET, Fitwel, Etc.)"**
 - a. [by Imola Frei, LEED AP \(BD +C\), RESET Air AP, Fitwel Ambassador](#)
15. **Text-CH 6 SOLAR GEOMETRY** [PDF PPTX MP4 YouTube](#)
16. **Text-CH 7 PASSIVE SOLAR HEATING** [PDF PPTX MP4 YouTube](#)
17. **Text-CH 17 ACTIVE SOLAR HEATING** [PPTX-w/audio MP4 PDF](#)
18. **LEED details** [PPTX-w/audio MP4 PDF](#) [LEED 4.1](#) [LEED Case-Studies Database](#)
19. **URBAN DESIGN (Paths, Edges, Nodes, Landmarks, Districts)** [Newport Beach CA Fashion-Island Shopping Mall](#) [PDF PPTX-audio mp4 YouTube](#)
20. **Text-CH 9 PASSIVE COOLING (and SHADING)** [PDF PPTX MP4:\(Part-1, Part-2\) YouTube](#)
21. **LEED ND (Neighborhood Design)**
 - a. [LEED v4 ND PLAN CHECKSHEET.pdf](#) **(DO THIS FOR PROJECT 1 and use LEED v4 ND Guide)**
 - b. [LEED v4 ND BUILT PROJECT CHECKSHEET.pdf](#)
22. **REVIT: Architectural Structural HVAC Plumbing Electrical Illumination Solar Energy Acoustics**
 - a. **REVIT vs. SKETCHUP TUTORIAL** [MP4 YouTube](#) by JJWIV
 - b. **REVIT TUTORIALS: Intro Building Levels & Views Walls Library(A,B)** [SWEETS CATALOG](#)
23. **GREEN SCHOOLS (Case-studies)** [Kashiwa Oha Smart-City](#)
24. **LEED BD&C (Building Design & Construction)**
 - a. [LEED v4 BD_C NEW CONSTRUCTION AND MAJOR RENOVATION CHECKSHEET.pdf](#) **(DO THIS FOR PROJECT 2 and use LEED v4.1 BD+C guide)**
 - b. [LEED v4 BD_C CORE AND SHELL CHECKSHEET.pdf](#)
 - c. [LEED v4 BD_C RETAIL CHECKSHEET.pdf](#)
 - d. [LEED v4 BD_C HOSPITALITY CHECKSHEET.pdf](#)
 - e. [LEED v4 BD_C SCHOOLS CHECKSHEET.pdf](#)
 - f. [LEED v4 BD_C HEALTHCARE CHECKSHEET.pdf](#)
 - g. [LEED v4 BD_C WAREHOUSES AND DISTRIBUTION CENTERS CHECKSHEET.pdf](#)
 - h. [LEED v4 BD_C DATA CENTERS CHECKSHEET.pdf](#)
 - i. [LEED v4 BD_C MULTIFAMILY MIDRISE CHECKSHEET.pdf](#)
 - j. [LEED v4 BD_C HOMES AND MULTIFAMILY Low-rise CHECKSHEET.pdf](#)
25. **LEED ID&C (Interior Design & Construction)**
 - a. [LEED v4 ID_C COMMERCIAL INTERIORS CHECKSHEET.pdf](#)
 - b. [LEED v4 ID_C RETAIL CHECKSHEET.pdf](#)
 - c. [LEED v4 ID_C HOSPITALITY CHECKSHEET.pdf](#)
 - d. [LEED v4 Operations & Maintenance EXISTING BUILDINGS CHECKSHEET.pdf](#)
26. **LEED O&M (Operations & Maintenance)**
 - a. [LEED v4 Operations & Maintenance RETAIL CHECKSHEET.pdf](#)
 - b. [LEED v4 Operations & Maintenance HOSPITALITY CHECKSHEET.pdf](#)
 - c. [LEED v4 Operations & Maintenance SCHOOLS CHECKSHEET.pdf](#)
 - d. [LEED v4 Operations & Maintenance WAREHOUSES AND DISTRIBUTION CENTERS CHECKSSHEET.pdf](#)
 - e. [LEED v4 Operations & Maintenance DATA CENTERS CHECKSHEET.pdf](#)
27. **AIA Green Building Design STANDARDS** (10th ed. 12th ed.) [AIA](#)
28. **LIGHTING** → **"VISION"** [PDF PPTX-w/audio MP4 YouTube](#) [Illumination Engineering Society Design Handbook: 1,2,3](#)
29. **Text-CH 11, 12, and 16 NATURAL & MAN-MADE LIGHTING** [PDF PPTX-w/audio MP4 YouTube](#)
30. **"Intelligent Natural Ventilation with Automated Windows and Controls"** by [Imola Frei, LEED AP \(BD +C\), RESET Air AP, Fitwel Ambassador](#)
31. **Text-CH 13 BUILDING THERMAL ENVELOPE** [PDF PPTX](#)
 - a. [Architectural SHELL / ENVELOPE A&E](#) [MP4 PPTX-audio YouTube PDF](#)
32. **Text-CH 18 HVAC TECHNIQUES** [PDF PPTX](#) [2020 Indoor Air Quality Webinar by a DESIGN-BUILD HVAC Contractor](#) (part 2)
33. **Dr. K Roy ACOUSTICAL A&E guest lecture 2017** [PDF PPTX](#) [LEED credits PDF](#)
34. [Upcoming Wunderlich book on Frank Lloyd Wright](#)
35. **Text-CH 20 Integrated Design Details**

SCHOOL CLOSURE / CLASS CANCELATION

Additional work assigned to cover any class cancelation.

DISABILITY SERVICES, RELIGIOUS OBSERVANCES, and COVID

https://elizabethtown-my.sharepoint.com/:w:/g/personal/ouimetc_etown_edu/EfZ-QooKt_VPjgwsWJz230wB3Rb6CIHsPvE0xuqWCpr-UA?e=4%3acZzjpW&at=9

DISABILITY SERVICES: Elizabethtown College welcomes otherwise qualified students with disabilities and is committed to providing access for all students to courses, programs, services, and activities. If you have a documented disability such as a learning disability or chronic illness or a new circumstance such as a concussion and would like to request accommodations, please contact the Director of Disability Services by phone (717-361-1227) or e-mail (daviesl@etown.edu). The Office of Disability Services can provide resources to you and facilitate communication with faculty about reasonable accommodations. After meeting with the Office of Disability Services, please set up an appointment to meet with me, the instructor, to discuss the accommodations as they pertain to my class.

RELIGIOUS OBSERVANCES: The College is eager to facilitate individual religious beliefs and practices whenever possible while retaining course student learning outcomes. It is your responsibility to meet with the class instructor in advance to request arrangements related to your religious observances that may conflict with this class, and to make appropriate plans to make up any missed work.

COVID-RELATED EXPECTATIONS: All students are expected to adhere to the established community expectations around safety, including: daily digital health reporting, physical distancing, proper wearing of facial coverings within buildings and classrooms and when within six feet of individuals outdoors, frequent handwashing, and participation in cleaning and sanitizing protocols as requested. You will be turned away from class if you do not have a face covering. Students diagnosed with a health condition that precludes mask wearing can contact Lynne Davies in Disability Services (daviesl@etown.edu) to request remote learning as a reasonable accommodation. **If you are exhibiting any symptoms of COVID or fail to pass the daily health screen, do not come to class.** Failure to adhere to the established community expectations around safety will result in notification of Campus Security and application of the student conduct process for failure to comply, endangering the well-being of others, and/or disorderly conduct. The student code of conduct applies also to participation in all virtual activities, including Zoom sessions and discussion boards.

MENTAL HEALTH & COUNSELING RESOURCES

Counseling Services provides a broad range of counseling and mental health support services that facilitate our students' personal, social, and academic development. Our licensed mental health professionals provide short-term individual counseling, group counseling, crisis intervention, and consultation to currently enrolled students for no additional charge. Counseling services are provided in a confidential and diversity-affirming environment to help students address a variety of mental health, situational, and developmental concerns. Our office is located in the Baugher Student Center, Suite 216. Appointments can be made in person or by calling 717-361-1405. Urgent walk-in services are also available. To access our after-hours crisis services, please call the 24/7 Campus Security number of 717-361-1111. For more information, please visit www.etown.edu/offices/counseling