

EXAM SPECIFICATIONS

LEED AP® BD+C Exam Specifications

The following outline provides a general description of exam content areas for the LEED AP BD+C exam.

Knowledge Domains reflect the rating systems' credit categories and what one needs to know. The LEED AP BD+C specialty exam tests the knowledge and skills necessary to participate in the design process, to support and encourage integrated design and to streamline the application and certification process.

KNOWLEDGE DOMAINS

1. LEED Process (8 Questions)

- A. Different avenues to achieve LEED goals (e.g., developing credit interpretation rulings/requests; Regional Priority Credits; innovative credit submittals; use of pilot credits, etc.)
- B. LEED system synergies (e.g., energy and EQ; waste management)
- C. Project boundary; LEED boundary; property boundary
- D. Prerequisites and/or minimum program requirements for LEED certification
- E. Knowing the evolutionary characteristics of LEED (e.g., development cycles of the rating systems; continuous improvement)

2. Integrative Strategies (9 Questions)

- A. Integrative process (e.g., energy and water discovery items)
- B. Integrative project team, as applicable per project type and phase (e.g., architect; engineer; landscape artist; civil engineer; contractor; facility manager, etc.)
- C. Value of collaboration (e.g., meeting on integrative green strategies)

3. Location and Transportation (9 Questions)

- A. Site selection
 - i. Development constraints and opportunities (e.g., prime farmland; floodplains; species and habitat; water bodies; wetlands; historic districts; priority designations; brownfields)
 - ii. Community connectivity terms/definitions (e.g., walkability; street design)
- B. Access to quality transit: knowledge of access and quality concepts/calculations (e.g., accessibility to multimodal transportation choices; quality transit; bicycle network)
- C. Alternative transportation: infrastructure and design (e.g., parking capacity; bicycle storage and shower rooms; alternative-fuel fueling stations)
- D. Green vehicles (e.g., fleet management; knowledge of regionalization of energy sources for electric power generation)

4. Sustainable Sites (9 Questions)

- A. Site assessment (e.g., topography; hydrology; climate; vegetation; soils; human use; human health impacts)
- B. Site assessment: site as a resource (e.g., energy flows)
- C. Construction activity pollution prevention (e.g., soil erosion, waterway sedimentation/contamination, airborne dust)
- D. Site design and development
 - i. Habitat conservation and restoration (e.g., on-site restoration or preservation; off-site habitat restoration; off-site habitat conservation; native or adaptive vegetation; disturbed or compacted soils)
 - ii. Exterior open space (e.g., amount of space and quality of services; vegetated outdoor space; biophilia)
 - iii. Exterior lighting (e.g., exterior light trespass and uplight; consequences to the development of wildlife and people)
 - iv. Rainwater management (e.g., historical rainfall conditions; natural hydrology; low-impact development)
 - v. Heat island reduction (e.g., heat island effect; green roofs; solar reflectance; roof and non-roof strategies)
 - vi. Joint use (e.g., joint parking, etc.)

5. Water Efficiency (9 Questions)

- A. Outdoor water use reduction: irrigation demand (e.g., landscape water requirement; irrigation system efficiency; native and adaptive species)
- B. Indoor water use reduction
 - i. Fixture and fittings (e.g., water use reduction through fixtures such as toilets; urinals; faucets [kitchen, lavatory]; showerhead)
 - ii. Appliance and process water (e.g., equipment types [i.e., cooling towers, washing machines])
- C. Water performance management
 - i. Water use measurement (e.g., water meter(s); submeters; types of water sources to measure; data management and analysis)
 - ii. Types and quality of water (e.g., potable; nonpotable; alternative water sources)

6. Energy and Atmosphere (14 Questions)

- A. Building loads
 - i. Design (e.g., building orientation; glazing selection; clarify regional considerations)
 - ii. Space usage (e.g., space types [private office, individual space, shared multi- occupant spaces]; equipment and systems)
 - iii. Opportunities for passive design
- B. Energy efficiency
 - i. Assemblies/components (e.g., building envelope; HVAC; windows; insulation)
 - ii. Operational energy efficiency (e.g., schedules; set points; interactions between systems)
 - iii. Commissioning (e.g., commissioning authority (CxA); owner's project requirements (OPR); basis of design (BOD); monitoring-based commissioning; envelope commissioning)
- C. Demand response (e.g., grid efficiency and reliability; demand response programs; load shifting)
- D. Alternative and renewable energy (e.g., on-site and off-site renewable energy; photovoltaic; solar thermal; wind; low-impact hydroelectricity; wave and tidal energy; green power, carbon offsets)
- E. Energy performance management
 - i. Advanced energy metering (e.g., energy use measurement; building automation controls)
 - ii. Operations and management (e.g., training of staff; operations and maintenance plan)
 - iii. Benchmarking (e.g., metrics used; proposed building performance rating/ baseline building performance rating; comparing building energy performance against similar buildings or historical data; tools and standards [ASHRAE, CBECS, Portfolio Manager])
- F. Environmental concerns: resource and ozone depletion (e.g., sources and energy resources [oil, coal and natural gas]; renewable and nonrenewable resources; chlorofluorocarbons [CFCs] and other refrigerants; stratospheric ozone layer)
- G. Energy model as a tool
- H. Process loads (e.g., elevator; refrigeration, etc.)
- I. Iterative optimization

7. Materials and Resources (12 Questions)

- A. Reuse
 - i. Building reuse (e.g., historic building reuse; renovation of abandoned or blighted building)
 - ii. Material reuse (e.g., structural elements [floors, roof decking]; enclosure materials [skin, framing]; permanently installed interior elements [walls, doors, floor coverings, ceiling systems])

B. Life cycle impacts

- i. Life cycle assessment (e.g., quantify impacts; whole-building life cycle assessment; environmental attributes used in Environmental Product Declaration [EPD]; Product Category Rules [PCR]; design for flexibility)
- ii. Material attributes (e.g., bio-based; wood products; recycled content; local; Extended Producer Responsibility [EPR]; durability)
- iii. Human and ecological health impacts (e.g., raw material source and extraction practices; material ingredient reporting)

C. Waste

- i. Construction and demolition waste management (e.g., waste reduction; waste diversion goals; recycle and/or salvage nonhazardous construction and demolition materials; waste management plan)
- ii. Operations and ongoing (e.g., waste reduction; storage and collection of recyclable materials [mixed paper, corrugated cardboard, glass, plastics, metals]; safe storage areas for batteries and mercury-containing lamps)

D. Environmental concerns of materials (e.g., where materials came from; how they are used/exposures; where they might go/impacts)

8. Indoor Environmental Quality (11 Questions)

A. Indoor environmental quality:

- i. Ventilation levels (e.g., natural vs. mechanical; outdoor air; regional climate conditions)
- ii. Tobacco smoke control (e.g., prohibiting smoking; environmental tobacco smoke transfer)
- iii. Management of and improvements to indoor air quality (e.g., source control; filtration and dilution; construction indoor air quality; air testing; ongoing monitoring)
- iv. Low-emitting materials (e.g., product categories [paints and coatings, adhesives and sealants, flooring, etc.]; volatile organic compound (VOC) emissions and content; evaluating environmental claims)

B. Lighting: electric lighting quality (e.g., tradeoffs [color, efficiency]; surface reflectance; types of fixtures)

C. Daylight (e.g., building massing and orientation; glare; human health impacts; illuminance)

D. Acoustic performance (e.g., exterior and interior noise; background noise; dead vs. live spaces)

E. Occupant comfort, health and satisfaction: controllability of systems (e.g., thermal; lighting)

F. Thermal comfort design (e.g., strategies to promote occupants' productivity and comfort; values of occupant satisfaction)

G. Quality of views (e.g., connection to outdoor environment; direct line of sight to outdoors)

9. Project Surroundings and Public Outreach (4 Questions)

A. Regional design (e.g., regional green design and construction measures as appropriate)

B. Cultural awareness; impacts and challenges; historic or heritage awareness

C. Educational outreach; public relations for the building

REFERENCES & SAMPLE QUESTIONS

LEED AP BD+C Exam References

The primary sources for the development of the LEED professional exams are the LEED rating systems. The following list of references is not meant to be comprehensive. When combined with the exam specifications, the candidate has the material from which the exam is based.

LEED AP BD+C EXAM

This exam is designed to test the knowledge and skills necessary to participate in the design process, to support and encourage integrated design and to streamline the application and certification process. You should also be familiar with the content of the U.S. Green Building Council's website, usgbc.org, and GBCI's website, gbc.org, including, but not limited to, LEED Project Registration, LEED Certification content and the purpose of LEED Online. [USGBC's website](http://usgbc.org) also has free access to all LEED rating systems, LEED Reference Guide introductions and checklists beyond those listed below.

REFERENCES

- U.S. Green Building Council. [*LEED v4 for Building Design and Construction Rating System*](#). U.S. Green Building Council, 2019.
- U.S. Green Building Council. [*LEED Building Design and Construction Reference Guide. v4 e-Document \(PDF\) Edition*](#). U.S. Green Building Council, 2020.
- [*"Green building incentive strategies."*](#) U. S. Green Building Council, 2014.
- [*Guide to LEED Certification: Commercial*](#). U.S. Green Building Council.
- U.S. Green Building Council. [*Foundations of LEED*](#). U.S. Green Building Council, 2020.
- U.S. Green Building Council. [*LEED v4 for Building Design and Construction Checklist*](#). U.S. Green Building Council, 2016.
- [*"LEED Online: Register a project."*](#) U.S. Green Building Council.
- [*"LEED Certification Fees."*](#) U.S. Green Building Council.
- [*"Addenda Database."*](#) U.S. Green Building Council.¹

¹Exam questions are reviewed against updates to the [LEED v4 addenda](#) that are published through Q1 of the same year.

LEED AP BD+C Sample Questions

Disclaimer: The exam questions listed here were discarded in the process of creating questions for new exams.

The questions are provided for your convenience to allow you to better familiarize yourself with the format and general content of questions on exams.

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Furthermore, your ability to correctly answer these sample questions does not in any way predict or guarantee your ability to successfully answer questions on the actual exams.

8. The city is building a new botanical garden and is attempting LEED certification. What could the educational program include to earn an Innovation in Design Credit?
- A. Present the building's sustainable features at the grand opening
 - B. Present the building's sustainable features at a town hall meeting
 - C. Provide on-going weekly tours highlighting the building's sustainable features**
 - D. Publish a press release to the local newspaper outlining the building's sustainable features

This question represents Knowledge Domain 1B: LEED Process; LEED system synergies (e.g., energy and EQ; waste management).

9. How should athletic fields be treated in the calculations for Water Efficiency Credit, Outdoor Water Use Reduction?
- A. Must be calculated using 100% potable water
 - B. May be included or excluded from the calculations**
 - C. May be calculated using a standard 20% reduction from baseline
 - D. Must be calculated using at least 20% from an alternative water source

This question represents Knowledge Domain 5A: Water Efficiency; Outdoor water use reduction: irrigation demand (e.g., landscape water requirement; irrigation system efficiency; native and adaptive species).

LEED AP® O+M Exam Specifications

The following outline provides a general description of exam content areas for the LEED AP O+M exam.

Knowledge Domains reflect the rating systems' credit categories and what one needs to know. The LEED AP O+M specialty exam tests the knowledge and skills necessary to participate in the design process, to support and encourage integrated design, and to streamline the application and certification process.

KNOWLEDGE DOMAINS

1. LEED Process (12 Questions)

- A. LEED interpretations
- B. LEED system synergies (e.g., energy and EQ; waste management; building operation plan and ventilation calculations)
- C. Project boundary; LEED boundary; property boundary; master site boundary
- D. Prerequisites and/or minimum program requirements for LEED certification
- E. Occupancy requirements (e.g., existing building [building must be fully occupied for 12 continuous months as described in minimum program requirements]; reduced occupancy guidance; 10% exemptions)
- F. Recertification (e.g., initial vs. recertification; performance period; ongoing performance; data tracking)
- G. Review process (e.g., Establishment vs. Performance review; credit statuses; credit responses; review report)
- H. Integrative process (e.g., roles of responsibilities; facilitating collaboration)
- I. Adaptations (e.g., unique compliance paths and/or separate credits for different project types)
- J. Ways to earn innovation credits:
 - i. Innovation option (e.g., criteria for new innovative method; using credit that has been used before)
 - ii. Exemplary performance option (e.g., which credits have exemplary performance paths; what are the thresholds of exemplary performance)
 - iii. Pilot option

2. Location and Transportation (5 Questions)

- A. Alternative transportation
 - i. Access and quality (e.g., accessibility to multimodal transportation choices; quality transit; transportation patterns)
 - ii. Survey methodology (e.g., timing; sample size; sampling vs. extrapolation; alternative transportation programs)

3. Sustainable Sites (9 Questions)

- A. Site design and development
 - i. Habitat conservation and restoration (e.g., on-site restoration or preservation; off-site habitat restoration; off-site habitat conservation; native or adaptive vegetation; disturbed or compacted soils)
 - ii. Site improvement plan (e.g., vegetated outdoor space; maintenance activities; exterior strategies; watershed quality; soil quality)
 - iii. Exterior lighting (e.g., exterior light trespass and uplight; fixture shielding; lighting zone; impact on wildlife and people)
 - iv. Rainwater management (e.g., historical rainfall conditions; natural hydrology; low- impact development; maintenance needs)
 - v. Heat island reduction (e.g., heat island effect; green roofs; solar reflectance; roof and non-roof strategies)
- B. Site management practices (e.g., impacts of site management decisions; planning for future site management; site equipment and maintenance materials)

4. Water Efficiency (13 Questions)

- A. Outdoor water use reduction: irrigation demand (e.g., landscape water requirement; irrigation system efficiency; calculated water budget; native and adaptive species)
 - i. Indoor water use reduction
 - ii. Fixture and fittings (e.g., water use reduction through fixtures such as toilets; urinals; faucets [kitchen, lavatory]; showerhead; determining performance through metering)
 - iii. Appliance and process water (e.g., equipment types [dishwasher, washing machines, vehicle wash bays])
- B. Cooling tower water use: water conservation techniques (e.g., cycles of concentration; total dissolved solids; potable water treatment; non-potable water use)
- C. Water performance management
 - i. Water use measurement (e.g., water meter(s); submeters; types of water sources to measure; data management and analysis)
 - ii. Types and quality of water (e.g., potable; nonpotable; alternative water sources)

5. Energy and Atmosphere (21 Questions)

- A. Building loads
 - i. Building components (e.g., building orientation; glazing selection; climate appropriate building materials; regional considerations)
 - ii. Space usage (e.g., space types [private office, individual space, shared multi-occupant spaces]; equipment and systems; occupant-driven loads [plug loads])
- B. Energy efficiency
 - i. Operational energy efficiency (e.g., schedules; set points; interactions between systems; influencing occupant behavior)
 - ii. Commissioning (e.g., commissioning authority (CxA); existing building commissioning; ongoing commissioning; identification of issues; differentiate from energy auditing)
 - iii. Audit (e.g., ASHRAE Level 1 and 2; identification of opportunities and improvements; differentiate from commissioning)
- C. Alternative and renewable energy practices
 - i. Renewable energy (e.g., on-site and off-site renewable energy; photovoltaic; solar thermal; wind; low-impact hydroelectricity; wave and tidal energy; non-qualifying sources)
 - ii. Green power and carbon offsets (e.g., off-site generated; renewable energy certificates (RECs); Green-e Energy certified or the equivalent; benefits of RECs; measurement [carbon dioxide-equivalent (CO₂e)]; Scope 1 and Scope 2 emissions; Green-e Climate certified or the equivalent; benefits of carbon offsets)
- D. Demand response (e.g., grid efficiency and reliability; demand response programs; load shifting)
- E. Energy performance management:
 - i. Energy use measurement (e.g., building-level energy meter(s); submeters; types of energy sources to measure; data management and analysis)
 - ii. Building automation controls/advanced energy metering (e.g., support energy management; data storage; support demand response participation)
 - iii. Operations and management (e.g., training of staff; operations and maintenance plan; current facilities requirements; preventive maintenance plan)
 - iv. Benchmarking (e.g., metrics used; determining baseline building performance; comparing building energy performance against similar buildings or historical data; tools and standards [ASHRAE, CBECS, Energy Star® Portfolio Manager])
- F. Environmental concerns: upstream and downstream impacts (e.g., sources and energy resources [oil, coal, and natural gas]; renewable and nonrenewable resources; chlorofluorocarbons (CFCs) and other refrigerants; stratospheric ozone layer depletion)

6. Materials and Resources (10 Questions)

A. Life-cycle impacts

- i. Material attributes (e.g., recycled content; material reuse; extended use; sustainable agriculture; local sourcing of food and beverages; bio-based; paper and wood products; electric-powered equipment)
- ii. Human and ecological health impacts (e.g., mercury in lighting; maintenance and renovation purchasing policy)

B. Waste

- i. Maintenance and renovation (e.g., maintenance and renovation waste management policy)
- ii. Operations and ongoing (e.g., waste management policy; waste audit; storage and collection of recyclable materials [mixed paper, corrugated cardboard, glass, plastics, and metals]; safe storage areas for batteries and mercury-containing lamps; durable goods waste)

C. Purchasing policies (e.g., environmental preferable purchasing (EPP) policy; ongoing consumables; durable goods; maintenance and renovations; lighting purchases)

7. Indoor Environmental Quality (15 Questions)

A. Indoor environmental quality

- i. Ventilation levels (e.g., natural vs. mechanical; outdoor air; regional climate conditions)
- ii. Tobacco smoke control (e.g., prohibiting smoking; environmental tobacco smoke transfer)
- iii. Management of and improvements to indoor air quality (e.g., source control; filtration and dilution; air testing; ongoing monitoring; management program/ I-BEAM)
- iv. Low-emitting materials (e.g., product categories [paints and coatings, adhesives and sealants, flooring, etc.]; volatile organic compound (VOC) emissions and content; evaluating environmental claims; comparing to published standards)
- v. Green cleaning (e.g., products, materials and equipment; frequency of cleaning; relationship between cleaning products and ongoing indoor air quality management; effectiveness assessment/APPA audits)

B. Lighting: electric lighting quality (e.g., tradeoffs [color, efficiency]; surface reflectance; types of fixtures; project-specific considerations)

C. Daylight (e.g., building massing and orientation; glare; illuminance)

D. Occupant comfort, health, and satisfaction:

- i. Controllability of systems (e.g., thermal; lighting; daylight)
- ii. Thermal comfort (e.g., permanent monitoring; periodic measurement; responding to thermal comfort issues; strategies to promote occupants' productivity and comfort)
- iii. Quality views (e.g., connection to outdoor environment; direct line of sight to outdoors)
- iv. Integrated pest management (e.g., pest preventive and control measures; nonchemical approaches; communication to building occupants; responsible parties)
- v. Assessment/survey (e.g., occupant satisfaction with acoustics, building cleanliness, indoor air quality, lighting, thermal comfort, and overall satisfaction; corrective action plan)

LEED AP O+M Exam References

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16. The owner of an office building is considering the best way to conduct a transportation survey to achieve Location and Transportation credit Alternative Transportation. The owner understands that several of the tenants allow employees to telework, and therefore, has chosen to distribute an electronic survey. Tenant A occupies 57% of the building, Tenant B occupies 32% of the building, Tenant C occupies 6% of the building, and the remainder is occupied by Tenant D. The building includes 972 regular building occupants. In order to correctly distribute surveys to randomized sample of each tenant, the owner must allocate how many of the surveys to each tenant?
- A. Tenant A - 143 surveys; Tenant B - 80 surveys; Tenant C - 15 surveys; Tenant D - 12 surveys
 - B. Tenant A - 163 surveys; Tenant B - 92 surveys; Tenant C - 17 surveys; Tenant D - 14 surveys**
 - C. Tenant A - 554 surveys; Tenant B - 311 surveys; Tenant C - 58 surveys; Tenant D - 49 surveys
 - D. Tenant A - 570 surveys; Tenant B - 320 surveys; Tenant C - 60 surveys; Tenant D - 50 surveys

This question represents Knowledge Domain 2A: Location and Transportation; Alternative Transportation; Survey methodology (e.g., timing; sample size; sampling vs. extrapolation; alternative transportation programs).

17. To achieve Indoor Environmental Quality Credit, Green Cleaning - Products and Materials, a project must have 75% of its cleaning purchases, by cost, certified by a given standard. Which standard should be used when determining the product to purchase for industrial and institutional general purpose, bathroom, glass and carpet cleaners?
- A. Green Seal GS-37**
 - B. GreenScreen v1.2 Benchmark
 - C. ASHRAE Standard 90.1-2004
 - D. Environmental Choice CCD-170

This question represents Knowledge Domain 7A: Indoor Environmental Quality; Indoor environmental quality; Green cleaning (e.g., products, materials and equipment; frequency of cleaning; relationship between cleaning products and ongoing indoor air quality).