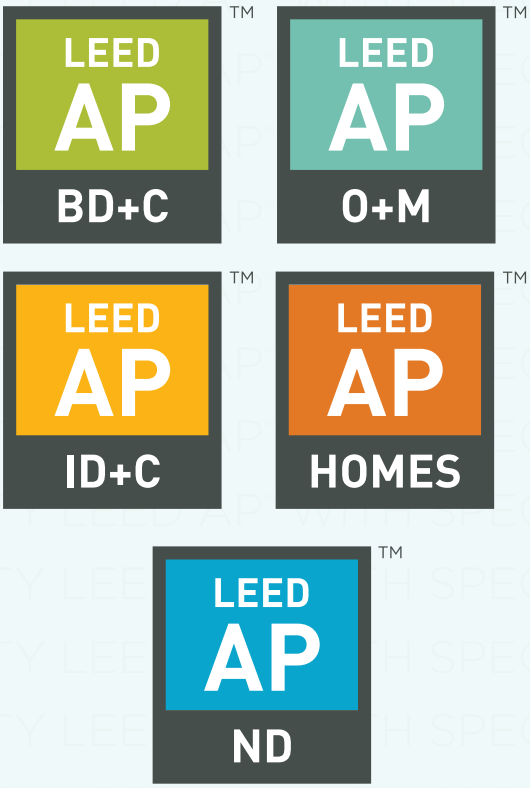

LEED AP® WITH SPECIALTY

CANDIDATE HANDBOOK

UPDATED AUGUST 2019

ABOUT GREEN BUSINESS CERTIFICATION INC.

Green Business Certification Inc.™ (GBCI) is the premier organization independently recognizing excellence in green business industry performance and practice globally.

Established in 2008, GBCI exclusively administers project certifications and professional credentials and certificates within the framework of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) green building rating systems as well as the PEER® standard for power systems, the WELL Building Standard . the Excellence in Design for Greater Efficiencies (EDGE) program, the Sustainable Sites Initiative (SITES®), the City Climate Planner Urban Greenhouse Gas Inventory Specialist credential, the Investor Confidence Project Investor Ready Energy Efficiency (IREE) certificate, Parksmart℠, TRUE, and the GRESB® benchmark, which is used by institutional investors to improve the sustainability performance of the global property sector.

LEED AP® with Specialty Candidate Handbook

Information in this Candidate Handbook represents current policies and procedures for GBCI's Credential Maintenance Program. Information in this Candidate Handbook supersedes information contained in any previously published Handbooks.

All information and guidelines are subject to change.

Please read and understand the entire Candidate Handbook including all policies, procedures and consequences.

REGISTERING FOR YOUR EXAM

Registration Process

1. Log in to your Credentials account using your existing USGBC® site user account or by creating a new account if you do not have one.
    a. When you register for your exam, make sure your name is entered exactly as it appears on the legal ID that you will use when you take your exam. If your account name does not match your legal ID, correct your account name during exam registration in your account settings. This may be of special concern to a candidate who uses a nickname or different names in different regions. Please note that if the name in which you register for your exam does not match the ID you intend to present at the test center, you must contact GBCI at least 5 days before your exam date to change your registration, or you will risk being turned away at the test center and forfeiting your exam registration fee.
    b. If your native language utilizes non-Roman characters, be sure to enter your name in Roman characters when you register for the exam. Make sure to bring identification, such as a passport that includes your name in Roman characters, to the test center.
2. Select the LEED AP exam you wish to take under the "Credentials" section and follow the instructions on the screen to complete the exam registration application.
3. Once you have completed the registration process, you are given a unique eligibility ID and may schedule your exam by visiting prometric.com/gbci. Prometric is the exam delivery organization that delivers GBCI exams.
4. When your exam appointment is scheduled, you receive a confirmation number onscreen and also from Prometric through an email.
5. Record your confirmation number. You will need this confirmation number to confirm, cancel, or reschedule your exam appointment through the Prometric website.
6. Once you have scheduled your exam, please print your confirmation notice from Prometric. Keep your confirmation notice for any communication with Prometric about your exam. You are not required to bring this information to the test center with you, though it may help should you require any assistance.
7. Once you register and pay for your exam, you have 12 months to schedule and take your exam session. If you fail your first attempt at taking the exam you may register and pay again in the same way as initial registration. After three unsuccessful attempts, you must wait 90 days before submitting a new registration and payment to GBCI. Candidates must pay the exam registration fee for each exam attempt.
8. You can confirm, cancel, or reschedule an exam on the Prometric website.
9. Rescheduling and cancelation policy:
    a. You may reschedule or cancel your exam up 30 days prior to your exam without incurring a rescheduling fee.
    b. If you reschedule or cancel your exam fewer than 30 days but more than 3 days before the scheduled date, you will be charged a $50 fee.
    c. You cannot reschedule your exam after midnight on the third day before the scheduled appointment. (For example, Wednesday appointments cannot be rescheduled after Sunday, 11:59 p.m.)
    d. If you miss your exam date or fail to reschedule 3 days prior to the exam, you forfeit the entire exam registration fee. Learn more about GBCI's exam refund/rescheduling policy.
    e. When you reschedule an exam, you will receive a new confirmation email. If you do not, please contact Prometric immediately to confirm that your exam was rescheduled.

Days before original exam date	Refunds	Reschedule
30 days or more	Yes	Yes
3-29 days	Yes, less a $50 cancelation fee	Yes, less a $50 rescheduling fee
0-3 days	No	No

To register five or more candidates at one time, contact GBCI customer service.

Eligibility Requirements

For the LEED AP with specialty exam, prior LEED project experience is strongly recommended. Practitioner experience is critical to earning the credential and, as such, practitioner competency and project proficiency is tested objectively within the exam.

To be eligible for a LEED AP with specialty credential, you must:

a. be 18 years of age or older.

b. hold a current LEED® Green Associate™ credential*.

c. agree to GBCI's Disciplinary and Exam Appeals Policy and credentialing maintenance requirements.

**This requirement is waived if you register for the combination exam. More information can be found under Exam Format.*

For individuals taking the combined exam: If you fail the specialty exam, and in the meantime allow your LEED Green Associate status to lapse, you must regain your active LEED Green Associate status by re-registering, paying for, and passing the LEED Green Associate exam in order to once again be eligible to take the LEED AP with specialty exam.

Audits

GBCI reserves the right to conduct an audit at any time (including prior to application submission and after credential has been granted) of all current and past exam applications. Any information contained in your Credentials account may be audited and a request for further documentation of any information or claims submitted by you may be made at any time. GBCI further reserves the right to take disciplinary or legal action—including but not limited to revocation of credential(s)—in the event that any conduct discovered during such an audit violates GBCI's Disciplinary and Exam Appeals Policy, GBCI policy, and/or law.

Testing Accommodations

If you have a documented disability that would prevent you from taking a LEED professional exam under normal testing conditions, you may request accommodations. GBCI complies with the provisions of the Americans with Disabilities Act (ADA). Under the ADA, entities that administer standardized examinations must offer the examinations in a place and manner that is accessible to candidates with disabilities. This may require reasonable modifications to the manner in which the exam is administered. Prometric, the exam delivery company used by GBCI, will provide candidates reasonable auxiliary aids and services, except where it may fundamentally alter the validity of the exam results. Available accommodations include, but are not limited to, a reader, a scribe, and extended testing time.

If you require testing accommodations, you must indicate this during your registration process by checking the box that says "Yes, I need testing accommodations." To be eligible for accommodations, you and your health care provider will each need to complete one form, the Candidate Form and the Provider Form, to document your disability and need for accommodation. There is no additional charge for testing accommodations. Each request is evaluated individually.

GBCI reviews this documentation and, if approved, alerts Prometric of the necessary accommodations. Please allow up to two weeks to receive a reply from GBCI following submission of your documentation. Please note that once you have requested testing accommodations, you are not able to schedule an appointment with Prometric until your request is processed by GBCI. You will be contacted by email regarding the approval status of your request.

Exam Registration Fees

See the exam page on the USGBC website for pricing. Your paid exam registration fee is good for only one exam attempt and is valid for 12 months. For USGBC members to receive member pricing for your exam, please link your member status to your USGBC account *before* registering for an exam.

GI Bill Benefits

The LEED professional exams have been approved by the U.S. Department of Veterans Affairs for reimbursement. The VA, in accordance with the GI Bill, has agreed to reimburse veterans, active service members, eligible dependents, spouses and reservists for the cost, up to $2,000, of any of the LEED professional exams administered by GBCI since December 3, 2009. Learn more.

THE EXAM

Exam Development

A LEED AP with specialty credential holder is an individual who possesses the knowledge and skills necessary to support the LEED certification process. The development of a valid exam begins with a clear and concise definition of the knowledge, skills, and abilities needed in order to successfully perform the job of a LEED AP with specialty. All LEED exams are developed by a global network of Subject Matter Experts and meet the specifications of a job analysis. Exam specifications are subject to rigorous validation by these experts, which ensures that the exam is valid and measuring what it is intended to measure. Once exams are launched, exam questions are regularly monitored to ensure continued reliability.

The exams assess your abilities at three cognitive levels: Recall, Application and Analysis.

a. Recall Questions: These questions assess your ability to recall factual material that is described in the exam references.

b. Application Questions: These questions provide you with a novel problem or scenario to solve using familiar principles or procedures described in the exam references.

c. Analysis Questions: These questions assess your ability to break the problem down into its components to create a solution. You must recognize the different elements of the problem, and also evaluate the relationship or interactions of these elements.

Exam Format

Each LEED AP with specialty exam contains 100 multiple choice questions and is delivered in a 2-hour period.

If you have a current LEED Green Associate credential, you can register for a LEED AP with specialty exam. As an alternative, if you do not hold a current LEED Green Associate, you may register for the combined LEED Green Associate/LEED AP with specialty exam. Please be aware that the option to take the combined exam in one 4-hour sitting is not available in all languages. If you cannot find the option to register for a combined LEED Green Associate/LEED AP with specialty exam, please register to take the two exams separately. See Exam Results section for more information regarding the combined exam.

The exam has scored questions and unscored questions. All questions are placed randomly throughout the exam and candidates are not informed of a question's status, so you should respond to all questions on the exam. Unscored questions are used to gather data regarding how the question performs. This data informs the use of the question on future exams.

The exam is computer-based. Exam questions and answer options are displayed on screen. The computer records your responses and times your exam. You are able to change your answers, skip questions and flag questions for later review.

During the exam, you may submit comments on any question(s) believed to contain a technical error in content by using the comment button located in the navigation bar. In order to challenge an exam question, you must have commented on the question and provided an explanation of your concerns. After the exam, within 10 days inform GBCI that you have left comments on your exam; in your correspondence, be sure to note the email address used to sign up for the exam, as well as the date on which you took it. You must notify GBCI within 10 days of your exam date that you have left a comment within your exam.

Be prepared to commit 2 hours 20 minutes for a specialty-only exam and 4 hours and 20 minutes for a combined exam. Total exam time is broken out as follows:

a. Specialty-only exam: an optional 10-minute tutorial, the 2-hour exam, and an optional 10-minute exit survey.

b. Combined exam: an optional 10-minute tutorial, the 2-hour LEED Green Associate exam, the 2-hour specialty exam, and an optional 10-minute exit survey.

If you need to take a break before completing your exam, you may do so by raising your hand for assistance. Testing time is **NOT** suspended. Be aware that if you exit the test center or end the exam session by pressing "Finish" within your exam before completing the exam, the exam cannot be restarted and the exam session and exam registration fee is forfeited.

Exam Language

The primary language for all exams is English. In the case of any discrepancies between the original English content and translated content or challenges made to the exams, the English content will be used as the basis of consideration. Translation is offered solely as an aid to non-native English speakers. Please refer to the table below for a list of available languages. Use of translators or foreign-language dictionaries during the examination is not be permitted. Additional time to complete the exam will not be provided. The translated exam is presented with the English text on top and the translated text below. Please note the exam tutorial, non-disclosure agreement, and end of exam survey are in English.

Exam	Languages Available
LEED Green Associate	English, Arabic, Brazilian Portuguese, Chinese, French, German, Japanese, Korean, Spanish
LEED AP BD+C	English, Arabic, Brazilian Portuguese, Chinese, French, Spanish
LEED AP Homes	English
LEED AP ID+C	English
LEED AP ND	English
LEED AP O+M	English, Arabic, Brazilian Portuguese, Chinese, French, Spanish

Exam Maintenance

The LEED professional exams are updated each year. Exams go through a maintenance process, in which the questions are evaluated based on performance; poorly performing questions are removed and replaced with new questions. Additionally, questions are reviewed against updates to the LEED standards (LEED addenda) that are published through January of the same year to ensure that all questions remain current and valid.

Please check the References section of this handbook for the most current list of exam references.

For a one-week period each year, exams are not offered, in order to accommodate deployment of updated exams at test centers globally.

PRE-EXAM CHECKLIST

Are You Ready?

Two Months Before Your Exam

a. Ensure that your given name (first name) and surname (last name) in your usgbc.org account matches the given name and surname on the identification you will present at the test center. (See Identification Requirements below.) **If the names do not match, you will not be allowed to test and you will forfeit the exam registration fee.** If you have any questions, please contact us.

b. Confirm that the date, time and location of your exam is correct. If it is not, please visit prometric.com/gbci for information about rescheduling or canceling your exam.

Exam Security

To ensure the integrity of LEED professional exams, you are required to review and accept a nondisclosure agreement that prohibits any disclosure of exam content:

a. Exam questions and answers are the exclusive property of GBCI

b. Exam, questions and answers are protected by copyright law. The exam may not be copied or reproduced in part or in whole, by any means whatsoever, including memorization

c. Future discussion or disclosure of the content of the exam, orally or in writing, or by any other means, is prohibited

d. Theft or attempted theft of exam questions is punishable to the fullest extent of the law

e. Failure to comply with the agreement will result in forfeiture of your credential

What to Expect at the Test Center

Plan to arrive at the test center at least 30 minutes prior to your scheduled exam appointment. If you arrive at the test site after your scheduled exam time, you will lose your seat and forfeit the exam registration fee.

Upon arrival at the test center, you will be required to show acceptable form(s) of identification (see Identification Requirements below) and sign in. Next, you will be escorted to a locker to store your belongings. You will have access to your ID and your locker key for the duration of your exam. Then you will go through a security checkpoint, where you will be asked to empty your pockets; remove eyeglasses, roll down shirtsleeves, remove watches and fitness trackers/monitors, remove jewelry*, and roll up pant legs for inspection; and pass through a metal detector. Upon completion of the enhanced security check-in, you will be escorted to a workstation by test center staff.

**Religious apparel and wedding rings are exempt.*

You must remain in your seat during the exam except when authorized to leave by test center staff. Raise your hand to notify test center staff if:

a. You experience a problem with your computer

b. An error message appears on the computer screen (do not clear the message)

c. You need to take a break (testing time is NOT suspended)

d. You need the test center staff for any other reason

Accessing personal effects during the course of your exam is a security infraction and as a result, your exam session could be voided without refund. Prometric test centers are outfitted with video cameras that record the check-in process and exam experience for each candidate. These recordings may be viewed by Prometric test center staff and GBCI in the case of suspected security infractions. If you have a medical condition that may necessitate access to medication (e.g., an insulin pump), you must submit a Testing Accommodation request during exam registration.

If you require a break (e.g., to use the restroom), you must abide by the aforementioned security policies, and you will be required to repeat the security check before you are permitted to reenter the exam room.

Identification Requirements

GBCI, along with Prometric, enforces a strict policy regarding acceptable identification in order to maintain the integrity and quality of the LEED exams and to ensure all candidates have access to a consistent and fair exam check-in process.

You are required to provide one form of valid identification that contains all of the following*:

a. an expiration date that has not passed
b. your signature
c. a photograph that looks like you

Examples of acceptable identification include:

a. current government-issued photo ID with signature
b. current credit card with integrated photo ID and signature
c. current photo ID without signature, plus 1 credit card with signature (first and last names must match on both)

Examples of acceptable forms of unexpired photo ID include:

a. driver's license
b. passport
c. military ID
d. green card, permanent residence card, or H-1B visa
e. for India residents: India PAN card or India voter ID

If the ID has a photograph but no signature and/or expiration date, an ID with signature with the same name and/or expiration date must also be provided. Note: the photo ID presented must contain a recent, recognizable photograph; the ID must have been laminated by the issuing authority at the time it was issued;* ***AND* *one form of acceptable ID listed above is also presented.*

Unacceptable forms of ID include, but are not limited to:

a. an expired ID
b. ID without an expiration date
c. photocopies of ID
d. Social Security card
e. for India residents: Aadhaar cards

See Prometric's website for more information.

Test Center Regulations

You must abide by the Prometric security rules while at the test center. We recommend that you review these carefully before your scheduled exam date, since you will be required to agree to them before starting your exam. See Prometric FAQs for more information.

Grounds for Dismissal from the Test Center

Any candidate who engages in misconduct or does not comply with the test proctor's warning to discontinue inappropriate behavior may be dismissed from the test site, have exam results invalidated, or be subject to other sanctions. Fraud, deceit, dishonesty, or other irregular behavior in connection with taking the exam is strictly prohibited.

If you are dismissed from the test center, inform GBCI within 10 days of your exam date and provide a reason for your behavior. GBCI reviews all instances of dismissal from a test center and makes a ruling based on the consideration of your rationale and the Prometric report of the incident. To appeal a GBCI ruling, send an email of your formal appeal to

GBCI. At this stage, the Credentialing Steering Committee will review and make a final ruling on your case.

AFTER YOUR EXAM

Exam Results

All LEED professional exams are scored between 125 and 200. **A score of 170 or higher is required to pass.** Your exam score will be displayed on screen at the end of the exam and a score report will be emailed to you following your exam session. **For the LEED AP combined exams, you must earn a 170 or higher on both parts to earn the credential.**

Within 72 hours of your appointment, your exam results are processed, your Credentials account is updated, and, if applicable, your credential is updated in the USGBC directory.

Passing the Exam

Designating Your Credential

As soon as you receive written confirmation that you have passed the specialty exam, you may use the appropriate signifier ("LEED AP®" followed by your specialty) after your name:

a. LEED AP® BD+C
b. LEED AP® Homes
c. LEED AP® ID+C
d. LEED AP® ND
e. LEED AP® O+M

The term "LEED Accredited Professional" is never to be used. You should no longer use LEED Green Associate as the LEED AP with specialty credential supersedes the LEED Green Associate credential.

Please review the LEED professional credentials section of the USGBC Trademark Policy and Branding Guidelines for additional guidance.

Certificates

Once your exam results have been processed, you can download a copy of your certificate through your usgbc.org account.

Credential Maintenance Program

You must fulfill the requirements in order to maintain your credential. For information regarding how to maintain your credential, see the CMP Guide.

Earning the LEED AP with specialty after earning the LEED Green Associate

Your LEED Green Associate credential expires and is replaced by the LEED AP with specialty.

Exam-related Complaints and Exam Content Appeals

Because of the need for exam security, GBCI does not release exam questions or answers to candidates. GBCI does not respond to complaints or appeals received more than 10 days after an individual's exam date and does not respond to complaints or appeals sent to any organizations other than GBCI.

If you experience any problems at the Prometric test center, you must inform test center personnel before leaving the test center. Prometric will draft an Incident Report and make it available to GBCI.

If you wish to submit an exam content appeal, you must submit comments during the exam on any question(s) believed to contain a technical error in content. You can use the comment button located on the navigation bar. In order to challenge an exam question, you must comment on the question and provide a brief explanation of your concerns during the exam. After the exam, within 10 days inform GBCI that you have left comments on your exam; in your correspondence, be sure to note the email address used to sign up for the exam, as well as the date on which you took it. GBCI reviews your concerns and notifies you of the findings.

GBCI does not modify exam scores under any conditions. In the event of a successful exam content appeal, you will be given the opportunity to retest; your original exam score will not be changed.

The only way to earn a LEED professional credential is to earn a score of at least 170 or higher on the required exam.

Candidate Confidentiality

GBCI recognizes your right to control personal information. GBCI policy is designed to safeguard this information from unauthorized disclosure. You can change your preference to be contacted by updating your personal preferences in your usgbc.org account.

To protect your right to control score distribution, your exam score is released only to you, the exam taker, and authorized GBCI staff. GBCI does not release exam scores except for use in research studies that preserve your anonymity. Candidate exam scores always remain confidential unless released with written consent of a candidate.

Official statistics regarding LEED professional exams, including all question performance data, individual data and demographic data, are considered confidential; however, GBCI may publish aggregate, non-identifying information based on such data.

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

LEED AP® HOMES Exam Specifications

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

Knowledge Domains reflect the rating systems' credit categories and what one needs to know. The LEED AP Homes 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 (9 Questions)**
    - A. LEED verification process
    - B. Roles and responsibilities of verification team (e.g., green rater; energy rater; quality assurance designee)
    - C. Certification submittal requirements (e.g., to GBCI)
    - D. Project eligibility (e.g., which rating system to use—Homes, Midrise or New Construction)
    - E. In-field verification requirements (e.g., performance test; visual inspection)
    - F. Resources for LEED Interpretations and Regional Priority Credits
    - G. LEED system synergies (e.g., energy and EQ; waste management)
    - H. Project boundary; LEED boundary; property boundary
    - I. Prerequisites and/or minimum program requirements for LEED certification
    - J. LEED Online
    - K. Integrative process (e.g., communication between project team and verification team throughout design and construction; communication of LEED goals and requirements to multidisciplinary team members including trade contractors)
2. **Location and Transportation (9 Questions)**
    - A. Floodplain avoidance (e.g., general requirements for new construction and renovation)
    - B. LEED ND as a pathway in the Location and Transportation category
    - C. Site selection definitions:
        - i. Sensitive land
        - ii. Infill development
        - iii. Open space
        - iv. Street network
        - v. Bicycle network and storage (e.g., general requirements)
    - D. Compact development (e.g., metrics associated with compact development)
    - E. Community resources (e.g., distance and measurement):
        - i. Define qualifying community resources
    - F. Access to transit (e.g., distance to and frequency of trips)
3. **Sustainable Sites (9 Questions)**
    - A. Construction activity pollution prevention (e.g., erosion control; storm water management; air pollution prevention)
    - B. Invasive plants (e.g., intent and prerequisite status)
    - C. Heat island reduction (e.g., shading use; nonabsorptive materials)
    - D. Rainwater management (e.g., examples of low impact development techniques)
    - E. Nontoxic pest control (e.g., how to achieve credit)

4. **Water Efficiency (10 Questions)**
    A. Types and quality of water (e.g., potable; graywater; blackwater; stormwater)
    B. Indoor and total water use:
        i. Testing for water leaks (e.g., total and indoor water use)
        ii. Define shower compartment
        iii. Water sense label interior fixtures
    C. Outdoor water use (e.g., general requirements: decrease turf grass and increase native plants)
    D. Irrigation demand (e.g., evapotranspiration; landscape coefficient; rainwater harvesting and storage; graywater reuse; municipal recycled water systems)
5. **Energy and Atmosphere (17 Questions)**
    A. Energy performance policies (e.g., ENERGY STAR thermal bypass checklist; HERS Index; building orientation)
    B. Building components (e.g., required systems; building envelope; HVAC; service water heating; power; lighting; lighting power density; receptacle load; insulation; windows, SIP and ICF construction techniques)
    C. On-site renewable energy (e.g., wind; solar; passive solar; geothermal; biomass; low impact hydro; biogas)
    D. Third-party relationships/requirements (e.g., prescriptive and performance paths for energy efficiency; LEED for Homes Green Rater; HERS Rater; energy testing and on-site verification requirements)
    E. Third-party alternate rating systems (e.g., HERS or alternative compliance path)
    F. Energy performance measurement (e.g., ENERGY STAR Thermal Bypass Inspection Checklist; ACCA Manual J; ACCA Manual D)
    G. Energy tradeoffs (e.g., integration and identification of tradeoffs in energy savings between mechanical, electrical, and building components; lighting design that considers energy use reduction and lighting power density relationship with daylighting)
    H. Energy usage (e.g., building schedules; occupancy and off-hours; indoor/outdoor air usage rates and impact on energy performance)
    I. Minimum energy performance (e.g., general requirements to meet ENERGY STAR for Homes; what projects need to be commissioned; processes)
    J. Energy metering (e.g., metering requirements for single and multifamily projects)
    K. Education of homeowner, tenant or building manager (e.g., content and distribution requirements for operations and maintenance manual; walk through requirements)
    L. Annual energy use (e.g., which option includes the home size adjuster; definition of LEED energy budget; minimum energy requirements for midrise; conditioned floor area of ENERGY STAR v3 reference home by number of bedrooms)
    M. Efficient hot water distribution system (e.g., multifamily central circulation system; performance testing; insulation)
    N. Advance utility tracking (e.g., options for tracking and reporting energy and water use)
    O. Active solar-ready design (e.g., photovoltaic-ready design; solar direct hot water-ready design)
    P. Home size adjuster as a prerequisite for EA prescriptive path
    Q. Building orientation for passive solar (e.g., basic credit requirements)
    R. Air infiltration (e.g., who performs the test and what is the test)
    S. Envelop insulation (e.g., R-value; 2012 International Energy Conservation Code)
    T. Windows (e.g., view factor; SHGC; window area and stringency)
    U. Space heating and cooling equipment (e.g., required duct leakage rate)
    V. Heating and cooling distribution systems (e.g., ductwork in conditioned space; ductwork in unconditioned

space; hydronic systems; who conducts the duct leakage test)

W. Efficient domestic hot water equipment (e.g., list of qualifying systems)

X. Lighting (e.g., lighting power density; dark skies)

Y. High-efficiency appliances (e.g., types that qualify for credit)

Z. Renewable energy (e.g., certificate retention; maximum points allowed)

6. Materials and Resources (10 Questions)

A. Building reuse (e.g., gut rehabilitation; material reuse)

B. Material acquisition (e.g., certified wood; recycled content; detailed framing documents and cut list/lumber order)

C. Certified tropical wood (e.g., definition)

D. Durability management (e.g., requirements of ENERGY STAR for Homes v3 check list; indoor moisture control measures)

E. Durability management verification (e.g., requirements)

F. Environmentally preferable products (e.g., recycled materials pre-consumer; post- consumer; collection requirements; commingled and locally—regionally—harvested and manufactured materials)

G. Construction waste management (e.g., accounted by weight or volume; reduction strategies; baseline for LEED reference home)

H. Material-efficient framing (e.g., applicable strategies; thresholds)

7. Indoor Environmental Quality (13 Questions)

A. Minimum ventilation requirement (e.g., indoor air quality; natural ventilation; mixed mode ventilation)

B. Combustion venting general requirements (e.g., no unvented combustion appliances; CO monitors; fireplace measures)

C. Garage pollutant protection (e.g., seal, weather-strip and install carbon monoxide detectors; EPA Indoor AirPLUS Label)

D. Radon-resistant construction (e.g., EPA radon zone 1; radon resistant construction techniques; requirements for renovation of existing building)

E. Air-filtering (e.g., where filters are required)

F. Environmental tobacco smoke (e.g., no smoking option; multifamily - no smoking requirements)

G. Compartmentalization (e.g., intent; strategies; verification of)

H. Enhanced ventilation (e.g., strategies that qualify for enhanced ventilation controls; systems that qualify for enhanced whole-house ventilation)

I. Contaminant control (e.g., strategies including walk off mats; shoe removal and storage; preoccupancy flush or EPA Indoor AirPLUS label and air testing - max contaminant concentrations)

J. Balancing of heating and cooling distribution systems (e.g., basic requirements of Case 1 - Forced-Air Systems; Options 1-3; Case 2 - Radiative Systems, Options 1 and 2

K. Combustion venting (e.g., EPA certified equipment or no fireplaces or woodstoves)

L. Enhanced garage pollutant protection (e.g., credit awarded for either exhaust fan or no garage/detached garage)

M. Low-emitting Materials (e.g., adhesives and sealants; paints; coatings; carpet; composite wood and agrifiber products; VOC's; urea-formaldehyde, California standard 1350)

8. **Innovation (5 Questions)**
    A. Preliminary rating (e.g., who needs to be at the preliminary rating, prerequisite status in rating system and goals of preliminary rating)
    B. Innovation (e.g., Innovation, Pilot, and Exemplary Performance strategies)
    C. LEED AP (e.g., specialty appropriate for the project)
9. **Regional Priority (3 Questions)**
    A. Regional Priority Credits - What are they and how to find them.

LEED AP® ID+C Exam Specifications

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

Knowledge Domains reflect the rating systems' credit categories and what one needs to know. The LEED AP ID+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 (11 Questions)
    A. LEED interpretations
    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. Differences between general ID+C rating system and the retail and hospitality subsets
    F. Review process (back and forth with the reviewer)
    G. LEED Online
    H. Documentation compilation
    I. Addenda and changes to the rating system (rating system development)
    J. Existing building conditions
    K. Ways to earn innovation credits:
        i. Innovation option (e.g., criteria for new innovative method; using credit that has been used before such as green housekeeping)
        ii. Exemplary performance option (e.g., which credits have exemplary performance paths; what are the thresholds of exemplary performance)
        iii. Pilot option

2. **Integrative Strategies (8 Questions)**
    A. Integrative process (e.g., early analysis of the interrelationships among systems)
    B. Integrative project team (e.g., architect; engineer; landscape architect; civil engineer; contractor; facility manager, etc.)
    C. Education of tenant/owner (e.g., development of a building manual; demonstration walkthrough of the green features in the building)

3. **Location and Transportation (8 Questions)**
    A. Surrounding density and diverse uses (e.g., walkability; street design and intersection density)
    B. Access to quality transit (e.g., accessibility to multimodal transportation choices; quality transit; bicycle network)
    C. Alternative transportation: infrastructure and design (e.g., parking capacity and design; bicycle storage and shower rooms)
    D. LEED for neighborhood development location

4. **Water Efficiency (10 Questions)**
    A. 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 [washing machine, dish washer])
    B. Water performance management: types and quality of water (e.g., potable; nonpotable; alternative water sources)

5. **Energy and Atmosphere (15 Questions)**
    A. Energy use
        i. Building envelope
        ii. HVAC
        iii. Lighting power and controls
        iv. Plug loads and equipment
    B. Energy efficiency: commissioning (e.g., commissioning authority [CxA]; owner's project requirements [OPR]; basis of design [BOD]; monitoring-based commissioning; envelope commissioning; what is commissioning; who does commissioning; what is the difference between fundamental and enhanced commissioning)
    C. Alternative and renewable energy practices
        i. Renewable energy (e.g., on-site and off-site renewable energy system that you own; photovoltaic; solar thermal; wind)
        ii. Green power (e.g., power that you buy; off-site generated; renewable energy certificates [RECs]; carbon offsets; Green-e Energy certified or the equivalent)
    D. Energy performance management
        i. Energy use measurement (e.g., tenant-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)
        iii. Operations and maintenance plan (e.g., training of staff; operations and maintenance plan)
    E. 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)
    F. Modeling pathway, prescriptive vs. simulation
    G. ASHRAE calculator
    H. Lighting power density
    I. ENERGY STAR equipment credit requirements
6. **Materials and Resources (17 Questions)**
    A. Interiors life-cycle impact reduction
        i. Interior reuse (e.g., reuse or salvage interior nonstructural elements)
        ii. Furniture reuse (e.g., reuse, salvage or refurbish furniture and furnishings)
        iii. Design for flexibility
    B. Building product disclosure and optimization
        i. Environmental product declarations
        ii. Sourcing of raw materials (e.g., extraction reporting; extraction practices)
        iii. Material ingredients (e.g., material ingredient reporting; material ingredient optimization; product manufacturer supply chain optimization)
    C. Waste
        i. Construction and demolition waste management (e.g., waste diversion goals; recycle and/or salvage nonhazardous construction and demolition materials; waste management plan)
        ii. Operations and ongoing (e.g., storage and collection of recyclable materials [mixed paper, corrugated cardboard, glass, plastics and metals]; safe storage areas for batteries and mercury-containing lamps; waste stream study; how to calculate and where to locate storage areas for recyclable waste)
    D. Materials calculator

7. Indoor Environmental Quality (16 Questions)

A. Indoor environmental quality

i. Ventilation levels (e.g., general knowledge of natural vs. mechanical; outdoor air; regional climate conditions; ASHRAE 62)

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; ongoing monitoring; natural ventilation pathways)

iv. Construction indoor air quality management plan and indoor air quality assessment

v. 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. Lighting control (e.g., multi-zone control systems; presentation controls)

D. Daylight (e.g., spatial daylight autonomy; annual sunlight exposure; glare; human health impacts; illuminance; measurement)

E. Acoustic performance (e.g., exterior and interior noise; background noise; dead vs. loud spaces; reverberation time; sound masking systems; sound transmission class)

F. Thermal comfort control

G. Thermal comfort design (e.g., ASHRAE 55)

H. Quality views (e.g., connection to outdoor environment; direct line of sight to outdoors; what makes a quality view; view factor)

LEED AP® ND Exam Specifications

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

Knowledge Domains reflect the rating systems' credit categories and what one needs to know. The LEED AP ND 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 (13 Questions)
    - A. LEED interpretations
    - B. Components of a LEED scorecard
    - C. Project boundary/context; LEED boundary; pre-project conditions; site vicinity; previously developed
    - 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)
    - F. Integrative process (e.g., roles and responsibilities; facilitating collaboration)
    - G. Ways to earn Innovation credits:
        - i. Innovative methods (e.g., criteria for new innovative method; using credit that has been used before)
        - ii. Exemplary performance (e.g., which credits have exemplary performance paths; what are the thresholds of exemplary performance)
        - iii. Pilot credits
    - H. Identifying development program; nonbuildable and buildable land; building/street frontage
2. **Smart Location & Linkage (21 Questions)**
    - A. Preferable locations:
        - i. Existing context (e.g., infill sites; adjacent sites with connectivity; transit corridor; nearby neighborhood assets; existing/planned utilities)
        - ii. Connectivity (e.g., street design and intersection density)
        - iii. Designated high-priority locations (e.g., high-priority redevelopment areas)
        - iv. Brownfield (e.g., contaminated soil or groundwater; remediation)
        - v. Existing transit service
        - vi. Bicycle network (e.g., short- and long-term storage; bikeable location; bicycle network)
        - vii. Housing and jobs (e.g., jobs-housing balance)
    - B. Sensitive feature avoidance:
        - i. Imperiled species and ecological communities (e.g., habitat conservation plan)
        - ii. Wetland and water bodies (e.g., classification of wetlands and water bodies; minor development impacts; buffer delineation)
        - iii. Agricultural land (e.g., prime and unique farmland; affected soils)
        - iv. Floodplain (e.g., flood hazard, National Flood Insurance Program [NFIP]; ASCE 24)
        - v. Steep slope (e.g., restoration and protection of steep slopes)
    - C. Site design and development: habitat and water body design, restoration, and long- term conservation
3. **Neighborhood Pattern & Design (23 Questions)**
    - A. Community resources:
        - i. Walkable streets (e.g., functional entry; building height-to-street width ratio; continuous sidewalks; street/building frontages; property setbacks; on-street parking)

ii. Connected and open community (e.g., surrounding connectivity; internal connectivity; through-connections; gates)

iii. Tree-lined and shaded streetscapes (e.g., tree-lined blocks; shaded sidewalks; street tree plantings)

iv. Access to civic and public space, recreation facilities

v. Local food production (e.g., neighborhood gardens; community-supported agriculture; farmers market)

vi. Transit facilities and transportation demand management

vii. Neighborhood schools (e.g., continuous sidewalks; traffic controls/bicycle lanes)

B. Compactness:

i. Compact development (e.g., residential density [DU/acre]; nonresidential density [FAR]; buildable land)

ii. Reduced parking footprint (e.g., location and size of parking lots)

C. Diversity:

i. Mixed-use neighborhoods (e.g., specific use types and categories)

ii. Housing types and affordability (e.g., Simpson Diversity Index score, housing categories)

iii. Visitability and universal design (e.g., Americans with Disabilities Act [ADA]; universal design features)

iv. Stakeholder engagement: Community outreach and involvement (e.g., pre-design meeting; charrette; ongoing means of communications)

4. Green Infrastructure & Buildings (21 Questions)

A. Infrastructure:

i. Renewable energy production (e.g., solar; wind; geothermal; small-scale; micro- hydroelectric; biomass)

ii. District heating and cooling

iii. Infrastructure energy efficiency (e.g., traffic lights; street lights; water; wastewater pumps)

iv. Recycled and reused infrastructure (e.g., roadways; parking lots; water retention tanks; water piping)

v. Solid waste management

B. Buildings:

i. Certified green buildings (e.g., LEED; ISO-compliant)

ii. Energy use (e.g., design; building loads; energy efficiency; ASHRAE 90.1-2010; Energy STAR®/HERs)

iii. Indoor water use (e.g., fixture selection)

iv. Materials reuse (e.g., building reuse; historic preservation; adaptive use)

C. Site design and development:

i. Construction activity pollution prevention and minimized site disturbance

ii. Outdoor water use (e.g., reduced potable water use for irrigation) and management of wastewater

iii. Heat island reduction and solar orientation

iv. Lighting pollution reduction

v. Rainwater management (e.g., EPA Technical Guidance Section 438; percentile rainfall event; low-impact development; green infrastructure)

5. Project Surroundings and Public Outreach (7 Questions)

A. Planning process and local framework (e.g., land use change amendments; public hearings; zoning; transportation)

B. Government agencies (e.g., Environmental Protection Agency [EPA]; FEMA; HUD; USDA; local/state agency equivalents)

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 (CO_2e)]; 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)

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, gbci.org, including, but not limited to, LEED Project Registration, LEED Certification content and the purpose of LEED Online. USGBC's website also has free access to all LEED rating systems, LEED Reference Guide introductions and checklists beyond those listed below.

References

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- "LEED Addenda (Corrections + Interpretations)." U. S. Green Building Council.
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- "Addenda Database." U.S. Green Building Council.

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.

The content of these questions, while representative of the type of questions you can expect, does not necessarily mirror the content that will appear on the actual exams.

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.

1. 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).

2. 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 HOMES Exam References

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

LEED AP Homes Exam

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References

- U.S. Green Building Council. *LEED Reference Guide for Homes Design and Construction*. v4 e-Document (PDF) Edition. U.S. Green Building Council, 2018.
- "Green building incentive strategies." U.S. Green Building Council, 2014.
- U.S. Green Building Council. *Guide to LEED Certification: Commercial*. U.S. Green Building Council, 2014.
- U.S. Green Building Council. *Foundations of LEED*. U.S. Green Building Council, 2009.
- U.S. Green Building Council. *LEED v4 for HOMES Design and Construction Checklist*. U.S. Green Building Council, 2013.
- "LEED Addenda (Corrections + Interpretations)." U.S. Green Building Council.
- "LEED Online: Register a project." U.S. Green Building Council, 2014.
- "LEED Certification Fees." U.S. Green Building Council, 2014.
- "Rating System Selection Guidance." U.S. Green Building Council, 2014.
- "Addenda Database." U.S. Green Building Council.

LEED AP HOMES Sample Questions

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1. What is the PRIMARY intent of Innovation Prerequisite: Preliminary Rating?
    A. To define the credits that could be achieved easily and cost effectively.
    B. To define target certification level at the beginning and declare it to all parties.
    C. To maximize opportunities for integrative, cost effective adoption of green design and construction strategies.
    D. To encourage exceptional performance for current credits and promote innovative performance in pioneering areas.

This question represents Knowledge Domain 8A: Innovation; Preliminary rating (e.g., who needs to be at the preliminary rating, prerequisite status in rating system and goals of preliminary rating).

2. Regional Priority Credits focus on which of the following types of environmental issues?
    A. Naturally occurring issues
    B. Man-made issues
    C. Environmental concerns and assets
    D. All of the above

This question represents Knowledge Domain 9A: Regional Priority: Regional Priority Credits - What are they and how to find them.

LEED AP ID+C Exam References

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LEED AP ID+C Exam

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References

- U.S. Green Building Council. *LEED Interior Design and Construction Reference Guide*. v4 e-Document (PDF) Edition. U.S. Green Building Council, 2018.
- "Green building incentive strategies." U. S. Green Building Council, 2014.
- U.S. Green Building Council. *Guide to LEED Certification: Commercial*. U.S. Green Building Council, 2014.
- U.S. Green Building Council. *Foundations of LEED*. U.S. Green Building Council, 2009.
- U.S. Green Building Council. *LEED v4 for Interior Design and Construction Checklist*.
- U.S. Green Building Council, 2013.
- "LEED Addenda (Corrections + Interpretations)." U.S. Green Building Council.
- "LEED Online: Register a project." U.S. Green Building Council, 2014.
- "LEED Certification Fees." U.S. Green Building Council, 2014.
- "Rating System Selection Guidance." U.S. Green Building Council, 2014.
- "Addenda Database." U.S. Green Building Council.

LEED AP ID+C Sample Questions

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1. Which of the following use types is classified as a service?

   A. Restaurant

   B. Supermarket

   C. Hardware store

   D. Place of worship

This question represents Knowledge Domain 3A: Location and Transportation; Surrounding density and diverse uses (e.g., walkability; street design and intersection density)

2. Under Location and Transportation credit surrounding Density and Diverse Uses, how many points are available under option 2: Diverse Uses?

   A. 1–2

   B. 1–4

   C. 1–8

   D. 2–4

This question represents Knowledge Domain 3A: Location and Transportation; Surrounding density and diverse uses (e.g., walkability; street design and intersection density)

LEED AP ND Exam References

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LEED AP ND Exam

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References

- U.S. Green Building Council. *LEED Neighborhood Development Reference Guide*. v4 e-Document (PDF) Edition. U.S. Green Building Council, 2018.
- "Green building incentive strategies." U.S. Green Building Council, 2014.
- U.S. Green Building Council. *Guide to LEED Certification: Commercial*. U.S. Green Building Council, 2014.
- U.S. Green Building Council. *Foundations of LEED*. U.S. Green Building Council, 2009.
- U.S. Green Building Council. *LEED v4 for Neighborhood Development Checklist*. U.S. Green Building Council, 2013.
- "LEED Addenda (Corrections + Interpretations)." U.S. Green Building Council.
- "LEED Online: Register a project." U.S. Green Building Council, 2014.
- "LEED Certification Fees." U.S. Green Building Council, 2014.
- "Rating System Selection Guidance." U.S. Green Building Council, 2014.
- "Addenda Database." U.S. Green Building Council.

LEED AP ND Sample Questions

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1. Which of the following would meet one of the minimum requirements for the Green Infrastructure and Building Credit, Solid Waste Management Infrastructure for a 25,000 ft^2 (2,323 m^2) mixed-use building?

   A. Provide at least one recycling area for paper, corrugated cardboard, glass plastics and metals

   B. Provide at least one recycling area of 250 ft^2 (23 m^2) for paper, corrugated cardboard, glass plastics and metals

   C. Provide at least one recycling area of 500 ft^2 (46 m^2) for paper, corrugated cardboard, glass plastics and metals

   D. Provide at least one recycling area of 1,000 ft^2 (93 m^2) for paper, corrugated cardboard, glass plastics and metals

This question represents Knowledge Domain 4A: Green Infrastructure and Buildings; Green Infrastructure; Solid waste management

2. What irrigation type has the highest irrigation efficiency (IE) for landscaped areas?

   A. Pop-up

   B. Drip line

   C. Impact rotor

   D. Area flooding

This question represents Knowledge Domain 2C: Smart Location and Linkage; Site design and development: habitat and water body design, restoration, and long-term conservation.

LEED AP O+M Exam References

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LEED AP O+M 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, gbci.org, including, but not limited to, LEED project registration, LEED certification content and the purpose of LEED Online. USGBC's website 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 Operations and Maintenance Reference Guide*. v4 e-Document (PDF) Edition. U.S. Green Building Council, 2018.
- "Green building incentive strategies." U. S. Green Building Council, 2014.
- U.S. Green Building Council. *Guide to LEED Certification: Commercial*. U.S. Green Building Council, 2014.
- U.S. Green Building Council. *Foundations of LEED*. U.S. Green Building Council, 2009.
- U.S. Green Building Council. *LEED v4 for Operations and Maintenance Checklist*. U.S. Green Building Council, 2013.
- "LEED Addenda (Corrections + Interpretations)." U. S. Green Building Council, 2014.
- "LEED Online: Register a project." U.S. Green Building Council, 2014.
- "LEED Certification Fees." U.S. Green Building Council, 2014.
- "Rating System Selection Guidance." U.S. Green Building Council, 2014.
- "Addenda Database." U.S. Green Building Council.

LEED AP O+M Sample Questions

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1. 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).

2. 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.

CONTACT

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USGBC's website is available 24 hours per day for exam application and registration, information regarding LEED professional exams and access to your account.

Call Center: 1-800-795-1746 (within the US) or +1-202-742-3792 (outside the US)

GBCI's call center is available Monday through Friday from 9:00 to 17:30 ET for questions regarding exam registration, USGBC or CaGBC member pricing, your Credentials account, the LEED Professional Directory and LEED professional exams. For any other questions, please review the FAQ section.

GBCI staff are available for questions, comments, and concerns regarding certificates, LEED professional exam records, USGBC or CaGBC member pricing refunds, exam content appeals, exam development, exam scoring, exam format and all other LEED professional exam policies and procedures.

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View the list of Prometric Call Centers for regional numbers to schedule, reschedule, or cancel your exam, or for general information.