Exam Detailed Content Outline

Domain 1:	Evidence-Based Design
	Describe evidence-based design
	• the definition of evidence-based design
	• the difference between the traditional design approach and how to integrate the EBD process into that approach
	Explain how the use of an evidence-based design process can benefit:
	• patients or primary end users
	• building owners/employers
	• family members or other patient advocates
	• building occupants
	• employees/staff
	• other users
	• communities
	• the general public
	Explain how the use of an evidence-based design process can influence these outcomes.
	• financial performance
	• operational efficiency
	• health safety and well-being
	• satisfaction and preferences
	• commitment (e.g., staff turnover, philanthropy)
	• community
	• equity and access
	• cultural considerations
	• organizational change
	• environmental sustainability
	• resiliency
	Delineate the key steps of an evidence-based design process.
	• define evidence-based goals and objectives
	• find sources for relevant evidence
	• critically interpret relevant evidence
	• create and innovate evidence-based design concepts
	• develop a hypothesis
	• identify and collect baseline performance measures (pre-occupancy)

	• monitor implementation of design and construction
	• measure and evaluate outcome performance measures (post-occupancy)
	Identify theoretical foundations to design for safety and health.
	• supportive design
	• salutogenic design
	• integrative medicine
	Describe a healing and therapeutic environment.
	• definition of a healing and therapeutic environment
	• design interventions that affect outcomes in a healing and therapeutic environment
	Describe attributes of a safe environment.
	• characteristics of a safe environment (visual, auditory, tactile, physical etc.)
	• design interventions that affect outcomes in a safe environment
	Explain why a systems-based approach can enhance and support the evidence-based design process and can assist the project team to identify design strategies that can yield the greatest economic, social, and environmental return on investment.
	• the definition of a systems-based approach
	• how multiple components which define the overall system should be addressed concurrently by an interdisciplinary team
	• the components that define and influence the overall system and how the relationship between these components influences outcomes (formerly Environment of Care):
	1. *concepts* – Do the design concepts and strategies support the project vision, goals, and objectives?
	2. *people* – Does the design include the definition of the ideal experiences from the various perspectives of all the people that will inhabit these spaces?
	3. *systems* – Do the design concepts and ideal experiences consider the direct impact on the systems (technical, mechanical, operational, and organizational)?
	4. *layout/operations* – Will addressing these components concurrently inform the layout/operation of the spaces to effectively increase the likelihood of desired user outcomes, staff/procedural efficiency, and operational cost reduction?
	5. *physical environment* – What are the design strategies (interventions) in the physical environment that are hypothesized to have a specific outcome? What are the metrics that will be used to measure these outcomes?
	6. *implementation and evaluation* – Where are the opportunities and the potential roadblocks to implementation? Will the proposed implementation strategy for the project achieve the stated goals and objectives?
	Explain why an EBD process alone is not sufficient to make improvements and will be more successful when considered in conjunction with a range of different contributors. Changes to a single

	component, without understanding the relationship between that component and others, can have unintended consequences.
	Understand why it is important to consider all the components holistically, the interrelated variables, and their influence upon each other, when implementing transformational change. There will be gaps and overlaps in these components that should be documented and addressed.
	Every organization has a unique culture, which should be considered and addressed. Explain why or how the design of the built environment can affect or influence the culture of the organization and how culture could influence design.
	• the different types of organizational cultures and models
	• the specific characteristics of the built environment that can exemplify and support change in organizational culture
	• the specific characteristics of the built environment that can address cross-cultural differences.
	Describe the role of executive leadership for both the project and the owner's organization to understand and champion the evidence-based design process.
	• participate in the creation of the vision, guiding principles, design guidelines, and desired outcomes
	• select an interdisciplinary project team
	• inform the organization of the importance of this work
	• steer and ensure the project stays on course, as a thought leader and vision keeper
	• engage in and monitor the design and construction process
	Describe the policy role of executive leadership to establish the short- and long-term impact of the project related to the social, economic, and environmental considerations that contribute to improved health and safety.
	Understand the role of the CEO, the Board of Directors, and executive leadership to the organization of the project.
	• commit to use an evidence-based design process
	• define the interdisciplinary team's level of decision making
	• establish organizational and operational strategy/vision
	• understand the operational implications of design decisions
	• request development of a project business plan (scope, schedule, budget and return on investment)
	Explain the benefits of stakeholder involvement.
	• executive and administrative leadership
	• board of directors/trustees
	• clinicians and other caregivers
	• employees (management, front-line, and support staff)
	• researchers

	• patients and families or other care advocates
	• other users/stakeholders
	• vendors and suppliers
	• community leaders
	• community organizations
	• donors
	Understand the changes that can occur during the lifecycle of the project.
	• leadership transitions both internal to the owner's team and external to the design and construction teams
	• maintenance of EBD concepts during policy development, design, construction, and activation and occupancy
	• data collection
	• commitment to conduct post-occupancy evaluation/design research
	Understand the importance of succession planning for project continuity, sustainability, and resilience.
	Understand the difference between a project business plan, a business case for using evidence-based design, and a business case for specific evidence-based design concepts/strategies/interventions.
	• definition of project *business plan* – the corporate document that defines the project scope, schedule, budget, and return on investment for the project.
	• definition of project *business case* – a high-level document that outlines the business case for using evidence-based design (resources, time, costs and benefits of using an evidence-based design process, and associated interventions).
	• *evidence-based design concept/strategy/interventions business case* – a detailed document that is used to justify a specific design concept, strategy or intervention that is linked to intended outcomes (e.g., overhead lifts, access to daylight) which includes identification of the first costs and multi-year operational savings that will be used to offset first costs to determine the return on that investment.
	Describe the importance of incorporating evidence-based design as part of the project business case.
	Describe the importance of developing preliminary business cases for design strategies in the early phases of the design process to justify additional costs.
	Describe the role of the interdisciplinary team to update the business cases for specific EBD concepts and strategies.
	Understand the importance of finalizing the business cases that outline the relationship between first costs (one-time capital costs) and ongoing multiyear operational savings/costs to determine how long it will take to obtain a return on investment.
	Describe the benefits of the interdisciplinary project team approach.
	Discuss how to assemble an interdisciplinary project team and key stakeholders.

	Discuss why and how an interdisciplinary team approach is beneficial to the project outcomes and other approaches to design and construction.
	Explain why achieving outcomes can be limited by a project delivery approach that does not use an interdisciplinary team approach.
	Identify the potential members, the key qualifications, and timing for onboarding the interdisciplinary project team in the following categories:
	• owners
	• patients and families and other care advocates
	• other end users
	• consultants
	• researchers
	• contractors
	• vendors
	• community leaders
	• community organizations
	Explain the responsibilities of the interdisciplinary project team to integrate the evidence-based design process into the traditional project phases.
	• define the context of the project
	• create the business case for utilizing an evidence-based design process, if not completed as part of the project business plan and funding allocation phase
	• develop the vision and measurable evidence-based design goals and objectives
	• define the project scope and budget
	• initiate and establish the research process, which includes engaging a researcher, collecting, reviewing, validating, and critically interpreting and organizing available and relevant evidence and information.
	• oversee the development of design concepts and strategies that are linked to intended outcomes and developing hypotheses.
	• develop a preliminary business case for specific EBD design concepts and strategies (identifying the first costs and the return on investment [ROI]), especially for those strategies that exceed the original scope and budget
	• document all of the above information in the Functional Program that will be used by the design team as the basis for design.
	• create a research plan to measure and evaluate post-occupancy results
	• monitor construction and activation to ensure EBD design concepts and strategies are implemented in compliance with the documented hypotheses and intended outcomes.
	• measure, evaluate, and disseminate post-occupancy results

Domain 2:	Research
	Describe the role of research to inform design decisions to achieve the best possible outcomes and how research can be used to evaluate outcomes.
	Explain the role of the researcher on the interdisciplinary project team.
	Define types of research studies.
	• *applied research* – practice-based research
	• *basic research* – academic research
	Define research methodologies
	• *quantitative* (e.g., experimental, quasi-experimental [comparative], and correlational studies)
	• *qualitative* (e.g., ethnography, grounded theory)
	• *mixed methods*
	Understand components of the research process.
	• define the research questions – areas of interest about which there is a question or an unknown
	• find, reference and critically evaluate the quality of existing research and experiential knowledge (expert opinion)
	• benchmark (external and internal)
	• find and evaluate new evidence
	• develop hypotheses
	• develop a research plan
	• conduct pilot study/studies
	• plan and conduct future design research
	• collect and analyze data
	• complete research report
	Describe the role of research to inform design decisions to achieve the best possible outcomes and to evaluate outcomes.
	Understand how to implement elements of the research process during design:
	• define the research questions – areas of interest about which there is a question or an unknown
	• conduct a literature review
	• consider benchmarking (external and internal)
	• critically evaluate the research and experiential knowledge (expert opinion) that has been found and gathered
	• reference the evidence and propose design concepts/strategies
	• develop the hypotheses
	Identify sources and collect and analyze existing evidence related to research questions.
	• academic papers
	• professional conference presentations

	• peer-reviewed journal publications
	• web-based resources (e.g. online journals, abstracting and indexing services, association websites)
	• lessons learned from completed building projects
	• experts' opinions
	• institutional databases, surveys, records
	• search engines
	• publicly reported data
	• gather industry data and compare information
	• tour an existing building or another site
	Determine the relevance of evidence to the project based on factors (e.g., sources, author qualifications and/or experience, appropriateness of research methodology, replication, composition of sample)
	Recognize the hierarchy of credible evidence.
	Evaluate the reliability, validity, and generalizability of sources and findings.
	Address potential conflicting findings and confounding variables.
	Identify limitations of studies – sample size, biases, faulty methodology, and potential implications of design on operations and outcomes.
	• setting
	• populations
	• samples
	• data analysis procedures
	• logistics, including the roles and responsibilities of individual team members, budget, and timeline
	• possible limitations to the study
	• references
	• cost estimates
	Develop a research plan. A research plan systematically organizes thoughts and plans activities before time, money, and efforts are invested.
	• a statement of the research topic, purpose and objectives
	• background information, including literature review and the significance of the study
	• hypotheses or research questions
	• methodology
	• research design
	• variables and measurements
	• data collection procedures to include: settings, populations, samples, and protection of human subjects
	• data analysis procedures

	• logistics, including the roles and responsibilities of individual team members, budget, and timeline
	• possible limitations to the study
	• references
	• cost estimates/funding
	Prior to conducting research the research plan needs to be refined before being submitted to funders or for approval by the Institutional Review Board.
	Prioritize the research topics into manageable and testable subtopics and propose hypotheses.
	• existing valid and relevant research on a particular topic
	• the feasibility of performing a particular research study
	• outcomes of interest
	• significance and distinction
	• potential participants and number of participants
	Interpret the implications of relevant knowledge, theory and evidence related to the project
	• the research in the more focused context
	Design research study
	• modes of implementing hypotheses, methods, data analysis, results reporting, and discussion formats
	• search for relevant theory and evidence
	• informal, scoping, and systematic reviews
	• quantitative methods
	• qualitative methods
	• mixed methods
	Data collection: Identify valid and reliable instruments (published and self-developed surveys, scales, metrics) to measure the intended outcomes.
	Identify data sources
	• research tools (e.g., case studies, surveys / questionnaires, field observations, interviews, focus groups)
	• community based / subject matter experts
	• creation of own tools
	Collect and analyze and evaluate data and effects / outcomes of the completed project.
	• descriptive statistics
	• inferential statistics
	Complete research report and share findings publicly.
	• publication venues
	• presentation venues
	Identify the implications of findings and results.
	• hypotheses

	• the current project
	• professional practice
	• future research
	Identify limitations of the study as it may be related to this specific project.
	• interpretation of the results
	• importance of reliability, generalizability, etc.
	Disseminate results
	• interdisciplinary team and architectural firm (internal)
	• public (e.g., peer-reviewed, popular press) both published and presented (external)
Domain 3:	**Project Setup and Predesign**
	Understand why it is important to begin discussing the integration of evidence-based design for future projects early in the strategic capital planning process.
	Explain how educating executive leadership and key stakeholders about research can help them understand the link between design and improved outcomes.
	Describe how the incorporation of evidence-based design during the planning phase could increase the proposed project scope and estimated budget.
	Understand why it is important to establish an interdisciplinary team at the conception of the project or before the start of the project.
	Describe how to incorporate benefits of using an evidence-based process into the project business plan.
	Define the context and culture within which the project will be undertaken.
	• integrate the evidence-based design process with the project team
	• select/hire a researcher/consultant
	• benchmark
	• understand current practices and operations (e.g., Gemba Walk)
	• conduct iterative mock-ups, simulations, and evaluations
	• conduct pilot testing
	• set up pre- and post-studies
	Describe how the cost and value of using an evidence-based design process could directly impact the operational and capital cost calculations of the business plan.
	• scheduling impacts associated with providing adequate time during the planning and design phases
	• research costs for resources, data collection, analysis, and publication
	• construction (first costs) for unbudgeted evidence-based design strategies/ interventions
	• measurement of multiyear safety and quality improvements and cost savings to determine ROI
	• accountability to Board and executive team

	Develop a preliminary total project budget to obtain capital funding and additional funding for evidence-based design strategies/interventions and research costs.
	Understand the upper limit on available funds.
	Identify the project metrics that align with the business goals and objectives.
	Describe the importance of creating the interdisciplinary team from project inception through post-occupancy.
	Describe why it's important to develop an interdisciplinary team structure that includes:
	• expectations for participation and time commitments
	• leadership, sponsorship, and committee structure
	• key stakeholders, patients, families, other care advocates, users, building occupants, and the community
	• participants with the appropriate qualifications, complementary skill sets, and appreciation of the evidence-based design process
	• decision-making authority
	• documentation methodology as leadership and team members will change during the course of the project
	Explain the importance of providing continuous education and engagement of the interdisciplinary team and key stakeholders about the evidence-based design process, review of research findings, and the application to design decision-making.
	• participation in user groups
	• establishment of vision and measurable goals
	• review of mock-up/simulations
	• engagement in research planning, data collection and review
	• participation in post occupancy evaluations and design research
	Develop project vision, EBD goals and objectives, guiding principles, and design guidelines.
	• the scope and expected outcomes identified in the owner's project business plan need to be translated to describe what the project hopes to accomplish.
	• the guiding principles and design guidelines are essential in the development of evidence-based design concepts and strategies.
	• align the project vision with the corporate strategy and vision and the owner's project business plan and goals.
	Document the process and translate the vision, evidence-based design goals, guiding principles, design guidelines, and operations into the functional and space program that will become the basis of design for the project.
	• safety, efficiency, experience, and cost targets
	• space types, key dimensions, priority adjacencies, and required characteristics

	• infection prevention, energy efficiency, environmental sustainability, resilience, community integration, and collaboration
	Understand how the use of a systems-based approach in planning informs the functional and space programs and design process to define:
	• ideal experiences by all who will experience these spaces
	• demand and utilization
	• care models and staffing patterns
	• functional operation of support services
	• space requirements
	• related departments and their functional areas
Domain 4:	**Design**
	Coordinate the functional and space programs with the approved budget and develop design diagrams incorporating the accepted evidence-based design concepts and strategies.
	• alignment of EBD concepts, strategies, and interventions with project goals/objectives, the budget and schedule
	Develop, test, adjust, and refine design concepts and strategies using information collected from the various data sources:
	• project vision, goals, and objectives
	• guiding principles and design guidelines
	• research questions
	• components of system-based planning
	• relevant evidence in the information repository
	• benchmarking
	• additional literature review and critical evaluation
	• user group and key stakeholder input
	• pilot studies
	• simulations
	• physical and virtual mock-ups to test ideas
	Critically evaluate and incorporate research findings to develop design concepts and select the best options for adjacencies, flow, user and staff experiences, safety, building systems, material choices, and structure and finishes.
	Record and synthesize information gathered.
	• information repository
	Establish a set of baseline metrics and data to be gathered before occupancy that can be used in the evaluation and measurement of hypotheses once the building is occupied.
	• measurable outcomes

	• system-based criteria (such as a Lean project approach that concurrently evaluates safety, efficiency, satisfaction, and cost)
	• estimated budget
	The interdisciplinary project team should obtain approval at project milestones from the following groups prior to proceeding to the next stage of design and documentation.
	• the owner's executive leadership team (governing body)
	• key stakeholders
	Determine the documentation required to illustrate the link between design strategies to the evidence-based design goals.
	Develop and document the research hypothesis/es that:
	• predict the relationship between a design strategy and desired outcome
	• base decisions upon critical evaluation of quality evidence
	• define proposed metrics and measurable outcomes
	Understand the various techniques used in the development, evaluation, and documentation of evidence-based design concepts/strategies during design development and for use in future research.
	• user group and key stakeholder input
	• annotated diagrams
	• hypothesis/es
	• business case development (design strategy)
	• virtual simulations
	• conceptual and structural mock-ups
	Research plans are the documents required for approval by the Institutional Review Board or other research approval bodies that identify the hypothesis and methodologies to be used for a research study.
	The plan explains every aspect of the proposed research study including protections for participants' welfare and privacy.
	Researchers should ensure that the plan is concise, clear, and cohesive.
	Monitor budget and document completed EBD business case.
	• the interdisciplinary team is responsible for tracking project budget
	• to complete a business case to identify the first costs and anticipated return on investment for evidence-based design strategies
	• to continue to refine and update the business case as evidence-based design strategies change during the design process
	• to adjust the budget or functional program to balance project objectives

Domain 5:	Construction and Occupancy
	Understand why it is important to review bids and ensure that the evidence-based design strategies are covered by the existing project construction budget or that the owner has been notified that an adjustment will need to be made to the budget.
	Explain why it is important to coordinate and communicate with different parties (e.g. general contractors and subcontractors) to ensure that the bid award represents the intent of the design strategies that are linked to evidence-based design goals and post-occupancy research plans.
	Describe the continuing roles and responsibilities of the interdisciplinary team to monitor the construction to ensure inclusion of the EBD strategies.
	Explain the importance of educating the general contractor and subcontractors about the value of evidence-based design strategies and the importance for compliance with contract documents.
	Explain why frequent observation of the construction site is important to ensure that evidence-based design strategies are built according to the contract documents.
	Understand the importance of using the business cases and the functional program when budget constraints are pushing for the reduction or elimination of design features linked to evidence-based design goals and the research plan.
	Describe why it is important to verify that the commissioned building complies with the evidence-based design intent prior to building activation/occupancy.
	• safety risk assessment
	• patient, staff, and user safety
	• mechanical, plumbing, and fire protection systems
	• lighting systems and controls
	• acoustical design
	• operational and logistics mapping
	• process mapping
	• technology integration
	Describe the steps that should be taken to ensure that activation readiness (staff relocation) incorporates new processes and workflow linked to evidence-based design strategies/interventions.
	• develop activation timeline
	• review research hypotheses
	• review annotated diagrams
	• assist activation team to provide training about future state workflows – including people, process and technology, physical environment changes
	• support staff recruitment/occupant building orientation and training
	• simulate tabletop exercises and full-size mock-up environments
	• conduct pre-occupancy day-in-the-life exercises
	Update and finalize research plan for post occupancy evaluation and proposed design research.

Domain 6:	Post Occupancy/Evaluation
	Collect data
	Describe how a post-occupancy evaluation is different from conducting other types of research studies.
	Explain the value and benefits of completing an unbiased post-occupancy evaluation.
	Describe the process of conducting a post-occupancy evaluation and the level of data collection and analysis.
	Identify the ideal time duration that should pass prior to conducting the post-occupancy evaluation and why.
	Explain why finalizing the business case should be completed after occupancy to document the return on investment.
	Explain how post-occupancy evaluation results can and should be shared privately or publicly, so lessons learned can be applied to future projects.
	Consider performing and documenting iterative post-occupancy evaluations to continuously re-evaluate on-going systems and operations to support continuous improvement.
	Research contributes to projects during design by informing design decision-making, it also plays a significant role after construction and initial occupancy by:
	• assess the effectiveness of design solutions
	• test and/or confirm theories
	• contribute to the industry knowledge base
	Reiterate and reaffirm the owner's goals and determine the role of the project team in conducting research. Execute the research plan by:
	• identify the research team
	• narrow down the research focus by prioritizing the research topics and select the hypothesis/es to be studied
	• conduct literature review and evaluate the level of existing evidence
	• establish research timeframe, schedule, and budget
	• determine methodology
	• define necessary resources
	• explain potential benefits and drawbacks of an independent third-party evaluation
	• obtain funding
	• obtain approval from the owner and Institutional Review Board
	Collect data and document how data were collected.
	Document empirical findings and conclusions
	Research results are disseminated internally to the design team and the organization and externally to the design community and wider industries.
	• determine how results will be shared beyond the firm/organization through social media, publication, or presentation

	• share results to the wider industry – formally presented, peer-reviewed
	Describe how the EBD process and lessons learned can be documented during the design and delivery of the project, shared, and made available to others.
	• Internal – communications within the firm and documentation in repositories, libraries, or other options
	• External – results shared to contribute to the body of knowledge (e.g., conference presentation, published research)
	Describe how the lessons learned could be organized into the following "buckets."
	• ongoing data collection
	• building infrastructure/retro-commissioning
	• cultural change
	• strategic planning
	• operational changes/alignment
	• integration with other processes, e.g. Lean
	Describe how post occupancy evaluations and research are documented and made available to others to capture learnings and how the results are shared to inform future projects.
	• libraries
	• repositories
	• industry publications
	• presentations
	• white papers
	• peer-reviewed journals