BCPE CORE COMPETENCIES

BCPE Examination Content Outline

The Human Factors/Ergonomics/User Experience discipline is characterized by the following:[1]

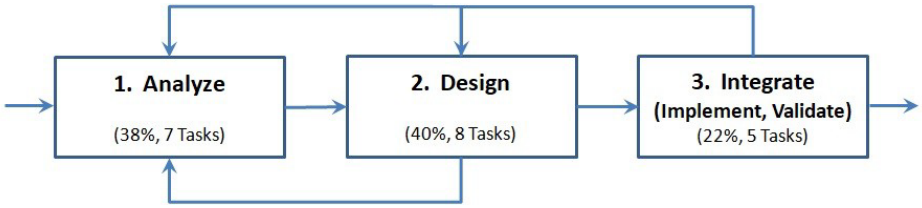
- Takes a systems approach, therefore considers the broader context of the human in the environment, organization, job, and task even when focusing on a specific type of interaction.
- Is design driven, involving analysis resulting in approaches, recommendations, and actions for a design.
- Is an iterative, human-centered process as reflected in the figure below.
- Focuses on two related outcomes: performance and wellbeing, which includes efficiency, effectiveness, health, and safety.

This document describes the Core Competencies which are tested in the exam as part of the BCPE certification process. The core competencies are grouped into three (3) high level categories:

- Analyze
- Design
- Integrate

Within each category the critical tasks for an early career professional (3+ years of experience) are listed along with the associated knowledge and skills. The relative weighting of each category in the exam is also listed.

Overview of Core Competencies (Importance %, Number of Tasks)



[1] J. Dul et al. 2012 *A strategy for human factors/ergonomics: developing the discipline and profession.* Ergonomics 55:4, 377-395

Analyze 38% of exam

Analyzing determines the criteria for performance of humans in the context of system elements, such as products, tasks, jobs, organizations and environments.

Competencies	Knowledge and Skills
1.1 Conduct user research and/or assessment to identify, document, and prioritize ***requirements*** for individuals and groups to achieve their goals.	• Ergonomic design principles, regulations, guidelines, and standards, including those that focus on user accessibility • User research, usability testing, field projects, psychometric approaches, ecological and contextual analysis, observational methods, and performance metrics.
1.2 Identify and employ relevant ***organizational factors*** impacting individuals and groups interacting within an organization, to produce recommendations to enhance quality of performance and wellbeing, including efficiency, effectiveness, health and safety.	• Fundamentals of organizational structure, culture, organizational behavior, group and team dynamics, and principles of work • Macro-ergonomic analysis methods • Sociotechnical systems theory, and methods for assessing work systems • Communication, leadership, stress and motivation.
1.3 Identify and measure the relevant ***physical, physiological and biomechanical*** aspects of individuals and groups performing their activities in their environments, with particular reference to efficiency, effectiveness, health, and safety.	• Biomechanics, physiology, functional anatomy, circadian rhythm effects, and adaptation to stress and workload • Physical measures and psychophysical/subjective measures • Anthropometric, demographic, cultural, and human development attributes of the user population • Design criteria/strategies for anthropometric data.
1.4 Identify ***cognitive, behavioral and social characteristics*** of individuals and groups that impact performance and wellbeing, including efficiency, effectiveness, health, safety, attitudes, value belief systems, and motivation.	• Cognitive task and error analysis methods • Cognitive function and process measurement methods, workload and situational awareness, social causation, network analysis, and assessment of teams.
1.5 Identify and apply methods of evaluation of ***cognitive aspects of human-technology interfaces*** to reduce human error, optimize mental workload, and enhance performance and wellbeing, including efficiency, effectiveness, health and safety.	• Cognitive factors, performance metrics, and evaluation methods for design, systems, and human performance • Human-technology performance modeling, inspection methods, and participatory methods.
1.6 Identify and apply methods of evaluation of ***physical aspects of human-technology interfaces*** to reduce human error, optimize physical workload, and enhance performance and wellbeing, including efficiency, effectiveness, health and safety.	• Performance metrics for human-technology interfaces, and evaluation methods for design, systems, and human performance • Measurement techniques in climatic and perceptual environments, analysis of risk factors, workplace assessment tools, and analysis of tasks, scenarios, user profiles, personas, and Return-on-Investment.
1.7 Identify and analyze ***training and education*** to enhance performance and wellbeing, including efficiency, effectiveness, health and safety.	• Assessing training/education knowledge and skills requirements • Methods to gather data, such as, performance metrics, surveys, observations, and interviews

Design 40% of exam

Designing applies the criteria for development or change of desired performance of humans in the context of system elements, such as products, tasks, jobs, organizations and environments.

Competencies	Knowledge and Skills
2.1 Apply ***ergonomic principles and data*** appropriate to developing and fulfilling a set of requirements to achieve an efficient, effective, safe and usable human-centered design.	• Ergonomics design principles, regulations, guidelines, and standards to fulfill design and user requirements • Applying applicable collected and historical data and information to the design • Human-centered design techniques and process for conceptual, prototype, operational model design alternatives, and iterative methods.
2.2 Design the ***hardware product***, which includes functions, information displays, interactions, communication modalities, etc., within the constraints, capabilities, and context to enable individuals and groups to accomplish a particular set of goals**.**	• Requirements, regulations, principles, guidelines, and standards for hardware design • Input/output modalities, interfaces, and feedback mechanisms for hardware design principles and specifications • Design principles of safety and warning systems, including perceptual environments • Systems design processes, including modeling, prototyping and iterative methods.
2.3 Design the ***software product***, which includes functions, information displays, interactions, communication modalities etc., within the constraints and capabilities of the hardware and the context to enable individuals and groups to accomplish a particular set of goals.	• Requirements, regulations, principles, guidelines, and standards for software design • Information architecture, interaction design, and visual design principles • Software and systems design processes, including modeling, prototyping and iterative methods.
2.4 Design ***tasks*** within human capabilities and limitations, and the workplace context to enable individuals and groups to accomplish a particular set of goals, and manage stress and fatigue.	• Designing for physiological, cognitive and biomechanical capabilities and limitations, and stress responses • Individual and group decision making (e.g. formal and naturalistic) and decision-making strategies.
2.5 Design ***jobs*** using systematic procedures, principles, and techniques in developing and combining tasks into jobs to make them safe, efficient, effective, and motivating, to better utilize human capabilities, and manage stress and fatigue.	• Principles, guidelines, and regulations of job design, shiftwork and automation effects, and human performance measurement • Design processes and tradeoffs with job design, redesign and team design • Planning successful implementation by identifying data and performance metrics.
2.6 Design the ***organization*** within human capabilities and limitations, and the social context to enable to accomplish a particular set of goals, and manage stress and fatigue.	• Organizational behavior, group dynamics and organizational theory • Design strategies to promote and facilitate individual, team and organizational processes and change.
2.7 Design the ***environment,*** within human capabilities and limitations, and the wider context to enable to accomplish a particular set of goals, and manage human stress and fatigue.	• Environmental design principles, regulations, guidelines, and standards for indoor and outdoor spaces, tools, and equipment (e.g. acoustic, visual, noise, lighting, vibration, acceleration/deceleration, temperature) • Environmental design to achieve desired effects on physiological and cognitive systems and responses, and human performance.
2.8 Design ***training and education*** to enhance performance and wellbeing, including efficiency, effectiveness, health and safety.	• Instructional systems design of training, education, and communication processes and methods as applied to products, tasks, jobs, organization and environment • Planning successful implementation by identifying data and performance metrics.

Integrate (Implement-Validate) 22% of exam

Integrating entails managing the implementation of a design and validating the effective design for desired performance of humans in the context of system elements, such as products (hardware and/or software), tasks, jobs, organizations and environments.

Competencies	Knowledge and Skills
3.1 Implement and test ***products*** and related systems, for predictive, stable, reliable and effective outcomes.	• Testing of low and high fidelity prototypes and simulations and products to ensure that design criteria are met • Determining whether standards, specifications and guidelines are met. • Collecting data and analyzing performance metrics for determining successful implementation.
3.2 Implement and test ***tasks and jobs*** and related systems, for predictive, stable, reliable and effective outcomes.	• Test and validation methods for independent and integrated tasks, jobs and systems • Assessment tools and testing environments, including prototypes and simulations • Human performance measurement methods for validating task and job design, including workload balance and structure.
3.3 Implement and test ***organizations*** and related systems, for predictive, stable, reliable and effective outcomes.	• Awareness of test and validation methods for organizations • Organizational analytics, performance metrics, and economic analyses • Awareness of change management and aligning change with organizational structure.
3.4 Implement and test ***environments*** and related systems, for predictive, stable, reliable and effective outcomes.	• Test and validation methods for environments to ensure that requirements and intended design are satisfied • Determining whether standards, specifications and guidelines are met.
3.5 Implement and test ***training and education*** materials to support effective and efficient individual, group, and organizational adoption of design.	• Test and validation methods for training and education to ensure that requirements and intended design are satisfied • Determining whether standards, specifications and guidelines are met.