FOUNDATION FOR Professional Ergonomics

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www.ergofoundation.org

# The Foundation for Professional Ergonomics (FPE) Criteria for the Dieter W. Jahns Student Practitioner Award

The Dieter W. Jahns Student Practitioner Award is open to graduate students (M.S. or Ph.D.) in Ergonomics and Ergonomics-related programs. Students who have completed their graduate degrees in the past year are also eligible.

Important Dates

Dates change, always check the latest summary at www.ergofoundation.org

Criteria

As this is a practitioner award, the student (or students) should describe and document a research or intervention project that exhibits:

- the major practice areas of Ergonomics: Analysis, Design, Validation, and Implementation
- direct, practical application
- final design recommendations or a description of how the resulting information can be applied to design

Entries will be judged by the Board of Directors of the FPE. Each of the following should be included, as it will be examined by the Board as part of the evaluation criteria:

- Explanation and demonstration of how the Ergonomics Core Competencies were addressed.
- Clear identification of the problem in the target community, including importance (magnitude, e.g. incidence, severity, prevalence, impact).
- Identification of the target community.
- Defined objectives.

- Rationale and background for the design (intervention) are understandable and comprehensive.
- Design description is described in a way that enables replication (who, what, when, where, how, safety considerations, milestones, etc.).
- The evaluation contains relevant, meaningful information, in accordance with the problem identification and expected effects of the implementation (examples: descriptive data, compliance data, acceptability, performance data, knowledge improvement, cost, etc.).
- Evaluation/outcome measures are well defined, valid, and reliable. If not, an explanation for their selection should be given.
- Analytic measures should be described adequately and be appropriate to the hypothesis or objectives.
- The full program impact should be considered, if possible. For example, were both beneficial and adverse effects included, unexpected outcomes captured, costs included?
- Limitations should be stated.
- Other issues that could be addressed include, if pertinent to the project include: implementation issues (barriers and enablers, policy changes, stakeholder involvement, etc.); lessons learned; hazards or concerns associated with changes; generalizability of results, acceptability, sustainability, etc.

Submissions

Submissions can be made individually or as a group (maximum size is four participants).

1. While no specific format is required, submissions should provide adequate descriptions, illustrations or photos, and details that address the judging criteria. The project can be drawn from a laboratory study, a field study, a practicum, or an apprentice assignment. If this is a group project, the roles of each of the individuals must be described. The FPE judging committee recognizes that a laboratory or a field study may not provide the scope necessary to demonstrate the full aspects of an Ergonomics practitioner. Thus, the student must describe the results of such studies in the context of an applied situation. For example, if the project is an experiment that demonstrates the improvement in the use of one process (procedure, design, application, etc.) over another, a description should be included that describes (1) the analysis of the user population and/or the situation that would have generated the idea for the study, (2) the design principles and/or theories that structured the approach, and (3) the evaluation process/principles/practice that would be used to determine the effectiveness of the study results in an applied setting.
2. The Ergonomics Core Competencies (below) will serve as the foundation for determining whether or not the submitted project falls within the broad category areas of Ergonomics and is a viable submission.

3. Submission should be sent electronically to:
   Robert J. Smillie, PhD, CPE
   robert.smillie@cox.net

# Ergonomics Core Competencies

The following core competencies list the critical tasks associated with each of the four Core Competency areas. Each task includes examples of knowledge and skills that support each task.

*Analysis*

1. Conduct user research and/or evaluation to identify, document, and prioritize ***requirements*** for individuals and groups to achieve their goals.
   Knowledge and skill in:
   - 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
2. Identify and apply relevant ***anthropometric data***, including applicable demographic and cultural attributes of individuals and groups, to develop design criteria.
   Knowledge and skill in:
   - Anthropometric, demographic, cultural, and human development attributes of the user population
   - Design criteria/strategies for anthropometric data (e.g., 'design for the extreme' or 'design for fit')
3. Identify and employ relevant ***organizational factors*** impacting individuals and groups interacting within an organization, to produce recommendations to enhance quality of work life, safety, effectiveness and efficiency.
   Knowledge and skill in:
   - Fundamentals of organizational structure, organizational behavior and group dynamics,and principles of work
   - Macro-ergonomic analysis methods, sociotechnical systems theory, and methods for assessing work systems
4. Identify and measure the relevant ***physiological and biomechanical responses*** of individuals and groups to their activities and environments with particular reference to health, safety, comfort and effectiveness and efficiency.
   Knowledge and skill in:
   - Biomechanics, physiology, functional anatomy, circadian rhythm effects, and adaptation to stress and workload
   - Physical measures and psychophysical/subjective measures

5. Identify ***cognitive, behavioral and social characteristics*** and responses of individuals and groups that impact health, wellbeing, safety, performance, quality of life, attitudes, value belief systems, and motivation.
   Knowledge and skill in:
   - Cognitive task and error analysis methods
   - Cognitive function and process measurement methods, workload and situational awareness, social causation, network analysis, and assessment of teams
6. Identify and apply methods of evaluation of ***cognitive aspects of human-technology interfaces*** to reduce human error, optimize mental workload, and enhance health, comfort, safety, effectiveness and efficiency.
   Knowledge and skill in:
   - Cognitive factors, performance metrics, and evaluation methods for design, systems, and human performance
   - Human-technology performance modeling, inspection methods, and participatory methods
7. Identify and apply methods of evaluation of ***physical aspects of human-technology interfaces*** to reduce human error, optimize physical workload, and enhance health, comfort, safety, effectiveness and efficiency.
   Knowledge and skill in:
   - 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 ROI

*Design*

1. Apply ***ergonomic principles and data*** appropriate to developing and fulfilling a set of requirements to achieve a safe, usable, effective, and efficient human centered design.
   Knowledge and skill in:
   - Ergonomics design principles, regulations, guidelines, and standards to fulfill design and user requirements
   - Human centered design techniques and process for conceptual, prototype, and operational model design alternatives
2. Design the ***hardware product***, which includes functions, information displays, interactions, communication modalities etc., within the constraints and capabilities, and context to enable individuals and groups to accomplish a particular set of goals.
   Knowledge and skill in:
   - Requirements, regulations, principles, guidelines, and standards for hardware design
   - Instructional, safety and warning systems design principles including perceptual environments
   - Controls and displays design principles, specifications, and methods

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.
   Knowledge and skill in:
   - Requirements, regulations, principles, guidelines, and standards for software architecture and design
   - Software and systems design processes, including prototyping and iterative methods
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.
   Knowledge and skill in:
   - 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 and assessment of teams
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.
   Knowledge and skill in:
   - Principles, guidelines, and regulations of job design, shiftwork and automation effects, and human performance measurement
   - Job and task analysis methods
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.
   Knowledge and skill in:
   - Organizational behavior, group dynamics and organizational theory
   - Design strategies to promote and facilitate individual, team and organizational processes
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.
   Knowledge and skill in:
   - 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 effects on physiological and cognitive systems and responses, and human performance

*Validation*

1. Evaluate and design an existing ***product*** and related systems, for predictive, stable, reliable and effective products.

Knowledge and skill in:
- Test design and analysis methods for products and systems for determining if design criteria are met
- Validation and re-design methods for products and systems

2. Evaluate and design an existing ***task*** and related systems, for predictive, stable, reliable and effective tasks.
   Knowledge and skill in:
   - Test design and analysis methods for independent and integrated tasks and systems
   - Task assessment tools and human performance measurement techniques for evaluating task design and re-design
3. Evaluate and design an existing ***job*** and related systems, for predictive, stable, reliable and effective jobs.
   Knowledge and skill in:
   - Test design and analysis methods for independent and integrated jobs and systems
   - Methods for evaluating human performance with respect to workload balance and structure
4. Evaluate and design an existing ***organization*** and related systems, for predictive, stable, reliable and effective organizations.
   Knowledge and skill in:
   - Test design and analysis methods for organizations
   - Organizational analytics, performance metrics, and economic analyses
5. Evaluate and design an existing ***environment*** and related systems, for predictive, stable, reliable and effective environments.
   Knowledge and skill in:
   - Test design and analysis methods for environments to ensure conformance with relevant regulations, guidelines and standards

*Implementation*

1. Define the ***integrative strategies*** necessary to effectively and efficiently implement design.
   Knowledge and skill in:
   - Human centered design processes, instructional systems design, training and education processes, feedback processes and methods, and communication methods
   - Analytics and performance metrics for determining successful implementation
2. Deliver ***training/education*** to support effective and efficient individual, group, and organizational adoption of design.
   Knowledge and skill in:
   - Instructional systems design, training and education processes, and communication methods
   - Methods for evaluating and/or measuring effectiveness and efficiency of development and delivery of training