**Graduate Program Goals and Outcomes Assessment**

**Human Factors and Ergonomics Graduate Program (MS and PhD)**

1. **Background of the Human Factors and Ergonomics (HFE) Graduate Program**
   
   The domain of Human Factors is human-centered (or user-centered) design. The field's focus is on applying an understanding of cognitive and physical human functionality to address user needs and the user experience by designing processes/services, technology, and infrastructure to facilitate effective and efficient human use. Human Factors is interdisciplinary and intersects psychology, kinesiology, engineering, and design.

   The UMN Regents approved the Human Factors and Ergonomics (HFE) graduate degree (master’s and PhD) program as an interdisciplinary graduate program in June 2010, one month before the Graduate School was reorganized. Following the decentralization of graduate programs, HFE first found an administrative home in Mechanical Engineering and since September 2012 in the Department of Design, Housing, and Apparel (DHA).

   The interdisciplinary program’s course offerings are concentrated primarily in the College of Design, the Psychology Department, and the College of Science and Engineering. Graduate faculty and courses are found throughout the University in the following units: Design, Housing, and Apparel, Mechanical Engineering, Psychology, Center for Design in Health, Computer Science and Engineering, Information & Decision Sciences, Cognitive Science, Kinesiology, and Environmental Health Sciences.

   The appeal and importance of UMN’s HFE program is reflected in its strong national and international set of applicants. There is strong demand for human factors graduates in a variety of settings including medical device companies, health care organizations, manufacturing companies, and the service industry. Demand for human factors students is expected to expand in years to come due to the depth and breadth of their understanding of human functionality and their ability to design to address human strengths and weaknesses. HFE students’ ability to think both quantitatively and qualitatively and to synthesize and apply knowledge gained from an interdisciplinary mix of courses and research will serve them very well in their professional pursuits.

2. **Process for developing this statement**
   
   This program’s goals and how to assess them were developed in consultation with Human Factors and Ergonomics (HFE) faculty and graduate students in one-on-one interaction, graduate faculty meetings, advisory committee meetings, and a focus group.
3. **Educational Goals and Outcomes**

The purpose of the Human Factors and Ergonomics Graduate Program at the University of Minnesota is to prepare students for careers in academia and industry using human factors content expertise and quantitative and qualitative methods to address or solve real world problems (in real world time) faced by business, government and society. Doctoral graduates in human factors will typically obtain jobs in academic institutions, research organizations, businesses, or government agencies. In these positions, they use their skills and knowledge to design human-centered systems, processes/services and technology to foster improved human performance. Graduates may conduct research, teach, analyze data and/or manage organizations. Masters students either pursue doctoral studies, or find employment as human factors professionals in the public or private sector. Regardless of the setting, an essential skill is the ability to construct and communicate analytical arguments from a human-centered perspective, using human factors concepts and quantitative and qualitative information. A successful human factors professional communicates effectively with others working in a variety of settings and roles—in both written and oral communication. Graduates of the program collaborate effectively with diverse individuals and with both interdisciplinary and multidisciplinary teams.

Doctoral graduates should have a deep, active knowledge of at least one area of human factors and will have made an original and significant contribution to the literature in that area. They should be able to design and execute a research program that addresses well-defined and important human-centered design problems. Desired outcomes for doctoral students include:

- Deep understanding and proficiency in human factors and ergonomics at the level required to contribute to the discipline;
- Specialized knowledge of a body of literature, including the ability to identify new research opportunities in the field;
- The ability to conceptualize and define the human factors aspects of a problem;
- Proficiency in designing and executing a research strategy to address/solve significant questions in a real world setting;
- The ability to effectively communicate a human-centered design argument both verbally and in writing;
- Demonstrate a commitment to active citizenship in the discipline, including engagement in professional service to the profession and society at large;
- Commitment to the ethical conduct of research and professional activities;
- Contribute to the intellectual community and be able to critically analyze and evaluate one’s own findings and give effective and constructive feedback to others.
While masters students do not typically achieve the same depth and breadth of disciplinary knowledge as a doctoral student, desired outcomes for master’s students include:

- Depending on the student’s master’s degree plan (Plan A or C), either contribute original research to the field or create at least two original human-centered design interventions that address existing real world problems;
- Develop critical thinking and problem solving skills;
- Gain proficiency in using quantitative and qualitative methods, data management and research design through course work, projects, and research;
- Develop both written and verbal communication skills to effectively communicate human-centered design arguments and quantitative and qualitative information to those who are not human factors professionals.

4. **Assessment of Achievement of Student Goals and Outcomes**

Doctoral students demonstrate mastery of human factors content and methodology and deep knowledge in their chosen dissertation area by independently generating a dissertation proposal. In doing so they synthesize existing literature and identify new research opportunities. Students defend their proposal and then conduct the proposed research, including the data analysis and interpretation. Successful completion of a dissertation approved by the student’s final examining committee and passing the final oral exam is evidence of the student’s contribution to knowledge in the discipline.

Doctoral students are required to complete a minimum of 42 approved HFE program course credits and 24 dissertation credits, helping to ensure they have the depth and breadth required to be knowledgeable human factors professionals. The interdisciplinary mix of course credits is drawn from psychology (primarily perception, cognition, and statistical methods courses), computer science and engineering, design, kinesiology, public health, and information & decision sciences. Students choose the courses and focus in consultation with their advisor. Completing the required Analysis of Psychological Data PSY 8811 and PSY 8812, for example, with grades of B or better provides evidence of a student’s basic mastery of statistical methods involving human subjects; students are encouraged to take additional statistical and research methods credits beyond PSY 8811 and 8812.

Master’s Plan A, with thesis, students are required to take a minimum of 30 credits—20 credits from the HFE approved course list, plus 10 thesis credits. Master’s Plan C, without thesis, students are required to take a minimum of 30 credits from the HFE approved course list, including at least two 3-credit courses that are, at a minimum, 50% project based. Master’s students are also required to complete Analysis of Psychological Data PSY 8811 and PSY 8812. Satisfactory completion of these courses provides evidence of a student’s basic mastery of
statistical methods involving human subjects. The HFE master’s course requirements help to ensure that master’s students leave the program with knowledge of HFE content and quantitative and qualitative methods at a master’s level of proficiency.

Both PhD and master’s students are required to complete an annual academic progress review in a meeting with their advisor to discuss their academic progress in light of program expectations. Topics addressed during the annual review include grades, milestones, presentations, publications, strengths, and areas that need work. Advisors provide constructive feedback to students and a five-point scale is used to rank progress (1 = outstanding and 5 = dismissal from the program). Students with scores of 3 – 5 meet with their advisor and the Director of Graduate Studies to discuss plans for improving.

Presentation of research by students in seminars and conferences provides professional experience in communicating their research, and provides feedback to the program on its success in creating scholarly human factors professionals. Active participation of students in HFE-affiliated research seminars and committees provides evidence of student engagement in the intellectual community and creates opportunities for students to contribute as peers.

The handbook detailing HFE program requirements is found here: http://humanfactors.design.umn.edu/documents/Handbook_031.pdf