

Research Strengths and Priorities – College of Design

The College of Design is increasing its research portfolio as a priority strategic initiative. We are especially interested in cross-disciplinary, cross-college, cross-university collaborative work where design innovation can be incorporated into STEM, social sciences, and humanities research.

Listed here are areas of strengths and priorities for research that are central to the mission of the College of Design. Most of these strengths are cross-collaborative with each other both within the college, university, and externally. All of these priorities occur at the local, regional, national, and international scales.

Improving STEM education, ideation, and communication through integration with art and design

Description: Research instructional methods and materials that will help guide the teaching and learning of deliberate approaches to creative problem solving in the design process

Priority areas:

- innovation pedagogy to spur economic development
- integrate design thinking into entrepreneurship education
- Science visualization (high impact hire in biomedical illustration)
- Mobile maker classroom
- Digital Fabrication & Design-Build (high impact hire in Architecture)
- Art and design history, theory, and criticism
- Art education
- Virtual reality

Funding: US Dept. of Education, Labor, Commerce, NEA

Innovative entrepreneurship

Description: Partner with business and communities to drive innovation through creativity and design thinking.

Priority areas:

- Sketch to shelf life cycle
- Corporate sponsored studio design
- Corporate sponsored research, design, and ideation
- Community and economic business relationships
 - Real estate (High impact hire)
 - Community Economic Development
- Social entrepreneurship
 - Community Arts (High impact hire)
- Global entrepreneurship

Funding: US Dept. of Labor, Commerce, Education, and Corporate and Foundation funders

Designing the sustainable human environment

Description: Building energy efficiency and building integrated renewable energy production. Integrated sustainable building systems and landscapes; biowalls, green roofs, green streets, bioretention basins, disaster recovery, and environmental health including research on materials that make these discoveries possible. Design of secure spaces for human habitation.

Priority areas:

- Materials
- Building energy systems
- Urban and rural infrastructure
- Incarceration facilities
- Health facilities
- Design for physical and cognitive disabilities
- Wayfinding and signage
- Technology usability
- Noise pollution

Funding: NSF, NIH, US Depts. of Labor, HUD, Homeland Security, Energy, Commerce, Education, Agriculture, Public Health, FEMA

Engagement in urban and community planning, policy, and design

Description: Integrating design into the understanding and framing of urbanized and rural environments by engaging directly in a community of inquiry and practice while learning to create more adaptable, flexible and resilient cities and regions within the context of a changing world.

Priority areas:

- Scale: Urban centers, neighborhoods, small communities, rural areas
- Governance, policy, planning, and visioning
- Economics
- Real estate (high impact hire)
- Historic preservation (high impact hire)
- Community arts (high impact hire)

Funding: US Housing and Urban Development, Transportation, Commerce, Education, Agriculture, Labor. State of Iowa, county, and regional governments.

Spatial design, analysis, and visualization

Description: Interactive design visualization and modeling using GIS and 3D animation, natural resource analysis, logistics, parametrics, computer programming and algorithms, automated machine guidance, geogames, geospatial statistics. Research, application, and support of these technologies.

Priority areas:

- GeoDesign (high impact hire in GIS)
- Natural resources analysis
- Business logistics
- Map design and communication
- New high impact hire in geographic information systems
- Science visualization (high impact hire in biomedical illustration)

Funding: US Dept. of Interior, Transportation, Environmental Protection, Agriculture

The CoD and Iowa State's Grand Challenge Research Themes

Enabling healthy lives

- Environments designed for human health and quality of life.
- Integrated design input

Building sustainable human and natural ecosystems

- Engagement in urban and community planning, policy and design
- Design the sustainable human environment, sustainable materials

Designing next-generation materials and manufacturing technologies

- Conception and production of objects and environments.

Creating data-driven science and information systems for societal challenges

- Data visualization, Geo-spatial and Community Data for Decision Making
- develop scientific basis for data driven government, community, NGO decisions

Developing global citizens and our workforce

- Design thinking: ideation, visualization, innovation, and entrepreneurship.
- Expanding STEM education to include the arts, humanities, and social sciences.
- Integrating design thinking into life-long learning
- Individualized learning

Research Resources in the College of Design

Research Strengths and Priorities (see previous section for details)

- Improving STEM education, ideation, and communication through integration with art and design
- Innovative entrepreneurship
- Designing the sustainable human environment
- Engagement in urban and community planning, policy, and design
- Spatial design, analysis, and visualization

Faculty Research Teams

- Quality of life & the built environment (Passe)
- Youth and the built environment (Shirtcliff)
- Data visualization & visual problem solving (Moss)
- Ideation (McKilligan)
- Sketch to shelf lifecycle (Herrnstadt)
- Design coding and parametrics (Westort)
- Spatial analysis and design (Kane)

CoD Research Centers

- Institute for Design Research and Outreach
- Center for Building Energy Research (Passe)
- ISU Geographic Information Systems Support and Research Facility (Kane)
- Community Visioning (Badenhope)
- Computation and Construction Lab (Doyle)
- Community Design Lab (Rogers)
- E-design (Affiliate) (McKilligan)
- Kies Collaborative Research Suite (Stevens, Shirtcliff, Wagner, Paxson, Osterberg)

Current Priority Research Grant Areas

- Community visioning (Badenhope)
- Smart cities (Passe)
- Smart decision-making for small and shrinking communities (Zarecor)
- Ideation (McKilligan)
- Community engagement (Rogers)
- Geographic information systems (Kane)

High Impact Faculty Positions

- Biomedical illustration (Moss)
- Digital Fabrication & Design Build (Doyle)
- Real Estate (Kuhlmann)
- Community Arts (Drinkwater)
- Historic Preservation (Grevstad-Nordbrock)
- GeoDesign (Poplin)