Master of Science in Architecture

RESEARCH PRACTICES

UNIVERSITY OF MINNESOTA | COLLEGE OF DESIGN | DESIGN.UMN.EDU
RELATIONSHIPS IN THE CONSORTIUM FOR RESEARCH

[Diagram showing relationships between various entities such as students, faculty, firms, non-profits, school, and consortium.]
“In the midst of a dynamic mix of professional experts and academic researchers, students thrive, guided by both mentors and professors in individual research projects that connect to multiyear research goals. This meaningful work also counts towards licensure, potentially upon graduation of the advanced post-professional degree.”

Renée Cheng, Director, M.S.-R.P. and the Consortium for R.P., Associate Dean for Research, College of Design, UMN
The Masters of Science in Architecture with a concentration in Research Practices (M.S.-R.P.) addresses two goals: providing a structured path to licensure totaling seven years from the start of college and integrating research with practice. The program takes advantage of many of NCARB’s recent changes to IDP and ARE® as well as leveraging the historically strong connection between practice and academy in our Minneapolis/St. Paul community.

Most critically, we believe that by offering M.S.-R.P., we nudge the profession towards true culture change, one that expects all our students can be licensed upon graduation, regardless of their final career choices. This change extends to architectural firms and the building industry, transforming the culture to one of sharing knowledge in the effort to collaboratively tackle the serious “wicked problems” affecting the built environment.
Connecting Education & the Profession Through Research

The relation between the architectural profession and academia has the potential to be a rich and interactive exchange leading to meaningful advancement of the discipline. M.S.-R.P. creates a robust knowledge loop in which the professionals identify problems in the course of practice and academic researchers communicate useful results back to practitioners. Research priorities developed by professionals ensure their value to clients, while complementary research priorities collectively developed with academic researchers address broad societal needs, advance building technology and reduce waste at many scales in the building industry. In the midst of this dynamic mix of professional experts and academic researchers, students thrive, guided by both mentors and professors in individual research projects that connect to multi-year research goals. Since the students’ roles in these research efforts is counted in their IDP, meaningful work systematically leads to licensure, potentially upon graduation of the advanced post-professional degree, the M.S.-R.P.
Overview

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Who should apply?
The M.S.-R.P. program admits candidates who have a previous professional degree (B.Arch or M.Arch, or for current UMN students working towards their M.Arch degree). Ideal candidates for the program will have completed at least half of the required IDP hours (approximately 2,800 hours) and have strong design skills, organizational abilities and interest in developing leadership capacity.

Research
The M.S.-R.P. incorporates a new experience that we are calling a “research practice internship”. The student is working within a larger consortium of firms and the University that establishes multi-year consortium-wide goals and links faculty advisors with professional mentors to the students. The consortium relationship creates a robust knowledge loop between the profession and academy. This in turn establishes meaningful internships for students that combine funded research as student assistants supervised by faculty with office-based internships paid by the firms – qualifying for the all important “Experience Setting A” as defined in IDP. By integrating the two experiences for the student, academic research is applied on actual projects and information is gathered in a way that allows for consistent methods. The results of this work build a rigorous database to share within the consortium providing the student with context for their work, understanding their project as one component in a strong bridge between school and profession.

Goals
The program’s goals include full integration of education, practice, and research, high quality education and practice experience with reduced time to licensure, and create a seamless relationship between education, internship, examination, and continued professional development. It will achieve these goals by providing students/interns with:

- A structured path to internship, examination, and licensure
- A role in the profession creating conduits for knowledge exchange
- Develop valued capacity for (future-oriented) practice-based research
Integrated Research Practices Curriculum
In addition to the coursework, the program includes an integrated curriculum, which includes a variety of educational opportunities and initiatives. The program encourages students to expand their education by participating in special lectures and events, professional practice, and research. The integrated curriculum includes: The M.S.-R.P. curriculum, a forum for M.S. students, related lectures and events, and research opportunities at the College of Design.

Research Internships/Practice Internships
M.S.-R.P. candidates are eligible for a funded one- or two-semester internship with local architecture firms, design firms, or construction companies. Internship candidates work with faculty, researchers, industry representatives, and practitioners. Typical projects investigate Integrated Project Delivery (IPD), Building Information Modeling practices, emerging construction technologies, professional practice, and computing technologies.

Intern Development Program (IDP)
The M.S.-R.P. program has been approved as a post-professional advanced degree by the National Council of Architectural Registration Boards (NCARB). M.S.-R.P. students who successfully complete the program after earning a National Architectural Accrediting Board (NAAB) or Canadian Architectural Certification Board (CACB)-accredited professional degree in architecture qualify for 930 elective hours of IDP (Experience Setting S: Supplemental Experience). Advanced degrees must be submitted to NCARB in compliance with the reporting requirements.

Practicum
Practica courses directly address topics in the Architect Registration Examination® (ARE ®). ARE exam sections are incorporated into coursework and M.S.-R.P. candidates are expected to attempt all sections of the ARE during their program.
Curriculum

The M.S.-R.P. Concentration requires a total of 30-36 credits, typically completed in one academic year. Due to the intensely integrated nature of the M.S.-R.P. the majority of the curriculum is composed of required courses and internship experiences. The range of 30-36 credits is used in the rare circumstance that a stipend-based internship is not available.

Students who enter the M.S.-R.P. may enroll in the program for only the M.S. degree or combine it with the M.Arch degree. Listed here are example schedules that outline possible course sequences for students in either option. The typical M.S.-Only curriculum is shown on this page. Two methods of combining degrees — with the 2-year or 3-year M.Arch. — are shown on the adjacent page.

M.S.-Only Degree Path

<table>
<thead>
<tr>
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<td>Practicum</td>
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<td>Professional Practice</td>
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<td>Elective</td>
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YEAR ONE

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<tr>
<td>Elective</td>
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<tr>
<td>Final Project</td>
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<td>Research Internship</td>
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YEAR TWO
## 2-year M.Arch + M.S.

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<td>Tech III</td>
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<td>Bldg Stories</td>
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<td>Final Project</td>
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<td>RI</td>
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<td>PI</td>
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## 3-year M.Arch + M.S.

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<td>Bldg Stories</td>
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<td>Practicum</td>
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<tr>
<td>Practicum</td>
<td>3 cr.</td>
<td>Final Project</td>
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<tr>
<td>Final Project</td>
<td>4 cr.</td>
<td>RI</td>
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<tr>
<td>RI</td>
<td>10 hr/wk</td>
<td>Elective</td>
</tr>
<tr>
<td>PI</td>
<td>15 hr/wk</td>
<td>Elective</td>
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**Note:**
- CR stands for credits.
- R stands for research.
- PI stands for professional internship.
- RI stands for research internship.
Set along the banks of the Mississippi River, the School of Architecture is in the heart of a dynamic metropolitan area. Just minutes from downtown Minneapolis and St. Paul, the University's urban location is rare among land-grant universities. This places the M.S.-R.P. program within a flourishing design and arts community, and a region offering many economic and ecological assets. This context offers rich educational, cultural, and recreational opportunities for students.

With over 250 firms, the Twin Cities have one of the largest and most active design communities in the country, giving students excellent opportunities to engage with local practitioners. Many practicing architects teach in the program. The numerous firms in the area also provide internship and employment opportunities for students pursuing their degree.

Minneapolis and St. Paul are home to some of the leading cultural institutions in the country. The Walker Arts Center and the Minneapolis Institute of Arts, both known for their innovative programming, host exhibitions and lectures that address a wide range of issues, including sustainability. There are more than 30 museums, over 60 theaters, numerous art galleries, and diverse music venues, making the Twin Cities a thriving arts center.

Minnesota has been ranked as one of the most livable places in the United States. The state is composed of a wide range of environments: the wilderness of the north shore of Lake Superior, small mining towns on the Iron Range, rolling prairies in the southwestern corner of the state, the central lakes region, and the metropolitan Twin Cities. For recreation there are the Boundary Waters Canoe Area, a wilderness of over one million acres; the Superior National Trail; and the “ten thousand lakes” for which the state is known. Within the Twin Cities there is an extensive park system that includes the Chain of Lakes, the Mississippi riverfront, and greenway bike trails. Fishing, ice-skating, skiing, and boating are all possible within the metropolitan Twin Cities.

Minnesota and the Twin Cities have long provided a setting for architectural innovation. Works by Frank Lloyd Wright, Marcel Breuer, Frank Gehry, Michael Graves, Philip Johnson, Herzog & de Meuron, Jean Nouvel, Steven Holl, Antoine Predock, Ralph Rapson, Eero Saarinen, Eliel Saarinen, and many others, can all be found in the area.
Benefits/Value

STUDENT Benefit
- 225 hrs* of IDP in experience setting A or O during academic year (Practice Internship)
- 150 hrs* of IDP in experience setting S per academic year (Research Internship)
- 600 hrs* of IDP in experience setting A or O per summer
- 930 hrs* of IDP in experience setting S for advanced degree
- Stipend and salary similar to Research Assistant position stipend and tuition reduction
- Fellowship opportunities exclusive to MS-RP including tuition, ARE® fees, etc.
- ARE instruction customized for MS-RP, sections taken in structured cohort

Value
- potential to complete IDP and ARE® and reduce time to licensure
- relationship with faculty members’ research
- high quality office experience in a challenging job market
- opportunity for leadership, substantively contributing to firm and to consortium

*students' individual hours may vary

CONSORTIUM MEMBER Benefit
- answer relevant research questions that are beyond the time and capacity of firms
- access to faculty expertise and faculty research
- access to highly qualified students matched to individual firm
- access to consortium database exclusive to members
- access to research results presented at exclusive consortium meetings
- citations in publications
- 6 hours per year of Continuing Education / AIA Learning Units (LU)

Value
- research capacity within the firm is expanded
- research results apply to projects with direct benefit to clients
- connection to University can lead to consultation, collaborative grants or projects
- eligibility for collaborative grants requiring full-time academic participants
- connection to University has marketing value, plus promotion by University
- collaboratively built database broadens and deepens expertise
Students

“The M.S.-R.P. program gave me the opportunity to build on my own personal research interests in digital processes and fabrication, but with the added benefit of partnering with an architecture firm. The lessons learned from that experience were extremely valuable, and it has fundamentally changed the way that I approach problems for the better.”

— Philip Bussey

“Through the M.S.-R.P. program I have been able to contribute to the conversation shaping the future of the profession. My project investigates how practitioners pursue social priorities while being accountable for sustaining healthy businesses. This inquiry is aligned with my personal interests and is knowledge I hope to continue to build on as I mature in the profession. My exposure to research, academics, and other professionals engaging in similar questions has already expanded my network and will be a valuable asset moving forward.”

— Jessica Horstkotte

“I enrolled in the M.S.-R.P. program for many reasons. The prospect of internship opportunities with top-level firms, the prospect of licensure upon graduation, and involvement in cutting-edge architectural research were very appealing to someone who already had an M.Arch. This program, with its collective resources, has helped me immensely in reaching my goals of licensure and solidifying my areas of interest within the broad field of design.”

— Matthew Tierney

“I was one of the first students to participate in the M.S.-R.P. pilot program and it has substantially impacted my career. As a participant, I developed an energy modeling methodology for a leading Minneapolis design firm. The power of the M.S.-R.P. program is that it upends the typical intern relationship with an office; I was able take a leadership role developing new knowledge for the firm and worked directly with one of the founding Principals to do so. I was hired by the firm after graduation and now lead our internal applied research initiatives.”

— Chris Wingate
The Rural Healthcare Design Toolkit hopes to act as a resource for architects, engineers, and landscape architects outside of Africa. An interactive, software-based tool developed by the during a semester long research effort sought to assist architects and engineers in making informed decisions when designing healthcare projects in rural Africa. The Rural Healthcare Design Toolkit advises culturally and environmentally sensitive design decisions based on the complex interactions among infrastructure, human behavior, and the natural environment present in rural locations. The Toolkit uses systems thinking to identify important social and environmental relationships causing “illness”, specifies building and site design considerations, and sets performance-based goals to encourage the use of sustainable building practices.

PORTABLE VIRTUAL ENVIRONMENTS
Student: William Adams
Faculty: Lee Anderson, Renee Cheng, and Andrea Johnson
Professional Supervisors: Taylor Cupp and Ricardo Kahn
Firm: Mortenson

Immersive virtual environments (IVEs) are recognized as potentially useful in many industries, including architecture, engineering, and construction. IVEs’ usefulness is attributed to their ability to accurately simulate scale and depth from an egocentric viewpoint. IVEs are often created by displaying a virtual model via a head mounted display (HMD). Advances in small, lightweight, high definition screens have caused the cost of HMD’s to go down while simultaneously improving their quality. A large portion of the research currently being executed on HMD facilitated IVEs is geared towards their use in video games, while fewer resources are focused on developing IVEs for the AEC industry. This project seeks to develop a portable, HMD facilitated IVE which is designed specifically for Mortenson Construction.
TUNED SURFACES
Student: Philip Bussey
Faculty: Marc Swackhamer
Professional Supervisors: Jim Moore and Alex Terzich
Firm: HGA Architects and Engineers

In contemporary architectural discourse, focus has expanded from “making form” to “finding form.” In form-finding, geometry grows out of a careful analysis of building program, user behavior and other “performative” standards such as light or sound. Typically, “parametric” software is used that can bind chosen parameters with geometric output. Resulting surfaces and material treatments are “tuned” to the nuances of program, light or sound, creating complex surfaces. To achieve the tuned surface in a cost effective way, architects must engage in the parametric design of fabrication methods, partnering with fabricators in a digital fabrication process, also known as “digifab”. The outcomes of this proposal includes a report speculating how parametric processes might be incorporated into a completed project.

DATA AND PARAMETRIC DESIGN
Student: Dan Raznick
Faculty: Marc Swackhamer and Renee Cheng
Supervisors: Rick Hintz, Meredith Hayes, Andrew Salveson, & Tony Layne
Firm: Perkins and Will

This research examines data and parametric processes through a collaboration with Perkins+Will, and focuses on a single building currently in schematic design. The project’s scope is aimed to investigate ways to integrate environmental simulation, spatial performance, and design intent criteria through the analysis, management, and visualization of data. Parametric design tools, simulation software, and Microsoft Excel are used to facilitate the processes. The goal is to create tools and visualizations to inform designers of the complex impacts seemingly simple decisions have on performance and design intent. There is rarely an ideal solution to satisfy all criteria, so by mining and representing data, designers can make informed decisions based on their priorities.
Program Faculty

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Renée Cheng, AIA
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Director, M.S. in Research Practices
& the Consortium for Research Practices
Associate Dean of Research
B.A., Harvard College
M.Arch, Harvard University
-Integrated project delivery,
-Emerging construction technologies,
-Professional practice,
-Computing technologies.

Blaine E. Brownell, AIA, LEED-AP
Associate Professor of Architecture
Co-Director M.S. Sustainable Design Program
B.A., Princeton University
M.Arch Rice University
-Energy modeling and its application to design
-Emerging materials
-Sustainable Infrastructure
-Contemporary Japanese Architecture

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Associate Professor of Architecture
Director, B.S. in Architecture Program
B.S. Arch. University of Virginia
M.Arch & M.S. Arch, University of Michigan
-Architecture photography
-Design pedagogy and representation
-New forms of critical urbanism
-Active learning environments

Andrea Johnson, AIA, LEED AP
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M. Arch, Columbia University
Bachelor of Arts, Stanford University
-Digital fabrication
-Building technology

Jim Lutz, AIA
Lecturer
Co-Director M.S. Sustainable Design Program
B.A., University of California, Berkely
M.Arch Syracuse University
-Sustainable Design strategies for single and multi-family residential projects
-Building technology
-Adaptive re-use and sustainability

Marc Swackhamer
Associate Professor
Director Master of Architecture Program
B.Arch University of Cincinnati
M. Arch, Rice University
-Biomimetics in Architecture
-Experimental fabrication technologies
-Responsive + light weight construction systems
-Digital production methods
Consortium For Research Practices

AECOM

CUNINGHAM GROUP

DLR Group

hGA

Mortenson

MSR

PERKINS+WILL

COLLEGE OF DESIGN

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CONSORTIUM FOR RESEARCH PRACTICES
Please visit the School of Architecture website, arch.design.umn.edu, for information about our graduate degree programs:

**Master of Architecture**
- **M.S. in Architecture — Sustainable Design**
- **M.S. in Architecture — Heritage Preservation**
- **M.S. in Architecture — Metropolitan Design**
- **M.S. in Architecture — Research Practices**

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archinfo@umn.edu

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89 Church Street S.E.
Minneapolis, MN 55455

**School of Architecture Location:**
The School of Architecture Graduate Program Office is located in Rapson Hall, room 145

*In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. The Master of Science alone is not an accredited degree.*

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*Credits: Photos by Architecture Photography course students 3-5, Blaine Brownell 15 & 23; book design by Dustin Harford.*

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Steven Holl Architects.*