

School of Architecture

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<http://www.soa.cmu.edu>

The School of Architecture (SoA) provides deep immersion in the discipline of architecture, intensified by the broader Carnegie Mellon culture of interdisciplinary innovation and creative inquiry.

We define the discipline of architecture as the integrated pursuit of design creativity, historical perspective, social responsibility, technical expertise, and global environmental leadership. Our undergraduate and graduate degree programs prepare students to be excellent, discipline-defining design thinkers in diverse global contexts.

This world-class architecture education is enhanced by our position within one of the world's leading research and entrepreneurship institutions, and by the foundational premise that architectural excellence demands both rigorous training in fundamentals and the development of unique specializations. Students may extend their core knowledge either through concentration in architecture subdisciplines like sustainable design or computational design, or through interdisciplinary interaction with CMU's other renowned programs—whether the sciences, the humanities, business, or robotics. Though every School of Architecture student graduates with intensive architecture knowledge, no two graduates leave with the same education.

In the twenty-first century, few architecture problems are straightforward. Graduates of SoA excel in the roles architects have performed for centuries—and in new roles catalyzed by the depth and breadth of their education—to create and execute innovative solutions to a huge range of emerging global challenges.

Bachelor of Architecture Program

The NAAB-accredited five-year Bachelor of Architecture (B.Arch) program prepares students to be design-thought leaders in a variety of fields, as well as to continue on their path to licensure in the profession of architecture. The B.Arch program begins with three largely scripted years of studio and coursework, providing students a strong, multifaceted foundation in architectural principles and methods. In the fourth and fifth years, students tailor their studio and course choices to the interests they've honed in their first three years: they may choose to continue a general-studies approach or may concentrate their work more heavily in a specific architectural subdiscipline. All B.Arch graduates are thoroughly prepared to continue toward professional licensure, but the tone of their education is distinctly personal.

Each course required for the B.Arch program falls into one of seven categories, each pursuing a set of specific objectives for student learning:

- **Studio (168 units):** Architectural design studio (prescribed for the first three years and selective thereafter) is the backbone of every semester in the B.Arch program. Students learn to combine rigorously rational and resourcefully creative techniques to identify design problems, collect and analyze data, apply theoretical and practical strategies in creation of a design solution, and evaluate its results through extensive testing; and to describe and work at various points along the continuum between form-finding and form-making. (Courses: Foundation I & II, Elaboration I & II, Integration I & II, Advanced Synthesis Options Thesis/Studio I & II)
- **Critical Practice (42 units):** A multifaceted field of practice, architecture interacts with dynamic social, organizational, economic, professional, and cognitive contexts. In this sequence, students learn to use methods from cognitive psychology to analyze the influence of human factors on design, construction and occupancy; to resolve ethical dilemmas with adjudication strategies based in architectural case study; to demonstrate critical awareness and broad understanding of the factors informing the intelligent resolution of architecture and construction; and to identify the roles of architects, urban designers and planners in shaping the built environment in a global context. (Courses: First Year Seminar: Architecture Edition I & II, Case Studies in Architecture and Urban Studies, Human Factors in Architecture, Real Estate Design and Development, Issue of Practice)
- **Design Tools (24 units):** Drawing and modeling both by hand and with the computer are core skills for developing powers of observation, the ability to think in three dimensions, and the communication of architectural ideas. By using a range of analog and digital design tools to engage in the act of making, students will be able to explore, analyze, formulate, fabricate, and represent ideas about the built

environment. (Courses: Analog and Digital Media I, Analog and Digital Media II)

- **Environmental Science (27 units):** Environmental education is one of our highest priorities. In this sequence, students learn to describe first principles of and computational approaches to the lighting and thermal performance of buildings; to demonstrate qualitative and quantitative climate- and environment-responsive strategies (energy conservation, passive heating/cooling, daylighting, natural ventilation); to select, configure, and represent building service systems; and to maintain global awareness of high-performance systems-integration strategies. (Courses: Building Physics, Environment I: Climate & Energy, Environment II: Mechanical Systems for Buildings)
- **History (27 units):** In architectural history courses, students learn to identify chronologically and geographically diverse building styles, building types, and urban plans; to describe the cultural, intellectual and aesthetic contexts surrounding the creation of those buildings and sites; to write clearly and persuasively about the historic built environment; and to demonstrate critical thinking, quality research, and effective information management. In addition to the two-semester Historical Survey of World Architecture, each student completes one elective course on architectural history within the School of Architecture. A minor in architectural history is available to students completing four additional, approved, nine-unit architectural history courses beyond these three required courses. (Courses: Historical Survey of World Architecture and Urbanism, Modern Architecture, Architectural History III)
- **Building Technology (18 units):** We understand technical knowledge as design knowledge and place major emphasis on understanding the state-of-the-art and innovative building structure, enclosure, mechanical, lighting, and interior systems. Students learn to design gravity- and lateral load-resisting systems for buildings; to select, configure and size construction systems in wood, masonry, steel, and concrete; and to distinguish among construction materials with regard to their process of manufacture, their physical properties, their environmental performance, and their methods of selection and specification. (Courses: Materials and Assembly, Structures/Statics)
- **General Studies (135 units):** University coursework in mathematics, physical sciences, social sciences, writing, and history are prerequisite to the School's own offerings. (Courses: Exploring Pittsburgh, Interpretation and Argument, Computing @ Carnegie Mellon, Descriptive Geometry, Generative Modeling, Fundamentals of Computational Design, University Electives)

Curriculum

Minimum units required for Bachelor of Architecture 450

First Year: Foundation

48-100	Architecture Design Studio: Foundation I	12
48-025	First Year Seminar: Architecture Edition I	3
62-122	Digital Media I	6
62-125	Drawing I	6
62-106	Architecture and the Arts	9
76-101	Interpretation and Argument	9
99-101	Computing @ Carnegie Mellon	3
48-105	Architecture Design Studio: Foundation II	12
48-026	First Year Seminar: Architecture Edition II	3
62-123	Digital Media II	6
62-126	Drawing II	6
48-240	Historical Survey of World Architecture and Urbanism I	9
xx-xxx	University Elective	9

Second Year: Elaboration

48-200	Architecture Design Studio: Elaboration I	18
48-215	Materials and Assembly	9
48-116	Building Physics	9
62-225	Generative Modeling	9

48-205	Architecture Design Studio: Elaboration II	18
48-215	Materials and Assembly	9
48-241	Modern Architecture	9
62-275	Fundamentals of Computational Design	9

Third Year: Integration

48-300	Architecture Design Studio: Integration I	18
48-315	Environment I: Climate & Energy	9
48-250	Case Studies in Architecture and Cities	9
xx-xxx	University Elective	9
48-305	Architecture Design Studio: Integration II	18
48-380	Real Estate Design and Development	6
48-381	Ethics and Practice	12
xx-xxx	University Elective	9
48-497	Thesis Prep (Optional)	3

Fourth Year: Advanced Topics

48-400	Advanced Synthesis Options Studio I	18
48-432	Environment II: Design Integration of Active Building Systems	9
48-xxx	Architectural History III (Elective)	9
xx-xxx	University Elective	9
48-410	Advanced Synthesis Options Studio II	
48-xxx	Architecture Elective	9
48-xxx	Architecture Elective	9
xx-xxx	University Elective	9

Fifth Year: Advanced Topics

48-500	Advanced Synthesis Options Studio III OR	18
48-509	Architecture Design Studio: Thesis I/ Independent Project	18
xx-xxx	University Elective	9
xx-xxx	University Elective	9
48-510	Advanced Synthesis Options Studio OR	
48-519	Architecture Design Studio: Thesis II/ Independent Project	18
xx-xxx	University Elective	6-9
xx-xxx	University Elective	6-9

Minors in Architecture

Undergraduate students in the School of Architecture can also qualify to earn one of three minors within the subject of architecture. These are the Minor in Architectural History, the Minor in Building Science, and the minor in Architectural Representation and Media.

The Minor in Architectural History is intended for those students that want to deepen their knowledge in architectural history. It is earned by completing the three required architectural history courses and then an additional four elective courses in architectural history.

The Minor in Building Science is intended for those students that want to deepen their knowledge in the building sciences and for those who are interested in gaining advanced placement (AMP) in the M.S. programs offered by the School in the areas of Building Performance & Diagnostics and Sustainable Design. It is earned by completing the two required building technology and three environmental science courses and then an additional three elective courses in the building sciences.

The Minor in Architectural Representation and Media is intended for those students that want to deepen their knowledge in architectural representation and media and for those who are interested in gaining advanced placement (AMP) in the M.S. programs offered by the School in the areas of Computational Design, Tangible Interaction Design and/ or Emerging Media. It is earned by completing the four required media courses and then an additional three elective courses in these areas.

The Minor in Architectural Design Fabrication is intended for those who wish to develop focused, disciplinary expertise in both analog and digital material methods for shaping the built environment and become involved in a community of practice dedicated to a rigorous pursuit of *making* as a mode of architectural research and cultural expression. It is also for

students interested in gaining advanced placement in the SoA's Master of Advanced Architectural Design (MAAD) program.

Minors in Other Disciplines

Undergraduate architecture students may also earn minors in many of the departments or schools on campus. Generally, a student must take six courses within a specific department or concentration to receive a minor. Students interested in minors must contact the school or department of interest to determine specific requirements or prerequisites. Since students of architecture are required to take fifteen electives (135 units), students can easily complete a minor without adding additional coursework to their curriculum.

Graduate Degree Programs

Carnegie Mellon University is recognized for outstanding contributions to science, technology, management, policy, and the fine arts. The School of Architecture builds on a tradition of interdisciplinary study.

Our faculty's diverse set of backgrounds and commitment to professional practice and scholarly research make for a rich learning experience.

Our graduates hold positions in innovative design practices, research organizations, federal and municipal governments, the building and manufacturing industries, and at leading universities both in the US and abroad.

Our programs reflect a commitment to excellence. Students with motivation and ability receive an outstanding educational opportunity at Carnegie Mellon University's School of Architecture.

The School of Architecture offers one (1) first professional Master's degree, seven (7) post-professional Master's degrees, and three (3) Doctoral degrees in the following areas of study:

Master of Architecture (*new!*)

The Master of Architecture (M. Arch) (<https://soa.cmu.edu/march>) is a studio-based, first professional degree program. It combines CMU's 100-year tradition of training architects in the broad core competencies and the opportunity to engage with the SoA's long-standing expertise in sustainable, computational, and public interest design. In July 2016, the National Architecture Accreditation Board (NAAB) determined that the M.Arch program was eligible for initial candidacy. Because NAAB "Initial Accreditation" is retroactive, subject to fulfillment of the "Plan for Achieving Initial Accreditation" for the M.Arch, CMU currently anticipates (but does not represent or guarantee) that the degrees awarded in May 2019 to the inaugural M.Arch class will be accredited.

Master of Science in Computational Design and Doctor of Philosophy in Computational Design

One of the first and best-known Computational Design programs in the US, our legacy continues today. Under the direction of dedicated faculty and in collaboration with other departments in the University, (e.g., School of Computer Sciences and the Department of Civil & Environmental Engineering), our visionary students continue to push for innovation and evolution of the state-of-the-art in design technology.

Master of Science in Building Performance and Diagnostics and Doctor of Philosophy in Building Performance and Diagnostics

Building Performance & Diagnostics deals with the comprehensive integration of *building design* and *advanced technology*, as a means of producing high performance architecture. Led by the Center for Building Performance & Diagnostics (CBPD) and housed within the Robert L. Preger Intelligent Workplace (<http://www.cmu.edu/greenpractices/greenign-the-campus/green-buildings/intelligent-workplace.html>), students have the opportunity to gain both diversity and depth of knowledge from world-renowned experienced faculty.

Master of Urban Design

Building on our legacy of Urban Design, and in partnership with the Remaking Cities Institute (RCI) (<http://www.cmu.edu/rci>), this 12-month, Studio-based Master of Urban Design program emphasizes environmental, economic, social and cultural issues affecting the contemporary metropolis, while providing a comprehensive foundation in design, theory, history, policy, management and technical skill.

Master of Science of Tangible Interaction Design

The Master of Tangible Interaction Design (MTID) is truly an interdisciplinary program that integrates computational intelligence and the physical world.

MTID students make interaction tangible by building and programming working prototypes. Housed in the Computation Design (CoDe) Lab (<http://code.arc.cmu.edu>), and leveraging our state-of-the-art Digital Fabrication (dFab) Lab (<http://www.cmu-dfab.com>), the program cultivates experimentation and collaboration in an intimate studio setting.

Master of Science in Sustainable Design

At the forefront of research in sustainable design and technology for over 35 years, Carnegie Mellon's School of Architecture is recognized internationally for its large core of dedicated faculty, providing a solid foundation from which students can learn how to positively and sustainably affect the future of the built environment. This is a post-professional degree program that integrates Design and Technology to provide a comprehensive knowledge base for professional practice.

Master of Science/Doctor of Philosophy in Architecture-Engineering Construction Management

A joint effort between the School of Architecture and the Department of Civil & Environmental Engineering, the Architecture-Engineering-Construction Management (AECM) programs prepare building delivery professionals for careers in capital project delivery. Graduates are educated to become effective decision makers who can positively impact economic, environmental, and ethical aspects of the built environment through professional management strategies. AECM programs deal with the entire life-cycle of capital projects, from pre-design, to design, construction, commissioning, operation, and maintenance stages. They focus on the integration of design and technology, in particular, advanced information systems, as a means of improving building performance, and eliminating negative environmental impact.

Master of Advanced Architectural Design

The Master of Advanced Architectural Design (MAAD) is a post-professional, design-based program that engages emerging methods of computational design, simulation, data processing, and fabrication to speculate upon future modes of architectural practice, enhanced construction methods, and alternative material manifestations within the built environment.

Advanced Standing in Master Degree Programs

The School of Architecture offers a unique opportunity to undergraduate students who wish to pursue a Masters degree in an architecture-related field through the Accelerated Masters Program (AMP). Undergraduate students may apply to the AMP in their 4th year of their architecture education, and if accepted, can apply units earned in their 5th year of their undergraduate architecture degree to their graduate degree. This allows students to graduate with a Masters degree in an accelerated period of time.

Student Advising

At the end of each semester, the faculty reviews each student's progress in all courses. Reviews during the first year are intended to determine a student's capabilities in relation to the study of architecture at Carnegie Mellon University and the School works with each student to ensure placement within the university if a change is desired. Subsequent reviews monitor and ensure continued progress in all sequences of the program.

Students are urged to meet with their assigned faculty mentor, first-year faculty advisor, and/or senior academic advisor to review their academic progress and plans before each semester. Such meetings are important to take full advantage of elective possibilities within the curriculum, general progress toward graduation, and professional goal setting. Students may also check their progress using the online academic audit in the Student Information Online (SIO) and should review the audit results with the senior academic advisor.

Study Abroad

The School of Architecture strongly encourages students to study abroad. The perspective gained through immersion in another culture and language is invaluable. Study abroad can fall into four categories: University Direct Exchanges, University Sponsored Programs, External Programs, and Departmental Summer Programs.

To receive credit for courses taken away, the student must have a C or better (not C-) in the course and have an official translated transcript sent to the School of Architecture. Studio work conducted abroad must be presented to the School Head and Studio Coordinator for approval.

Students should make the decision to study away by the fall of their third year so they can plan their courses accordingly. Students are allowed one semester away for which they receive studio credit except for those students at approved yearlong direct exchange programs. To qualify for study away, a student must have completed the third-year of their program, have a minimum overall QPA of a 3.00 (or 2.75 for SoA summer study abroad) and be in good academic standing.

Summer Courses

Students can receive credit for passing comparable courses at other institutions with advanced approval from the School. A Transfer Credit Evaluation form must be completed by the Academic Advisor prior to enrollment at the other institution for a course to be considered for transfer.

Faculty

MARYLOU ARSCOTT, Studio Professor – BArch, Architectural Association; Carnegie Mellon, 2007-

MARTIN AURAND, Principal Architecture Librarian/Archivist – MLIS, University of Pittsburgh; Carnegie Mellon, 1987-

AZIZAN AZIZ, Senior Researcher, CBPD – MS Building Performance & Diagnostics, Carnegie Mellon University; Carnegie Mellon, 1997-

NINA BARBUTO, Adjunct Instructor – MArch, Southern California Institute of Architecture; Carnegie Mellon, 2014-

JOSHUA BARD, Adjunct Assistant Professor – MArch, University of Michigan; Carnegie Mellon, 2012-

WILLIAM BATES, Adjunct Associate Professor – MArch, University of Miami; Carnegie Mellon, 2014-

ERIC BROCKMEYER, Adjunct Assistant Professor – MTID, Carnegie Mellon University; Carnegie Mellon, 2011-

LEE CALISTI, Adjunct Associate Professor – BArch, Kent State University; Carnegie Mellon, 2002-

DONALD K. CARTER, Director, Remaking Cities Institute – BArch, Carnegie Mellon University; Carnegie Mellon, 2009-

ERICA COCHRAN, Assistant Professor and UDream Coordinator – PhD, Carnegie Mellon University; Carnegie Mellon, 2009-

DOUG COOPER, Andrew Mellon Professor – BArch, Carnegie Mellon University; Carnegie Mellon, 1976-

LIZA CRUZE – MArch, Virginia Tech;

DANA CUPKOVA, Assistant Professor, Lucian & Rita Caste Chair – MArch, UCLA; Carnegie Mellon, 2013-

GERARD DAMIANI, Associate Professor – BArch, Syracuse University; Carnegie Mellon, 1996-

STEFANI DANES, Adjunct Professor – MArch, Yale University; Carnegie Mellon, 1986-2001, 2009-

JEFFREY DAVIS, Adjunct Professor – BS Architecture, University of Illinois, Urbana-Champaign; Carnegie Mellon, 1996-

DONNA FICCA, Adjunct Assistant Professor – BArch, Virginia Tech; Carnegie Mellon, 2011-

MATTHEW HUBER, Adjunct Assistant Professor – BArch, Carnegie Mellon University; Carnegie Mellon, 2014-

EDDY KIM, Visiting Assistant Professor, George N. Pauley Jr. Fellow – MDesS, Harvard University; Carnegie Mellon, 2014-

JEFF KING, Adjunct Assistant Professor – MArch, Tulane University; Carnegie Mellon, 2005-

NICHOLAS LIADIS, Adjunct Assistant Professor – MArch, University of Detroit; Carnegie Mellon, 2010-

JENNIFER LUCCHINO, Adjunct Associate Professor – MArch, Rice University; Carnegie Mellon, 2002-

JAMES O'TOOLE, Adjunct Associate Professor – BArch, Penn State University; Carnegie Mellon, 2008-

JOHN EBERHARD, Professor Emeritus - M.S., Industrial Management, Massachusetts Institute of Technology; Carnegie Mellon, 1989-

JEREMY FICCA, Associate Professor, Director dFab Lab - MArch, Harvard University; Carnegie Mellon, 2007-

JOHN FOLAN, T. David Fitz-Gibbon Associate Professor - MArch, University of Pennsylvania; Carnegie Mellon, 2008-

KAI GUTSCHOW, Associate Professor - PhD, Columbia University; Carnegie Mellon, 1998-

VOLKER HARTKOPF, Professor, Director CBPD - PhD, University of Stuttgart; Carnegie Mellon, 1972-

HAL HAYES, Studio Professor - BArch, Carnegie Mellon University; Carnegie Mellon, 2008-

JONATHAN KLINE, Adjunct Professor - MFA, Penn State University; Carnegie Mellon, 2002-

RAMESH KRISHNAMURTI, Professor - PhD, University of Waterloo; Carnegie Mellon, 1989-

KRISTEN KURLAND, Teaching Professor - BArch, University of Pittsburgh; Carnegie Mellon, 1996-

KHEE POH LAM, Professor - PhD, Carnegie Mellon University; Carnegie Mellon, 2003-

STEPHEN LEE, Professor and Head - MArch, Carnegie Mellon University; Carnegie Mellon, 1981-

CINDY LIMAURO, Professor, Drama - MFA in Lighting Design, Florida State University; Carnegie Mellon, 1987-

VIVIAN LOFTNESS, University Professor - MArch, Massachusetts Institute of Technology; Carnegie Mellon, 1981-

ARTHUR LUBETZ, Adjunct Professor - BArch, Carnegie Mellon University; Carnegie Mellon, 1988-

MICK MCNUTT, Adjunct Associate Professor - MArch, Syracuse University; Carnegie Mellon, 2007-

CHRISTINE MONDOR, Adjunct Associate Professor - BArch, Carnegie Mellon University; Carnegie Mellon, 1999-

IRVING OPPENHEIM, Professor - PhD, Cambridge; Carnegie Mellon, 1972-

STEPHEN QUICK, Adjunct Professor - MArch, Cornell University; Carnegie Mellon, 2010-

DIANE SHAW, Associate Professor - PhD, University of California - Berkeley; Carnegie Mellon, 1996-

SCOTT SMITH, Director, Shop - MFA, Cranbrook; Carnegie Mellon, 1984-

KENT SUHRBIER, Adjunct Associate Professor - BArch, Carnegie Mellon University; Carnegie Mellon, 2000-

FRANCESCA TORELLO, Adjunct Associate Professor - PhD, Politecnico Torino; Carnegie Mellon, 2007-

VALENTINA VAVASIS, Adjunct Associate Professor - MBA, Northwestern University; Carnegie Mellon, 2014-

SPIKE WOLFF, Adjunct Assistant Professor - MArch, SCI-Arc; Carnegie Mellon, 2003-

HEATHER WORKINGER MIDGLEY, Adjunct Associate Professor - PhD, Indiana University of Pennsylvania; Carnegie Mellon, 2006-