

Design Computing Certificate

The Design Computing Certificate recognizes M Arch students who devote a significant portion of their studies to digital media and computational techniques in architectural design. This certificate recognizes their advanced knowledge and skills and provides preparation for leadership positions at the intersection of architectural design and information technology. Within the Certificate itself are five opportunities for particular focus: visualization, simulation, fabrication, representation, and theory. Students wishing to pursue this field in greater depth should consider applying to the Design Computing Stream of the Department's Master of Science in Architecture program.

CERTIFICATE REQUIREMENTS

The certificate can be completed within the accredited Master of Architecture (M Arch) program through 15 credits of coursework taken in at least three of the focus areas shown below. In addition, the student's thesis topic should reflect one of the focus areas, and the thesis committee must be chaired by a design computing faculty member.

FOCUS AREAS

- Visualization
- Simulation
- Fabrication
- Representation
- Theory

To receive certificate recognition students must fill out a Certificate Completion Form prior to graduation. Check with the Graduate Program Advisor for deadlines.

COURSES BY FOCUS AREA

VISUALIZATION

ARCH 481: 3D Modeling and Rendering (3)

Lectures and weekly exercises focus on understanding and applying the underlying principles of 3D computer graphics and rendering software. Topics include user-interface, data creation and modeling, lighting models, smoothing, texture mapping, ray tracing, radiosity, animation, and solid modeling. Prerequisite: ARCH 380.

ARCH 581: Advanced Rendering (3)

Advanced rendering tools use computer models to simulate the complex physical processes to generate digital images that can mimic the physical world and predict the final appearance of a design. The objectives are first to provide the opportunity for guided explorations and

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discussions of the technical features of advanced tools and algorithms within the domain of the architectural visualization, and second, to provide hands-on experience with various rendering tools.

SIMULATION

ARCH 533: Advanced Environmental Systems (3)

Evaluation is a part of the iterative design process. It is a measure of how well a given design solution or proposed design alternatives fulfill the expected performances. The objectives of the course are to: 1) Provide the knowledge and hands-on experience of a computational simulation of building performance (solar, lighting, thermal, acoustical analysis). 2) Utilize a visual calculation feedback that can support early stage conceptual design as well as final design prediction.

ARCH 582: Computational Lighting Design (3)

Computational Lighting Design is an innovative course that draws from recent developments in lighting simulation, visualization, per-pixel data measurement and analysis techniques. It provides the student with an understanding of the theoretical aspects of computer applications for lighting design and analysis; and the practical knowledge of tools and techniques that enhance the integration of the lighting analysis into the architectural design process.

FABRICATION

ARCH 527: Intro to Digital Design & Fabrication (3)

Fundamentals of digital fabrication technologies and the related software, with special attention to requirements and opportunities for craft and design expression.

ARCH 528: Digital Design for Fabrication + Construction (3)

This course pays particular attention to digital design systems and the development of parameterized models and their subsequent fabrication or construction.

ARCH 529: Advanced Digital Projects (3)

Advanced projects in digital design and fabrication for students who have completed the introductory fabrication courses and wish to develop a project further.

REPRESENTATION

ARCH 478: CAD and Working Drawings (4)

Intensive introduction to computer-aided design systems for developing construction documentation (working drawings). Lectures and exercises focus on learning the methodology for using CAD to efficiently prepare working drawings, as well as discussions regarding industry

recognized standards and current technology used in the preparation of documentation. Prerequisites: ARCH 380, CM 313.

ARCH 482: Web Weaving (3)

Examines the function, limitations, and uses of primary World Wide Web technologies and fundamental Web site design and implementation. Participants develop hands-on design/build expertise for Web site design, implementation, and maintenance using readily available tools and techniques. Looks beyond today and explores emerging Internet technologies.

ARCH 486: Algorithmic Geometry in Arch Design (3)

Introduction to computer programming and use of scripting for algorithmic generation of designs, the foundations of generative design and form-finding. Significant lab time required.

ARCH 487: Fundamentals of Building Info Modeling (3)
fundamentals of BIM, 3D parametric modeling and 2D documentation in professional practice.

THEORY

ARCH 484: Design Computing Seminar (3)

Discusses design computing research and report on ongoing project progress, with demonstrations and guest speakers. Explores design computing, design thinking and design process, and inventing new computer aided tools for design.

ARCH 587: Theory of Design Computing (3)

Examines the relationship between theory of design and computational tools for practice. Explores how the emergence of computers as a mainstream tool in design has already changed architectural practice. Discusses how, as with other technologies that revolutionized the practice of architecture, information technologies carry hidden implications about design process and products.

ARCH 588: Research Practice (3)

Provides the opportunity for a guided preliminary exploration and refinement of a research topic in design computing. Weekly seminar meetings focus on the review of principles, theories, and methods that underlie the applications of computational research in architecture, focusing on student work with regular presentations and discussions.

FREQUENTLY ASKED QUESTIONS

- Can I combine this with M Arch degree options or other certificate programs? — Yes. As long as your coursework satisfies the requirements for the Design Computing Certificate, and your thesis topic and committee fit these guidelines, they may simultaneously satisfy other certificates, but check with your adviser to make sure.
- Does the certificate appear on my UW transcript? — No. However, many employers recognize the value of the skills covered by the certificate when included on your résumé, and the department records certificate holders on its website.
- Can an undergraduate earn the certificate? — This is a certificate in the M Arch program only.
- Is this the same as the evening certificate in Fabrication? — No. UW Outreach offers an extra-cost Certificate in Fabrication with similar content, for non-matriculated students.
- Do required courses count towards the certificate? — Yes. Courses such as ARCH 533, which is required of all M Arch students, do count towards the certificate.
- Is the certificate the same as the Master of Science (MS) in Design Computing? — No. The MS in Architecture program in Design Computing is a 5-6 quarter advanced study option that includes many of these same courses, but offers greater depth.
- Would getting the certificate while an M Arch student shorten time spent in the MS program? — Maybe. The university permits up to 15 credits taken under one degree stream to be applied to another. Speak with an adviser if you are interested.
- What about independent study and Special Topics courses? — Maybe. This is a rapidly evolving area of course and technical development and we are aware of that. If you are concerned, check with an adviser to find out if a particular ARCH 498, 598, or 600 will count towards the certificate.