ECOSYSTEMS IN ARCHITECTURAL SCIENCES TRACK

Anna Dyson, Program Director

The Ecosystems in Architectural Sciences Track supports students to innovate the means and methods of architectural systems. This track provides preparation in interdisciplinary scientific inquiry, qualifying students to incorporate rigorous scientific methods in the research, development, and deployment of novel material and informational ecosystems for the built environment. Students in this track engage in research related to the behaviors of living ecosystems, emphasizing the interconnections between the built environment process and health, equity, and justice across both human and non-human living systems.

ADMISSION REQUIREMENTS

Applicants must have a master's degree or equivalent in architecture, engineering, environmental design, or, exceptionally, in a related field. Two years of professional work in an architecture office are recommended. The Graduate Record Examination (GRE) General Test taken no more than five years prior to application is required. All applicants whose native language is not English are also required to take the Internet-based Test of English as a Foreign Language (TOEFL iBT), which includes a section on spoken English. The TOEFL requirement may be waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its international equivalent from a college or university where English is the primary language of instruction. Applicants must have studied in residence at the baccalaureate institution for at least three years to receive the waiver. A waiver will not be granted on the basis of an advanced degree (such as M.A., M.S., or Ph.D.) from another institution.

In addition to meeting the qualifying criteria, candidates are required as part of the application to submit a portfolio of their own architectural work, a writing sample in the form of a substantial research paper or publication, and an explanation of their motivation for engaging in their chosen course of study. Qualified applicants may be invited to interview with a member of the doctoral faculty.

The portfolio should be a well-edited representation of the applicant's creative work. Anything submitted that is not entirely the applicant's own work must be clearly identified as such. The portfolio is submitted digitally as a single PDF document optimized not to exceed 20 Mb and will need to be uploaded as part of the online application. Pages of the pdf portfolio should be uploaded as spreads. The digital portfolio will be viewed on computer screens, so resolution above 150 dpi is not necessary.

Admission to the Ph.D. program in Architecture is administered by the Yale Graduate School of Arts and Sciences. For general questions regarding admissions, please contact graduate.admissions@yale.edu.

THE APPLICATION PROCESS

The online application can be accessed at http://gsas.yale.edu/admission when it is available. Applications for the program beginning in the 2025–2026 academic year must be submitted no later than January 2, 2025. Applicants will not be allowed to submit applications after the deadline has passed.

TRACK REQUIREMENTS

The Ecosystems in Architectural Sciences is housed within the Yale Center for Ecosystems in Architecture (Yale CEA) at the Yale School of Architecture. As a lab-based program, this track requires students to be full-time and in residence in the New Haven lab during the duration of their program, with the exception of a maximum of four semesters that might be undertaken in field research related to their area of inquiry. Students may be asked to attend summer orientation courses before their first term. (See Degree Requirements under Policies and Regulations in the Bulletin of the Graduate School of Arts and Sciences.)

This Ph.D. track supports two areas of specialization: (1) built environment (BE) systems modeling and (2) environmental control systems (ECS) design and development. The two proposed areas of specialization are complementary and have considerable overlap in terms of curriculum. However, they differ in terms of the dissertation deliverables: (1) The modeling specialization requires the development of novel contributions to computational methods for quantifying and qualifying the behavior and performance of built environment systems, and (2) the experimental specialization requires the design, physical prototyping, and experimental observation of a novel environmental systems concept within the context of architectural design research.

All students are encouraged to take courses related to their specific areas of interest outside the School of Architecture. For example, a student working on biodiversity in urban contexts might take courses in the School of the Environment. Typically, at least two of the eight elective seminars would be in related fields. Students can also opt to do independent readings with individual faculty members related to their specific areas of interest.

For the Ecosystems in Architectural Sciences track, not later than the end of their second year, students are also expected to demonstrate competence in the pertinent bioclimatic and architectural modeling languages. Computational design competence is more than a formality and requires some acquaintance with the software languages that are current in the chosen area of inquiry. Competency may be demonstrated by a grade of High Pass in at least two of the related required courses and/or seminars.

The student's field of interest within the Ecosystems in Architectural Sciences track is defined by the end of the second year, by which point all course requirements are normally completed, although further options courses that deepen interdisciplinary expertise may be pursued beyond second year. At this time, the program director assigns the student a thesis adviser, who may or may not be from the School of Architecture, and typically many students may be co-advised by an additional member of their committee depending on the area of inquiry. During the fall term of the third year, students undergo an examination on topics relevant to their doctoral research in the presence of the thesis adviser. Following successful completion of the examination,

the program director, in consultation with the student's adviser, appoints a dissertation committee for the student. The dissertation committee consists of the student's adviser plus a minimum of two additional faculty members. One of the dissertation committee members typically comes from outside the School of Architecture, with selection based on the student's area of interest. Upon appointment of the committee, the student will undertake a qualifications exam, which includes an oral component with the committee and a written component. Upon successful completion of the qualification exam, a student is ready to prepare for the candidacy exam and final dissertation.

Field, Qualifying, and Candidacy Examinations

Each Ph.D. student in the Ecosystems in Architectural Sciences track is required to undergo three stages of evaluations that determine whether they are prepared to proceed to the next stage in the Ph.D. course of study. The proposed timelines are typical but may be adjusted in exceptional cases in consultation with the Graduate School of Arts and Sciences. During the first three terms of coursework, the student will undertake three oral field examinations in the presence of their adviser, typically taking the standard format of architectural design review juries. Between the second and third year of doctoral studies, the student undergoes a qualification examination with their appointed committee that contains both written and oral components. Finally, between the third and fourth year, the student takes the candidacy examination with their committee.

FIELD EXAMINATIONS

Purpose The field examinations are designed to test the basic knowledge in the chosen field of inquiry, as accumulated within the student's first terms of coursework, including topics in building physics, energy modeling, passive and active building systems, history and theory of ecology and environmental design, and material systems and production. Students undertake an oral exam with external reviewers sometime after the first year of course work, and successful completion is required in order to continue on to further doctoral studies within the Ecosystems in Architectural Sciences track.

Descriptions and Procedures The field exam is given as an oral exam by a minimum of three master's-sequence course instructors in which the candidate presents their work and is asked a series of questions by the reviewers. Usually, this process takes place during the period of mid-term and end-of-term reviews. The review takes sixty to ninety minutes with articulated responses to questions in which a variety of topics as listed above may be covered.

Evaluation Following the reviews, instructors meet to discuss the student's performance on the exam and determine whether the student warrants a pass or fail grade. Pass: student proceeds without conditions; Fail: student may not be considered for continuing acceptance into the Ph.D. program.

QUALIFYING EXAMINATION

Purpose The qualifying examination is the prerequisite for preparing the candidacy proposal and writing a dissertation. It is designed to examine the knowledge acquired by the student in their proposed field of inquiry. In this context, knowledge of the field not only entails a mastery of the subjects related to the field but also requires

the ability to formulate and elaborate on both theoretical and practical problems related to the chosen field of inquiry. Both aspects are tested with the oral and written formats of the qualifying examination. The qualifying examination in the Ecosystems in Architectural Sciences track is typically taken after the conclusion of coursework and must be completed before admission to Ph.D. candidacy. Preparation for the qualifying examination comprises a combination of coursework and supplementary individual readings as discussed with advisers throughout the course of doctoral studies. Typically, students are recommended to take the examination at the end of their second year of doctoral studies, depending on the required coursework and preparation as agreed upon by the student and their primary adviser. The scope and focus of each examination is a matter for discussion and negotiation with individual examiners. In preparation, the student should strive for a level of knowledge and expertise such as would be required to construct and teach a course on the subject and to be able to conduct independent scholarship in the field.

Descriptions and Procedures The qualifying examination is divided into two parts: an oral examination and a written examination. The examination format is intended to strike a balance between comprehensive knowledge of the related field(s) that are pertinent to the proposed dissertation and the requisite tools for critical scholarship in the chosen area within Ecosystems in Architectural Sciences. The specific format of each examination is tailored to individual student needs, interests, and background.

For the preparation of both parts of the examination, the student prepares and submits a comprehensive bibliography in support of their dissertation proposal and related to the preparatory literature review that they have accumulated during course work and independent readings in support of their proposed dissertation topic. This comprehensive bibliography should be submitted alongside their proposal (two to five pages) to their adviser and eventual examiners two months prior to taking the qualifying examinations. Responsibility for formulating exam questions rests with faculty members specializing in the related fields of inquiry, and others who are appropriate in specific cases as deemed by the examination committee members. The committee is made up of at least two examiners who are not the principal adviser to the student and at least one examiner who is from a department outside of the School of Architecture.

The oral examination, which does not exceed two hours, concentrates intensively on a precise cluster of problems specifically related to the body of literature as presented by the student's qualification proposal summary and bibliography.

The written examination is also formulated by the committee in response to the student's proposal summary and bibliography and is designed to examine the student's facility in carrying out research in the chosen field. The examiners present the student with three relevant questions to be answered in essay format. Two of the questions can be answered with access to books, notes, and any other available resources and are to be completed within five days, comprising no more than thirty typewritten, double-spaced pages. The third question is prepared during a six-hour session at the end of the five-day period within the Ecosystems in Architectural Science lab space, without the aid of supporting materials.

Evaluation There are four possible categories of evaluation on the qualifying exam.

1. *Pass:* The student will proceed to prepare the candidacy exam and the doctoral committee will be confirmed.
2. *Pass with conditions:* The exam was generally acceptable and the student will begin preparations for candidacy but minor specific recommendations on further evaluation are needed, and a doctoral committee will be confirmed to set a date for further evaluation of additional requirements.
3. *Re-examination required:* The scheduling of another examination date to be determined.
4. *Fail:* The committee doesn't think that the candidate will be able to accomplish the proposed dissertation project. The student receives an M.Phil. degree upon graduation of this phase, provided that the units of academic credit on all coursework have been successfully completed.

CANDIDACY EXAMINATION

By the end of the third year, students are required to present and defend their preliminary proposal of a dissertation topic. This prospectus should consist of a topic statement, an outline of a detailed program of research, and an annotated bibliography. Students are admitted to candidacy for the Ph.D. upon completion of all pre-dissertation requirements, including the prospectus, oral examinations, and qualifying exam with the committee. At this point, they begin dissertation research and writing, submitting drafts of the dissertation chapters as they are completed. The dissertation committee guides and monitors the student's progress in writing the dissertation and evaluates the dissertation upon completion.

Procedures Following the successful completion of the qualifying examination and acceptance of the summary dissertation proposal, the committee is confirmed for the development of the dissertation proposal itself. The dissertation proposal, accompanied by a working bibliography, is prepared and submitted to the committee three months prior to the candidacy exam. It is worked out in consultation with the advising faculty and submitted to the committee, who then meet with the student for a two-hour colloquium to assess the scope, significance, and feasibility of the topic and the student's preparation to accomplish it within the standard doctoral time frame. After approval by the committee, a two-page, single-spaced summary of the proposal is submitted to the director of doctoral studies for approval to proceed. Once accepted, this proposal becomes the basis for the eventual assessment of the completed dissertation. After acceptance of the proposal, the student is admitted to candidacy for the Ph.D. Students must be admitted to candidacy by the beginning of the fourth year of study, unless exceptional circumstances are approved by the director of graduate studies and the Graduate School of Arts and Sciences.

GRADUATE RESEARCH ASSISTANT AND TEACHING FELLOW EXPERIENCE

The program in architecture considers teaching to be an important part of graduate training. Students in the Ph.D. program in architecture are expected to teach or serve as research assistants for four terms, normally in their third and fourth years. Students in the Ecosystems in Architectural Sciences track are expected to serve as both teaching fellows in the School of Architecture and research assistants in the school's Center for

Ecosystems in Architecture. All assignments are carried out under the direct supervision of senior faculty.