Catherine Kehoe was born in Hartford, Connecticut. She received her BFA in painting from Massachusetts College of Art and Design and her MFA in painting from the School of Visual Arts, Boston University.

Kehoe has received the following awards: Massachusetts Cultural Council Fellowship in Painting; Ballinglen Foundation Fellowship, Lillian Orlowsky and William Freed Foundation Grant; Pollock-Krasner Foundation Grant; Berkshire Taconic Artist's Resource Trust Grant; Massachusetts Cultural Council Finalist Grant; Blanche E. Colman Award; St. Botolph Club Foundation Grant, and the Sam and Adele Golden Foundation for the Arts Award.

Kehoe is represented by Anderson Yezerski Gallery, Boston. She has been a visiting artist at Johns Hopkins University, Swarthmore College, College of William and Mary, University of Washington, Salve Regina University, Rhode Island College, Colby College, Hendrix College, George Mason University, University of Arkansas at Fort Smith, and Indiana University.

She has taught painting and drawing at Massachusetts College of Art and Design and Brandeis University. She has also taught painting workshops at Art New England, The Fine Arts Work Center in Provincetown, Washington Studio School, Art Workshops Boulder, Townsend Atelier, Warehouse 521, Winslow Art Center and Cullowhee Mountain Arts, and life drawing workshops as part of the Training the Eye course at Harvard Medical School.

Kehoe is a co-founder of Black Pond Studio in southeastern Massachusetts.