

ACT2019 School Application

Margo Crawford

January 30, 2019

1 Relevant Background

Last semester, I did an independent study where I read through the first four chapters of *Seven Sketches in Compositionality*.

2 Project Preference

1. Fritz - Partial evaluations, the bar construction, and second-order stochastic dominance
2. Milewski - Traversal optics and profunctors
3. Hofstra - Complexity classes, computation, and Turing categories
4. Spivak - Toward a mathematical foundation for autopoiesis
5. Backens - Simplifying quantum circuits using the ZX-calculus
6. Sadrzadeh - Formal and experimental methods to reason about dialogue and discourse using categorical models of vector spaces

3 Commitment

Should I be accepted into the program, I can fully commit to coming to Oxford.

4 Statement

Last semester I did an independent study where I read through the first half of *Seven Sketches in Compositionality*. I really enjoyed it, and I think it would be a lot of fun to learn more about Category Theory and get the chance to apply it to some different fields.

I am currently a senior engineering major with a concentration in computing, in my undergraduate degree at Olin College of Engineering. I think that participating in this program would be helpful to me because I am considering

applying to grad school in a few years. I have some research experience in Graph Theory but I would really like to gain more exposure to the world of academia and I think that this would be very helpful to me for that reason. I am trying to learn as much as I can so I can make as informed of a decision as possible and I think that applied category theory would help me reach that goal by allowing me to meet not only mathematicians but also others who are applying category theoretical ideas to their research, like computer scientists, natural scientists, linguists or engineers.

Even if I decide that I would prefer to go into industry as a software engineer, I still believe it would be a very rewarding experience. Firstly, because I could be more sure in my decision. Secondly, because the program seems very interesting in its own right. I really enjoy working with smart people and learning from the people around me. The ACT School seems like an excellent way to do this.

Margo CRAWFORD

PERSONAL INFORMATION

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GITHUB: github.com/margocrawf

ACADEMIC EXPERIENCE

SEP 2018-PRESENT	Babson College - Graph Theory Research <i>Professors Nathaniel Karst and Denise Troxell</i> Worked with Professors Karst and Troxell and a group of 4 students on minimal zero blocking sets for rectangular, cylindrical, and mobius grid graphs.
SEP 2018-PRESENT	Senior Capstone- Dassault Systemes Working with Dassault Systemes on a four person team to improve the experience of assembly in CAD. Skills used include 3D modeling and rendering, designing user interfaces, software architecture, and project management.
SEP 2016-DEC 2018	Undergraduate Course Assistant Course assistant for classes Modeling and Simulation of the Physical World, Software Design, and Discrete Math. Assisted students with assignments, graded work, and advised project work.
MAR 2017-MAY 2017	e-Lisp-C's Lisp Interpreter Created a Lisp Interpreter using C for Software Systems class. The interpreter tokenizes text input from a file, recursively builds an abstract syntax tree, then evaluates and executes.
FALL 2017, FALL 2018, SPRING 2019	Independent Studies Independent studies with small groups of 3-6 students in Information Theory, Category Theory and Abstract Algebra. We assigned ourselves readings and problems were weekly, with meetings to review, solve additional exercises and check in with our faculty advisor.

EDUCATION

MAY 2019	B.S. in Engineering with a Concentration in Computing Olin College of Engineering , Needham, MA GPA: 3.6
SPRING 2018	Exchange Semester at AIT Budapest , Hungary GPA: 3.93

WORK EXPERIENCE

JUN 2018-AUG 2018	Tableau Software <i>Software Engineering Intern</i> Software Intern for the Product Usage and Telemetry team at Tableau Software. Improved existing internal libraries used by other teams for telemetry in Python, Java and Javascript, fixed bugs, wrote unit tests and Gitlab CI pipeline scripts.
JUN 2017-AUG 2017	Common Sensing Inc. <i>Software Engineering Intern</i> Improved production and manufacturing test software and prototyped new communication methods in Python for the Gocap, an Internet of Things device to track insulin pen logs.



Applied Category Theory <act2019school@gmail.com>

ACT2019 School : Letter of support for Margaret Crawford

1 message

Riccardo Pucella <rpucella@forrester.com>

Wed, Jan 30, 2019 at 2:01 PM

To: "act2019school@gmail.com" <act2019school@gmail.com>

Dear ACT2019 School organizers,

I am writing in support of Margaret Crawford's application to the ACT2019 School. My name is Riccardo Pucella, and I am lecturer at the Franklin W. Olin College of Engineering near Boston, where I teach Computer Science. In my spare time, I am a Principal Software Engineer at Forrester Research, part of the Analytics Team, and before that I was Assistant Professor in the College of Computer Science at Northeastern University, researching logic and programming languages.

I suspect I will mostly confirm what Margaret wrote in her application. She is interested in applying mathematical methods to solve engineering and computer science problems. Olin does not have a lot of deep math courses, and so she has taken several independent studies, one of which was with me on Applied Category Theory, working through the first half of Spivak and Fong's "Seven Sketches in Compositionality" with two other students for one semester. She also took my Foundations of Computer Science class, which had a lambda calculus as well as a dataflow networks module. As far as background is concerned, it is perhaps a little thin for some of the projects that are described on the ACT2019 School page, but she should be perfectly fine with others, especially those with a more applied bent.

The School's relevance to Margaret is less in terms of a concrete research project with which she's currently involved than in terms giving her first-hand experience doing research in a highly collaborative environment. This is important for her because she has expressed an interest in pursuing graduate studies in Computer Science. In addition, I think getting her exposed to both different topics than she is used to seeing and to students from different areas with different work and research approaches will be invaluable.

She does not have extensive research experience, as an undergraduate student at an Engineering school. Aside from various class projects (pretty intense, granted, since Olin is a project-oriented school), her most relevant experience is probably the graph theory research she conducted with two Babson professors in graph theory studying zero blocking sets on various surfaces. That should have mentally prepared her for the kind of thinking that the School will demand.

I'm sure Margaret will be able to make a contribution as she participates in the school, and more importantly she will greatly benefit from the experience.

Please feel free to reach out if you have any questions.

Best,

Riccardo Pucella

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Riccardo Pucella

Principal Software Engineer (Data)

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