

# Teaching Statement

## Teaching Philosophy

My teaching philosophy is based on three principles: creating active learning environments, developing student's internal motivation, and integrating research and learning. These principles are informed primarily by the experience of teaching over these past years, including particularly the feedback I have received from my students and colleagues.

**Active learning.** We learn most effectively when we are actively engaged in a task rather than just listening or watching a lecture. Throughout all of my courses at Indiana University, I have experimented with active learning techniques. For the programming and computational modeling classes that I teach, I focus on three activities: (a) During lectures, I ask students to follow along and to solve problems live; (b) I ask students to give a tutorial to the class on a topic of their choice; and (c) Students work on a final mini-research project and present it to their peers. For the more conceptual classes, introducing activities can be more challenging, but I tend to focus on two activities: (a) I ask students to think about an idea that has been presented, write down their own reactions to these ideas, discuss them with a neighbor in the classroom, and finally open the discussion to everyone in the classroom (i.e., think-pair-share); and (b) I incorporate activities where students get to build and use simple toy computational and robotic models as a way to better understand cognitive systems.

**Internal motivation.** My goal as a facilitator is to incentivize the students' intrinsic motivation to learn. I strive for this in five ways. First, I make a strong effort to emphasize the value and interestingness of the topic at hand. For example, we discuss why programming can be purposeful for their careers, regardless of what it is; we discuss why computational models can help us to understand natural phenomena, regardless of the phenomena of interest. Second, I de-emphasize the all-importance of grades as the ultimate goal by making the grading scheme as simple as possible and allowing students to re-do and re-submit any homework or activity and to show improvement. Third, I offer students ungraded activities. Doing exercises without a grade feeds their intrinsic motivation by shifting the emphasis from product to process. Fourth, I encourage students to go beyond my prompts. Assignments include optional open-ended questions. Finally, I strive to demonstrate how fun learning topics in my class can be.

**Integrating research and teaching.** My teaching and research have played complementary roles. Research has played an influential role in my teaching in several ways. First, deep understanding of a topic has been invaluable in teaching. Second, I bring the mindset inherent in my research – “build to understand” – into the classroom. I encourage students to develop their quantitative skills typical in Informatics and Engineering and to apply them to phenomena of interest to Cognitive scientists. Third, I introduce students to the current state of the art in research. Fourth, I encourage students to develop activity-based mini-research final projects based on replications of published research. Some of those have become the basis for work that was later submitted and published. The complementarity flows in both directions: Teaching has also helped my research. Studying course materials has prompted many new research questions. Crucially, the tools that I use for teaching have also helped my research. For instance, I have started to develop a series of agent-based models, neural networks models, and evolutionary algorithm models in Python to make them accessible to students, and because these models are useful for cutting-edge research, now people in my research group have started to make unique research contributions using those models.

In addition to these three major principles, I communicate clear and high expectations early in the course; respect diverse backgrounds and talents; make myself available to students; make sure the learning environment is a safe space, and actively promoting marginalized voices; provide a near-equal number of readings by male/female authors; provide prompt feedback; and develop cooperation among students.

## Courses Taught

I have taught three courses per year since the start of my tenure-track position. Altogether, I have taught six different courses: four undergraduate and two graduate courses. Two had not been previously offered, so I designed those from scratch. Two were 8-semester courses; I extended them into full-semester courses. The rest had been offered previously, and I restructured those significantly.

**COLL C105 Brains & Minds, Robots & Computers.** This course introduces students to cognitive science and artificial intelligence. We discuss a mechanistic understanding of cognition and we compare and contrast the abilities of the human mind with the current capabilities of machines and robots. We also provide hands-on experience in the laboratory section, which allows students to get acquainted with both computer simulations of artificial agents and actual robots. The course receives large participation (around 60 students each time).

**COGS Q260 Programming for the Cognitive and Information Sciences.** This course is designed to introduce the fundamental skills necessary for computer programming within the Cognitive Sciences. The course assumes no programming skills at the start and everyone gets a chance to learn the basics and gain confidence.

**COGS Q320 Computation in the Cognitive and Information Sciences.** This course is designed to follow Q260 and it is designed to refresh students' programming abilities and to guide them towards being able to use those abilities to solve problems in any application of their interest, with a particular focus on applications in Cognitive Science. The course is designed largely around project assignments, including data analysis, generation of interfaces for subject experiments, and simulation models. Students do a final programming project.

**COGS Q530 Programming Methods in Cognitive Science.** This course is one of the required courses in the Cognitive Science Program. The course assumes no programming skills, it works through all the fundamentals of programming, and then focuses on applications to Cognitive Science. Students do a final programming project.

**COGS Q700 Modeling Evolutionary and Adaptive Systems.** This seminar course has focused on providing an introduction to different approaches for modeling adaptive processes underlying cognition in living organisms. I have focused it on the adaptation of brain-body-environment systems at both the evolutionary and the lifetime scales. I developed and taught this seminar for the first time in the Fall of 2015. I've taught the course three times now. The course received large participation.

**COLL X101 Simulating disease spread.** I created this two-week Pre-Fall Intersession course during the pandemic. The idea was to use computational models to better understand and predict the spread of disease, taking into consideration the human factor and the spread of ideas in populations. Despite the short time, the class was a great success. Two of the undergraduates that I worked with decided to help me run the class. The agent-based model we developed for the class is still in use in our research group. The best part of the course was that we got to identify incoming students with relatively advanced programming skills and an interest in research. The course received a relatively large participation.

## Mentoring and Advising

I have had the pleasure of working with various students at different levels and from a wide variety of different majors including Informatics, Computer Science, Intelligent Systems Engineering, Neuroscience, Psychology, and Philosophy. My mentoring philosophy is to allow students to shape their own research. I believe it is crucial that students approach a topic they themselves are passionate about. From there, I assist students to situate the topic as a novel one that will contribute to the research corpus. I have been the primary advisor for 10 graduate students. I have been part of the committee of an additional 24 graduate students. I have mentored 23 undergraduate students. Several of my students have published under my mentorship. I have also advised a postdoctoral researcher during 2017–19.

## Teaching Peer-Review and Student Evaluations

My teaching has been peer-reviewed several times. All of the feedback I have received has been positive and encouraging. As of the most recent evaluation (2021), my teaching was evaluated as “Outstanding” by the Program where I teach (Cognitive Science Program).

Dr. Ruth Eberle, who is the Director of IT and Adjunct Assistant Professor at Cognitive Science Program, has observed my teaching several times throughout the last few years. Her feedback has been strongly positive. In it she mentions: “He also has a very clear interest in refining his pedagogy to meet the learning needs of his students. I have seen inspiring success in this area. Each time I observed Eduardo’s teaching the students were more engaged. He incorporates a balance of presenting material (lecturing), of working interactively with the students looking at code, and of allowing the students to work on exercises and projects in class.”

Prof. Selma Šabanović has also observed my teaching, including as recently as the Spring 2021 semester. Her feedback was overwhelmingly positive as well. I include a small part of her feedback here. “One of the challenges of an introductory programming class for cognitive science is the diversity of the students in terms of their disciplinary backgrounds, personal interests, and prior knowledge. I was very impressed with how Dr. Izquierdo addressed this challenge throughout the course. He created and emphasized an open and welcoming atmosphere from the very first class meeting, which started off with personal introductions by the professor and students (including an invitation to share personal pronouns, interests, expectations from the course). Dr. Izquierdo also shared his teaching philosophy with the students, emphasizing active learning and his desire for students to have intrinsic motivation to learn. This set up the classroom as a mutual learning community, not only among the students, but also between the instructor and the students. Throughout the class recordings I viewed, Dr. Izquierdo was supportive of students’ different levels of programming experience and encouraged them to ask questions and comment on the topics from their perspective.”

Importantly, all courses have received great participation and encouraging student evaluations. Below I outline some of the student’s anonymous feedback given at the end of each of the courses.

**COLL C105 Brains & Minds, Robots & Computers.** “The course was very engaging and I enjoyed the variety in topics it covered all pertaining to cognitive science in some way. Eduardo also does a great job trying to get fellow peers involved with the class through discussion and was always willing to answer a question.” “The course is over an incredibly interesting subject– one that’s not often discussed about or offered anywhere else. Professor Izquierdo had detailed lecture slides, explanations and also provided immense help to me during my time in this course, and made sure my DSS accommodations and test circumstances were met.” “I enjoyed the multidisciplinary of the course material, and how many different lenses we were encouraged to engage with the topics through.” “I liked how the course managed to frame a majority of the current academic problems in artificial intelligence research without losing depth or complexity. The materials were relevant and form the groundwork of much of the research in philosophy of mind and computer science. Eduardo was more than capable of pointing students in the right direction and answering their questions directly.”

**COGS Q260 Programming for the Cognitive and Information Sciences.** “I liked the emphasis put on student learning – I’ve taken other programming courses before, and a lot of the time, they would just put up code on the projector and tell us to copy it. I like how in this course, we instead were presented with a problem, and had to figure out how to solve it. This is how I think all programming courses should operate, since it’s much more like how programmers actually approach things.” “The professor taught this class extremely well. The methods of teaching were super helpful and the environment seemed really open for anyone who was struggling or had questions. The in class participation aspects of the class were really helpful for getting to know the material and other students could help each other work through things in class. The in class progress quizzes as well as the labs and group work were super helpful to get a good feeling of how well we were doing in the course.” “He is enthusiastic and knowledgeable about the topics. He inspires learning beyond the course material.”

**COGS Q320 Computation in the Cognitive and Information Sciences.** “It’s one thing to learn how to code, but learning the applications of coding in cognitive science makes coding much more interesting. It was also cool how we could adapt the code according to our interests.” “Eduardo was very motivating and inspiring when it comes to academics. He outlines each class before he begins the lecture to let us know what we are doing for the day. He stops and makes sure everyone is on the same page and encourages questions more than any of my other professors. I am happy I got my first programming experiences with Eduardo, I feel like I learned the most I could’ve out of this class.” “I was able to learn not only through standard lectures and readings, but also through applied assignments that involved problem solving and exposure to new programming tools/libraries.”

**COGS Q530 Programming Methods in Cognitive Science.** “Eduardo does a great job of demonstrating programming concepts and techniques. He also takes time to explain the conceptual and sometimes even the historical background and application of certain techniques, like the genetic algorithm or the development of object-oriented programming. He also made efforts to demonstrate the usefulness of what we learned in class for how we might use it in our own cognitive science research. Great professor.” “Super personable and helpful. Made the class worth taking. Went from almost no knowledge on the subject to feeling like I was quite confident in my abilities at the end.” “This course exceeded my expectations. Eduardo’s teaching style made everything really easy to understand and helped me feel like I was ‘getting’ coding for the first time. The materials were covered in an interesting and engaging way. The class time itself had a good balance of interactive elements, lecture, small group work, and student-led presentations. The progression of skills we learned and the kinds of assignments we worked on helped me learn a lot really quickly. And I really appreciated how committed Eduardo was to helping students outside of class. Overall it was an excellent course.”

**COGS Q700 Modeling Evolutionary and Adaptive Systems.** “Eduardo is one of the best instructors I’ve had at IU. He genuinely cared about ensuring student success. He was not teaching us required material—he was teaching a relevant skill, in a useful language, that he allowed us to be applied to our own fields.” “Eduardo is without a doubt the best instructor I’ve had at IU. He is a thoughtful instructor from the materials he prepares for class to his willingness to meet with students outside of class time. He is excited about the materials he teaches and does an excellent job tailoring his lessons and assignments to the unique skillsets of each student, and is eager to see us all succeed. The course provided a great survey of modeling techniques and how to implement them. I’m leaving this course not only more confident in my ability to understand modeling, but also in my ability to implement them.” “Eduardo is an excellent professor. He was able to gear the class toward students of many skill levels, allowing everyone from relative beginners to people with substantial coding experience to feel enjoyably challenged by the projects. I really appreciated Eduardo’s willingness to meet outside of class and help with projects via email, often close to deadlines.”

**COLL X101 Simulating disease spread.** “The enthusiasm and personalization was through the roof. It’s very motivating to come in to a welcoming and excited instructor every day. There is also a great effort to encourage participation even if you aren’t confident in your own ability.” “The instructor did a great job at making class engaging. He made an effort to get to know his students, and made sure that everyone felt welcome and comfortable sharing comments/questions. I liked how he was able to check in with every student on their daily progress. With regard to the class itself, I appreciated the sequence in which the instructor introduced the material: from programming concepts, to epidemiological models, and ultimately agent based models. It was clear how each concept built off of the last. I liked how the class fostered personal learning by allowing us to take on our own individual projects.” “The instructor always emphasized further learning outside the class, as well as taking what we learned in class and using it to explore our own questions. He was very helpful in making sure everyone understood everything and was keeping up.”

## Mentoring Feedback

Finally, my mentoring has also received great feedback. The Director of the Center of Excellence for Women and Technology had this to say about my contributions to undergraduate mentoring over these past few years:

“Eduardo has mentored a total of nine women through our program over the last five year, all to high acclaim. He has demonstrated a commitment to the core values of the program, and specifically, I would like to emphasize Eduardo’s dedication to the act of mentoring students. He spends time getting to know each of them, learns about their interests, and helps shape their research projects to maximize skill-building, career trajectories, and exploration. He works to empower women to use technology to benefit their careers and communities, as well as helping to build their own confidence. Eduardo is generous with his time and seeks to meet student’s needs. Beyond Eduardo’s responsibilities as a faculty mentor, he is active in other Emerging Scholar program components including participating in orientation/mentoring training sessions and serving as a judge for both the poster competition and the research hackathon.

In 2020, a student nominated Eduardo for our Center’s Outstanding Faculty Mentor Award which is conferred to faculty who “nurture development of technical skills in women” and “who motivate and encourage women students.” The student shared, “When I look back at the people who have shaped my undergraduate years, there are many names that come to mind, but no one has had near the tremendous influence Dr. Izquierdo has had. He’s encouraged me, challenged me, and given so much of his time to help me achieve goals greater than I could’ve ever imagined. I believe there is no better way to advocate for women than to empower us to achieve more than we previously thought ourselves capable. Whether that’s achieved by taking a little time to inspire and encourage the young women in his classes or by putting incredible opportunities in the paths of his students, Dr. Izquierdo is an extraordinary mentor deserving of recognition.”

Eduardo’s commitment to empowering underrepresented groups is further demonstrated by his participation in Ally training through our Faculty Male Advocates and Allies for Equity workshops. These workshops aim to raise awareness and provide practical methods to work towards equity and inclusion through research and resource sharing, candid discussions, and using scenarios to practice Ally skills. Recognizing him as an ally, a female student in one of his classes reported, “On International Women’s Day, Dr. Izquierdo started his lecture a little differently, briefly talking about the added pressure of being a woman in computing and sharing a bit of the incredible history of women in computing.”

Eduardo has been a highly valued, reliable, and esteemed mentor in our program. Everywhere I turn, I find students praising his mentorship. Here is a small sample of some of the feedback: “I’m really thankful my mentor is giving me the freedom to do whatever I desire!! I am entirely growing as a person which feels amazing, and I am overwhelmingly grateful for all of the people and opportunities in my life right now.” “I am making progress towards my goals and am excited about this topic as well as really appreciate my mentors’ dedication and support.” “I feel very lucky to have a mentor that reached out to me early in the fall semester and he has been walking through the basics of coding with us since early September.” “My research mentor has been very helpful and responsive, and we share many of the same research interests.” “I’m really glad I have this opportunity to work with Eduardo because I really am very happy with all that I’m doing and after a preliminary discussion on possible research directions, I am extremely excited about where I think we can go with this!”

I appreciate the opportunity to share Eduardo’s strengths in the areas of mentorship and allyship particularly as they relate to underrepresented groups. His work as a faculty mentor in our program clearly demonstrates his commitment and impact in this area.”