**DR. DIMITRIS PAPANIKOLAOU**

## TEACHING STATEMENT

My purpose as a teacher is to train students to become not only technically skillful and creative computational designers but also system thinkers that can critically rethink the anthropogenic environment through the lens of information, computing, and social behavior. I measure success and originality of work by proper contextualization and clarity of contributions. This ensures that my students understand the value of their work and where to invest their effort. I teach, at the graduate or undergraduate level, advanced topics on urban computing, human-building interaction, and data-driven modeling and simulation. These topics are organized sometimes into dedicated studios, labs, and seminars and other times into more complex course types that synthesize them. Over the course of my academic career, I have developed a curriculum of four interrelated courses: Synergetic Cities, Connective Environments 1, Connective Environments 2, and Data Driven Urban Modeling and Simulation. The *Synergetic Cities* seminar constitutes a comprehensive literature review on what I consider to be the future in the field or urban and social computing, starting with a general introduction on smart cities and then covering topics of cybernetics, information theory, tangible media, social networks, game theory, mechanism design, and urban systems simulation. *Connective Environments 1: Human-Building Interactions* explores basics of engineering design, mechanical computation, and interactive computing and challenges students to reimagine the built environment as a medium to connect people. *Connective Environments 2: Human-City Interactions* explores urban scale interactions focusing on network communications and social cooperation. Finally, the *Data Driven Urban Modeling and Simulation* seminar provides the systems modeling view on designing synergetic systems by teaching students how to work with data and how to build dynamic physics-based models. At UNCC, these courses are typically cross-listed between the School of Architecture and the Departments of Software and Information Systems (SIS) and Computer Science (CS), and they constitute an integral component of UNCC's dual Master's degree (M.Arch./M.S.) program in Architecture and Information Technology. Throughout my teaching experience, I find the following practices effective:

**Systemic Analysis:** Each time I introduce a new research topic, I often combine a reverse engineering assignment with systems analysis methods. This helps students develop intuition and create a context for the lectures, workshops and discussions that follow. For example, in my engineering design boot camp assignment, students disassemble mechanically actuated toys and use graph theory to explain how their mechanical parts synergize to store and release kinetic energy.

**Use Design ad an Inquiry Tool:** I find that design projects are most valuable when students use them as inquiry tools to test hypotheses. In my urban computing courses, I use design and analysis of strategic games as a framework for learning how to engineer systems of collective intelligence. Through these exercises, students explore questions such as: how can coordinated action emerge from opportunistic behavior? How and when can the game reach a sustainable equilibrium?

**Critical Reflection:** Designers build intuition by experience yet they develop critical thinking by reflective analysis. I often conclude my courses with a position paper in which students make a thesis or reflection on the topic's literature with arguments based on their work findings. This motivates them to choose meaningful project topics with a potential to expand research directions beyond my class. To further cultivate critical discourse, I use class discussions and blog posts in which students comment on each other's responses.

**Peer Learning:** While many of my studio assignments are individual, others involve collaborative work with multiple interdependencies. In these assignments, students must negotiate what they can design, design what they can model, model what they can build, and build what that they can then test and assess. These types of assignments illustrate students the interdependencies between design decisions, information flow, and teamwork in sociotechnical systems, which are fundamental in human-centered design.

**Functional Prototypes:** I ask students to demonstrate their ideas with functional prototypes. Not only this improves their communication skills but also it helps them frame the scope and priorities of their projects in accordance to the time constraint of the course. In addition, I encourage students to share their progress and thoughts publicly in their blogs. This reminds them that as intellectuals the value of their ideas must be clearly communicated to the world.

**Articulate Contributions:** I align teaching with research giving the opportunity to students to articulate the value of their work, publish, and put their contribution in par with global standards. This is done by asking students from early on to combine design with writing, to critically read and present papers from leading journals/conferences, and to situate their own work in relation to the contributions of others.

**The Renaissance Man:** Buckminster Fuller said a designer is an emerging synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist. Recognizing the multifaceted nature of this mindset, I always search novel experiential pedagogies and transdisciplinary collaborations while ensuring to adjust my courses' pace with that of students through online surveys and frequent one-to-one discussions. I want my students to see me not as a judge or a grader but as a mentor who inspires grounded visions, cultivates critical reasoning, illustrates possibilities, and gives pointers to resources. When my students approach me outside class telling me with enthusiasm they discovered links with new research domains or asking me pointers to additional resources I know I have contributed to their education.