# SYLLABUS

| Interaction Design | | | ● **ArtCenter** | |
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| **Advanced Interactive Prototyping** | IxD 256 | | **01** | **3** |
| **Hybrid** | 8:00 am - 12:50 pm | | **Mondays** | **FA21** |
| INSTRUCTOR | Name | **Maxim Safioulline** | | |
| | Contact information | **Maxim.Safioulline@Artcenter.edu** | | |
| | Availability | **Mondays, 3pm-4pm** | | |

## COURSE DESCRIPTION

The purpose of this lab is to introduce students to interconnected digital systems. The class explores the relationships and the possibilities within the digital systems of information and control. Students will create tangible interactive experiences that explore these topics and will experiment with various forms of making, coding and hacking as a design methodology. This class introduces a deliberate and systematic approach to prototyping within the iterative design process and has a strong focus on self-learning and exploration.

## COURSE LEARNING OUTCOMES

**CLO 1: Documenting and communicating design process and methodologies**
Students will be able to document their design process and iterations effectively and with intent. They will be able to compile these documentations in process books, design blogs, oral presentations and other forms of written and oral communication.

**CLO 2: Systems thinking**
Students will demonstrate the ability to approach their designs as a system, analyse its components and subsystems, and their relationships. They will be able to create various representational models, i.e. diagrams, flowcharts, schematics, and use them for system analysis.

**CLO 3: Prototyping strategy**
Students will be familiar with a range of prototyping techniques and strategies and will demonstrate the ability to select the ones appropriate for the design challenge at hand.

**CLO 4: Research and self-learning**
Students will demonstrate their ability to extrapolate from the general understanding of digital systems to gain insight into the functioninging of a particular technology or system. They will also be able to apply research techniques to learn previously unfamiliar technologies or systems.

**CLO 5: Hacking and reusing technology**
Students will demonstrate the ability to reuse, repurpose and subvert existing digital and physical systems, components and artefacts to serve their own needs in design research and prototyping.

## SECTION DESCRIPTION

Students expand their range of design concerns beyond the screen-based interactions and explore the physical and material aspects of interaction design.
The class will start with a series of three small projects exploring core concepts of digital systems: representation, interconnectedness and control. Using the skills and knowledge gained in these projects students will create the  final project exploring the possibilities and the limitations of digital media.
Students will learn to use:
- Processing, P5js
- Particle.IO, Adafruit.IO
- Particle, Adafruit and Arduino-based electronic kits
- Sensors, servo motors, LEDs and LED screens, and other electronic components

Class deliverables:

- Working prototype for every project
- Process book (case study) for the final project including: impetus, context, concept, iterations, tools and methods, system diagram, user flow, project in use, future possibilities

For the duration of the class students will keep a Web-based blog on GitHub.com. They will document their process, discoveries, learnings, and failures on a weekly basis.

| **ANTICIPATED SCHEDULE** (List major projects and assignments, not all weekly activities) | |
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| ***Project 1: Representation***. Learning how to express both natural and fictional systems in code and electronics.<br>- System diagrams and flowcharts<br>- Modelling systems in code<br>- Code as narrative and expressed imagination | Weeks 1 - 3 |
| ***Project 2: Control***. Experimenting with the affordances of control, influence and coercion through physical and graphical interface strategies.<br>- Affordances and limitations of physical and digital interfaces<br>- Dealing with complexity, Gestalt principles in UI design<br>- Microinteractions | Weeks 4 - 6 |
| ***Project 3: Communication***. Working to reuse and repurpose technology to create an integrated system that includes physical, graphical and networking components.<br>- Connecting physical and digital<br>- Standards, protocols, documentation<br>- Layers of abstraction and limitations of expertise. (Computers as reliable magic) | Weeks 7 - 9 |
| ***Project 4: Exploration.*** Using research and self-learning strategies to build a project within a scope of pre-defined tools and technologies<br>- Prototyping strategies<br>- Combines physical, digital, and networking components<br>- Using sensors, actuators, screen-based control, screen-based datapoints<br>- Web-based API for data exchange | Weeks 10 - 14 |

| **GRADING** |
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| <ul><li>Attendance (if you miss more than two classes without permission, you overall grade will be lowered one letter grade, 3 unexcused absences will result in an F)</li><li>20% Participation</li><li>20% for each of the four projects, with the main focus on the quality of documentation</li></ul> |

| **ALIGNMENT CHART** (Contact your Chair or Director if you don't have the CLOs for your course) | | | | | | | | | |
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| | ALIGNMENT TO COURSE LEARNING OUTCOMES | | | | | | | | |
| MAJOR ASSIGNMENTS (ie, midterm and final, only main projects, etc... Make sure to indicate which CLOs the Project directly addresses) | CLO 1 | CLO 2 | CLO 3 | CLO 4 | CLO 5 | — | — | — | — |
| ***Project 1: Representation*** | x | x | x | x | | | | | |

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| *Project 2: Control* | x | x | x | x | | | | | |
| *Project 3: Communication* | x | x | x | x | x | | | | |
| *Project 4: Exploration* | x | x | x | x | x | | | | |

| COST INFORMATION | | | |
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| REQUIRED MATERIALS: | Prototyping board, sensors, accessories | ESTIMATED COST OF MATERIALS: | $ 90.oo |

| INSTRUCTION/HOMEWORK | | | |
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| CLASS ACTIVITIES (all that apply during the term) | y | Lecture/Discussion | WEEKLY HOMEWORK: | 2 – 4 hours |
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| | y | Instruction/Demonstration | | |
| | y | Critique | | |
| | y | Studio time | | |
| | y | Lab | | |

## EXPECTATIONS FOR CLASSROOM CONDUCT

ArtCenter is committed to maintaining a civil and safe learning environment, free from bias, coercion, and harassment for all. The classroom is a shared environment where all parties are accountable for behavior and contributions to a productive and supportive atmosphere. We understand that our members represent a rich variety of backgrounds and perspectives and are committed to providing a set of conditions for learning that respects diversity. While working together to build this community we ask all members to:

- Be open to the views of others
- Honor the uniqueness of colleagues
- Communicate in a respectful manner
- Recognize differences in learning, language, approach and ability
- Appreciate the opportunity that we have to learn from each other in this community
- Respect the work and materials of others

All students are expected to abide by the ArtCenter Code of Conduct. All Faculty members, as Employees, are expected to abide by the Employee Standards of Conduct. The full statements of these policies can be found in the Student and Employee Handbooks. To report an incident, please see the Grievance and Complaint Policies and procedures listed in the Student Handbook, Faculty Handbook, and Employee Handbook. If you have any concerns or would like to discuss an incident, please contact your Instructor, your Department Chair, the Center for the Student Experience, or the Office of the Provost.

## POLICY AGAINST HARASSMENT

The College is committed to providing an educational environment that is free of any kind of unlawful harassment. In keeping with this commitment, the College maintains a strict policy prohibiting unlawful harassment by any employee and by any third parties, such as contractors, visitors, students or vendors. Any harassment on the basis of race, color, religious creed, sex, ancestry, national origin, age, physical or mental disability, medical condition, genetic characteristic, marital status, veteran status, sexual orientation, gender identity, transgender identity or any other characteristic protected by federal, state or local law is strictly prohibited. Examples of such conduct that may violate this policy include verbal harassment, physical harassment or visual harassment. Verbal harassment may include, but is not limited to, epithets and derogatory comments or slurs on any of the bases listed above. Physical harassment may include, but is not limited to, assaulting, impeding or blocking movement, or physically interfering with the normal work or movement of another, when directed at that individual on any of the bases listed above. Visual harassment may include, but is not limited to, the display or possession of derogatory posters, cartoons, computer images or drawings on any of the bases listed above. Violation of the Policy Against Harassment may result in disciplinary action, up to and including suspension or dismissal. Please see the Student Handbook for additional guidelines on the above.

**Title IX Student Policy and Procedure**

ArtCenter does not discriminate on the basis of sex, gender or sexual orientation in its education programs or activities. ArtCenter complies with Title IX of the Education Amendments of 1972, and certain other federal and state laws, which prohibit discrimination on the basis of sex, gender, or sexual orientation in employment, as well as all education programs and activities operated by the College (both on and off campus), and protect all people regardless of their gender or gender identity from sex discrimination, which includes sexual harassment and sexual violence. For more information, please see the Notice of Non-Discrimination and Policy Statement. Further contact information, policies and procedures, complaint forms, and other resources can be found on the Title IX Webpage on Inside.ArtCenter.edu.

## ATTENDANCE POLICY

To complete a course successfully, students must attend all class sessions (unless they are engaged in research or location assignments that have been authorized in advance by the class instructor of the missed class). The instructor takes attendance at the beginning of each class.  At the discretion of the instructor, three or more absences may result in a grade of F. Students who miss a class due to illness should discuss the absence with the instructor at the next class meeting. Students who are ill for a week or longer should inform their Department Chair's office of their absence. Please see the full Attendance Policy in the [Student Handbook](#) for more information.

## DISABILITY STATEMENT

ArtCenter complies with the Americans with Disabilities Act, Section 504 of the Rehabilitation Act, and state and local requirements regarding students and applicants with disabilities. Under these laws, no otherwise qualified individual with a disability shall be denied access to, or participation in the services, programs and activities of the College. The Center for the Student Experience has more information on Disability Services, policy and Resources for students. Please see the full Disability Statement in the [Student Handbook](#) for more information.

## STATEMENT OF ACADEMIC AND CREATIVE INTEGRITY

Academic and creative integrity is essential to personal and educational growth of students, which all members of the ArtCenter community are expected to uphold. This value maintains the standards of excellence of the College and creates a meaningful learning environment. A violation of the Academic and Creative Integrity Policy is defined as misconduct including but not limited to plagiarism, creative dishonesty, multiple submission of the same work, cheating, unauthorized collaboration, misrepresentation of ability, sabotage, falsification of records, and complicity in any of the above. The full Academic Integrity Policy can be found in the [Student Handbook](#).

## GRADE POINT DESCRIPTIONS

Grades are considered FINAL when submitted by the faculty and can only be changed to correct an error in grading or to change an official Incomplete grade to a final grade. Students CANNOT submit or redo work after the end of the term unless an official Incomplete has been approved. The deadline for changing an Incomplete grade is Friday of Week 14 of the term following the term when the course was taken. The deadline for changing an incorrect grade is Friday of Week 6 following the term when the course was taken. Please see the [Student Handbook](#) for the full statement on Grades and Grade Points. ArtCenter uses the following grading system:

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| A | 4.00 points | C+ | 2.50 points | D- | 0.75 points | N | 0.00 points (Non-attendance Failure) |
| A- | 3.75 points | C | 2.00 points | F | 0.00 points (Fail) | U | 0.00 points (Unsatisfactory) |
| B+ | 3.50 points | C- | 1.75 points | S | 0.00 points (Satisfactory) | P | 0.00 points (Pass) |
| B | 3.00 points | D+ | 1.50 points | I | 0.00 points (Incomplete) | W | 0.00 points (Withdrawal) |
| B- | 2.75 points | D | 1.00 points | M | 0.00 points (Missing) | | |

# WEEKLY PLAN

| WEEKLY PLAN OF ACTIVITY | | | |
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| Course Name: Adv. interactive Prototyping | | Instructor: Maxim Safioulline | |
| Term: Summer 2021 | | Meeting Location and Time: Online, Mondays, 4pm-9pm | |
| Week | Topic | Class Activities | Assignments |
| Week 1 | Project 1: Representation | Introduction to object-oriented programming with Processing. Building an example of a simple extendable interactive system. | Come up with a natural system you'd like to represent in code: sun moving across the sky, a bunch of ants on a table, etc. The system needs to have several moving components. Think about how you could use a keyboard and/or a mouse to make your system interactive. Create a diagram of the system that would show the following: All components of the system (including the user interacting with it); The property of each component - what are they like? The roles of each component - what do they do? The relationships of the components - how do they affect each other? |
| Week 2 | Project 1: Representation | Homework reviews - diagram discussions. Using diagrams as a tool for communication and visual thinking. Code demo: translating diagrams into code | Continue working on your systems based on the feedback you received during class: focus on translating your diagrams into code within a Processing sketch. Figure out how interactive elements could be embedded and which aspects of the system could be controlled via mouse and/or keyboard |
| Week 3 | Project 1: Representation | Project review, group critique. | Read Stephanie Houde and Charles Hill, What do Prototypes Prototype?. Pick 3 quotes from the text and write 1 paragraph response for each quote. Post on GitHub. Polish your Project 1 and create a blog post on your GitHub featuring a lot of images (and/or videos) from the project and responses for the following: - Why did you decide to work on this topic, what's your interest there? - How did you envision your system in the beginning and how did that vision change? - At least one image of your diagram. - How did you translate your diagram into code? - How did you deal with the complexity in your system? - How did you decide on the interactive elements? - What would be some paths for future development of the project? Prepare your Particle.IO account, your Argon or Photon board and all the controllers you think you might use for project 2. |
| Week 4 | Project 2: Control | Reading discussion, project 2 kick-off: virtual prototyping with TinkerCad. Code demo: single value via Serial connection. | Start building a new interactive system in Processing or continue working with the one from Project 1 Work on connecting the Particle.IO board controller to your system's parameters. Think about what kind of controllers |

| | | | (knobs, buttons, touch sensors, joysticks, etc.) you'd need to make your system interactive and plan on how you'd build the corresponding connections. |
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| Week 5 | Project 2: Control | System prototype reviews<br>Code demo: multiple values via Serial connection. | Work on the layout of your controller. Sketch, draw, or use software to outline the layout. You won't be able to use any words or images in your controller so think about how the layout of the panel would communicate its purposes and the mapping of the controls. Look into Gestalt principles to help you with your layout<br>Mount your controller on flat cardboard surface (a box, for instance) and test out your design in action. Make a video illustrating the use. |
| Week 6 | Project 2: Control | Project review: controller interaction review, group critique. | Create a blog post on your GitHub featuring a lot of images (and/or videos) from Project 2 and responses for the following:<br>- Why did you decide to work on this topic, what's your interest there?<br>- How did you envision your controller in the beginning and how did that vision change?<br>- How did the physical peculiarities of the sensors influence your interaction?<br>- How did the communication schema influence your interaction?<br>- How did you settle on the physical shape of your controllers?<br>- Describe the details of the build process, including pictures, videos and code.<br>- What would be some paths for future development of the project?<br>Finish you project 2 controllers.<br>Read Programming Design Systems to help you think about translating graphical representation into code |
| Week 7 | Project 3: Communication | Reading discussion, project 3 kick-off. Code demo: GET requests and Data Streams with Particle.IO boards. | Prepare a concept of what kind of sensor-driven data you could collect in your environment and how you could visualise it via a Web-based graphical page. Think about data visualizations and dashboards as your starting points.<br>Assemble your data-gathering devices, collect the data and visualise it in P5JS. |
| Week 8 | Project 3: Communication | Project 3: Intro to P5JS.<br>Code demo: loading JSON data from Particle.IO boards | Finish your data-gathering and data displaying systems. |
| Week 9 | Project 3: Communication | Project review: data systems review, group critique. | Read Chapter 2 "The Internet of Things" from Adam Greenfield "Radical Technologies"<br>Prepare a short slide deck with the proposal for the fourth project. You can continue working on one of the previous projects and develop it further, you can combine previous projects - or you can start a new one from scratch.<br>Project requirements: A complex system of interconnected elements represented visually; a hardware interface with 3 inputs (sensors, knobs, buttons, etc.) which communicates with the visual components and affects them directly or indirectly. The form of communication can be wired or wireless.<br>In your concept presentation talk about: 1. Context (the field or sector of design in which |

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| | | | you'll be working - games, IoT, data visualisation, etc.) 2. General concept 3. Impetus (why do you want to build this?) 4. Goals (what are you hoping to achieve and Rev.SH.01.9.2021<br>how are you going to measure success.) 5. Tools and methods. |
| Week 10 | Project 4: Exploration | Reading review (IoT chapter from Radical Technologies.) Concept presentations. | Create system diagrams listing the relevant components of your system and their interactions<br>Create a project roadmap for the next 5 weeks.<br>Create the first technical prototypes. |
| Week 11 | Project 4: Exploration | Storyboarding workshop.<br>Heuristic evaluations - tools, methods and strategies. | Create storyboards exploring the use cases for your system.<br>Update and iterate technical prototypes.<br>Fill out the heuristic evaluation checklist for your project. |
| Week 12 | Project 4: Exploration | Group review - midway check-in, one-on-one meetings | Updates based on feedback.<br>Project presentations - create the first draft. |
| Week 13 | Project 4: Exploration | Final presentations dry-run; one-on-one meetings | Prepare for the final presentations.<br>Context (the field or sector of design in which you'll be working - games, IoT, data visualisation, etc.)<br>General concept<br>Impetus (why do you want to build this?)<br>Goals (what are you hoping to achieve and how are you going to measure success.)<br>Precedents (who else did something similar and what can you learn from their mistakes and successes?)<br>Tools and methods (what are you using to build this - and how is it all coming together?)<br>Prototyping process (show your prototypes - working and not, how they came together, how they affect your thinking and vision for the project?)<br>Future iterations (if you were to continue working on this project - what would be a cool thing to do next?)<br>Updated all the content on your Github pages. |
| Week 14 | Project 4: Exploration | Presentations for individual projects | |