**Shader Studio**

This 1 point studio course will focus on advanced graphics programming skills using OpenGL/WebGL Shading Language to modify the rendering pipeline. This course will only cover GLSL version 1.0 and will focus on fragment shaders, using glslEditor online tool (http://editor.thebookofshaders.com) or its native counterpart glslViewer (https://github.com/patriciogonzalezvivo/glslViewer). Because this language is compatible with OpenGL ES and WebGL, later students will be able to apply the knowledge to other tools, libraries and applications (real or fictional) of blockchian, and their speculative designs what the technology might become.

**Neuroscience and Art**

This course will explore bridges/ links between neuroscience and art. After covering basic concepts related to structure and function of the nervous system, we will focus on how the properties of our nervous system affect art making and viewing. We will particularly focus on the vision system, memory and attention.

Ideas/ concepts covered will include: 1.) basic architecture of the central nervous system and its known properties/ functions, including neuronal architecture axons/ dendrites / synapses and basic molecular concepts (what is a neurotransmitter / synaptic junction)], 2.) localization of brain functions (from focal lesions to cells and molecules to brain wide networks and back), 3.) basic structural and functional components of the sensory system with particular focus on the visual system, 4.) the relationship between sensory system and perception / approximations and predictions made by the nervous system to interpret incoming sensory stimuli (ex. blind spot filled in, etc), 5.) common abnormalities in perception (benign hallucinations/ Charles Bonnet syndrome, etc.), 6.) case studies of famous artists and writers whose work was possibly affected by neurological disorder (Kant, Van Gogh, Caspar David Friedrich, Edgar Allan Poe, Nietzsche).

**Recurring Concepts in Art**

What is the relationship between new media art and the art that preceded it? Has the revolutionary impact of digital media produced entirely independent spaces of art making and creativity? Thinking around such questions tends toward historical dialectic, or the idea that the present is always in dialogue with the past. There is a long history of ties between the making of art and technological advancement. Taking this history as its foundation, this course will explore how digital technologies have produced new arenas for artistic expression and interpretation, while focusing on how 20th-century artists working before the digital boom utilized other media, techniques and approaches to effect comparable formal, conceptual and experiential dynamics. The course has been designed to enhance perception and understanding of art through a variety of channels - from sustained, close looking to exploratory conversations to more rigorous thinking and discussions informed by readings, projects (including making projects) and written assignments.

**Flying Robotic Journalism**

It used to be that only the wealthy and powerful could put eyes in the sky. Dramatic aerial images of riots and other uprisings—captured by guerrilla drone journalists, activists and protesters—suggest a politically transformative leveling of the playing field.

Yet even the cheapest quadcopter can threaten evisceration or fatality, and unmanned flight is a legal minefield. With all this uncertainty, what are the prospects for drone journalism in the US and globally?

In this class, learn about the law, technology, and practice of drone journalism. You'll meet pioneers of the field, develop conceptual understanding by programming toy drones, and finally conceive & pilot a modest drone journalism mission.

**Blockchain Fiction**

"Blockchain is the new Internet” - something bigger is going on here, than just another form of digital payment like Bitcoin. The blockchain enthusiasts promise applications from smart contracts, to autonomous organizations, to anarchistic systems of government. This course introduces fundamental concepts and functionalities of the blockchain and its applications, and offers a way to playfully explore its multiple dimensions. The goal of the course is not only to improve skills in this utopian however very real technology, but also to creatively apply it, to come up with design fiction and push the concept to the edge. Students will learn the basics of blockchain technology, cryptography, and the functions specific to the blockchain like crypto-currencies, smart contracts, and autonomous organizations. Students will create their own designs and applications (real or fictional) of blockchain, and their speculative designs what the technology might become.

The course includes reading and practical work as homework and in class work.

**Syllabus**
Bodies of War: Engineering Ethics

This course examines 21st-century technologies of war and asks: What is the edge of ethical engineering? Students will critically examine U.S. Military technologies including robotic exoskeletons, military robots, neural prosthetics and networking (brain warfare), biometric scanning, and UAVs (drone warfare). Soldiers from the U.S. Air Force, U.S. Army, and U.S. Marine Corps branches will join class sessions along with guest speakers to discuss the role of new technologies and robotic warfare during their service in Iraq and Afghanistan. Students will produce a final course project that may be submitted as an essay, multimedia project, or applied technology that engages with the ethical questions posed in the class. Each project will be designed over the course of the semester in direct collaboration with a U.S. Military former or active-duty

Mo 3:20-5:50pm (01/22 - 03/19) Syllabus

Avant-Garde Procedural Art

This class is an introduction to using the strategies of Procedure and Instruction in visual, moving image, performance and sound art. It is a mixture of making, reading, analysis and critique. We will look at the historical precedents to today’s practices that range from algorithmic art to socially engaged art, and their roots in the artistic revolts of avant-garde movements beginning in the early 20th century. These include Surrealism, Situationist International, Fluxus, Neo Dada, Conceptual Art, and Happenings. We will examine the artistic motives and contexts for using these strategies, and students will design and test their own art experiments using these techniques to create meaningful and responsive prototypes.

Thursdays 3:20 PM - 5:50 PM (01.26.17 - 03.09.17) Syllabus

Bluetooth LE

Bluetooth is a short range (~100m) wireless technology for connecting devices. Bluetooth low energy peripherals such as lights, sensors, and wearable devices broadcast their presence and the services they provide. Applications on phones, tablets, or laptops can discover and connect to these Bluetooth devices without any configuration.

The goal of this class is for you to understand Bluetooth concepts, learn to create Bluetooth peripherals, and build Bluetooth applications.

The class will introduce the low energy features of Bluetooth, explain the Bluetooth attribute protocol, and teach the design of Bluetooth services. You will learn to build Bluetooth peripherals using Arduino. You’ll also use Node.js to build peripherals and applications that can run on a Raspberry Pi or laptop. You will build iOS or Android applications to connect to these peripherals, using JavaScript and Apache Cordova.

The course will be a mixture of lecture and in-class collaborative coding. There will be small with weekly assignments building Bluetooth peripherals and applications. Students are encouraged to have their own hardware for the class but have the option to use devices from the equipment room.

Mo 3:20-5:50pm (02/23, 03/01, 03/08) Syllabus

100 Days of Making

This course is focused on a daily, iterative practice. Students will identify a theme, idea or topic they would like to explore over the course of 100 days and must commit to making or producing a variation on that idea every day for 100 days. Students who enroll must commit to producing and documenting physical evidence of their efforts. Projects can focus on building, writing, drawing, programming, photographing, designing, composing or any creative expression.

In parallel to the making, in-class lectures will examine the work of artists who’s work has been defined by iteration and discuss the role of discipline and routine in the creative process.

Toward the end of the class we will focus on documentation and reflection on the experience and each student will produce a compilation of their 100 day efforts.

Fr 3:20-5:50pm (01/26 - 05/04) Syllabus

The Fungus Among Us

We live among the vast and relatively unknown Kingdom of Fungi. Mycelial networks have been likened to social and communications networks. What do we have in common with mushrooms? What can we learn from them? Fungi communicate, remediate, and decompose. They are used as food, medicine, spiritual guides, and material building blocks. Some are crucial to the soil food web; others will kill you. Fungi are closer to Animalia than to Plantae, and only 5% of the Fungi have been classified.

Students will explore fungi through reading, research, writing and interacting with fungi, and making one case study and one project that explores the physical and conceptual material covered in class. Readings that span the biological, theoretical, social and creative will include Paul Stamets, Dale Pendell, Anna Tsing, and Gilles Deleuze. Students are asked to utilize “technologies” in the creation of projects, which might include digital media, cooking, mycotecture, or working with existent fungal communities.

Fr 3:20-6:15pm (02/23, 03/01, 03/08) Syllabus
soldier who will work with students on a theoretical, technical, or performative final project.

In 1992, French theorist Gilles Deleuze observed, "There is no need to fear or hope, but only to look for new weapons." In the 21st century, the U.S. government, universities, and private institutions collaborate to "look for new weapons" by engineering technologies for American warfare. These technologies often focus on the human body as the site of military innovation. If the U.S. Military is primarily concerned with engineering "technologies of war," is there an opportunity for engineers, such as ITP graduates, to engineer "technologies of peace"? What design and function would such embodied "technologies of peace" play and can they intervene in an increasingly militarized U.S. society where Google owns military robotic companies and Apple iPhones are used to detonate bombs throughout the Middle East?

**Thursdays 3:20 PM - 5:50 PM (03.23.17 - 05.04.17)** Syllabus

**Collective Narrative**

ITPG-GT.2706.1 Tues 09:00am to 11:30am Marianne Petit

This two-point workshop is centered on the examination and creation of collective storytelling environments. We will examine a wide-range of storytelling spaces including participatory and user-generated environments, site-specific works, community based arts practices, and transmedia storytelling. Weekly assignments, field trips, and student presentations.

**Tu 9:00-11:30am (01/23 - 03/06)** Syllabus

**Designing Meaningful Interactions**

ITPG-GT.2805.1 Wed 12:10pm to 2:40pm Katherine Dillon

This class will focus on how to create interfaces that get people to take the action you intended them to take and how to make that interaction a compelling experience. We will look at a wide range of examples of interaction design and explore different approaches to solving user experience problems across a number of platforms and at a wide range of scales. The class format will include lecture, student presentations, discussion and in-class design exercises. The class will be very hands-on with assignments each week that focus on a particular aspect of user experience design including research, wire-framing, rapid prototyping, critique and user testing. Tools will include pen and paper, models and digital tools. Students will be active participants in the class and all assignments will be discussed and reviewed in class. Students should come to every class with a computer and sketchbook.

**Sec: 001: Th 3:20-5:50pm (01/25 - 03/08)**

**Sec. 002: Th 6:30-9:00pm (01/25 - 03/08)**

**Detournering the Web**

ITPG-GT.2119.1 Thur 6:30pm to 9:00pm Sam Lavigne

"Detournement" is the practice of hijacking cultural or artistic materials and reusing them to produce new works that both counter and explicate the original intent or ideology of the source material. In this class, students will learn how to scrape massive quantities of material from the internet using the Python programming language, and then deploy that material to make satirical, critical and political projects. The class will cover a variety of web scraping techniques, as well as command line programs and Python tools that will allow us to automatically manipulate text, images and video, with readings pertaining to the history of artistic "hijackings" and satire.

**Mo 6:30-9:25pm (01/22 - 04/23)** Syllabus

**Development in the Public Interest**

ITPG-GT.2809.1 Fri 3:20pm to 5:50pm Harlo Niani Holmes

Over the course of the semester, students will team up with people who work in high-octane environments (journalists, human rights defenders, cop watchers, whistleblowers, and documentary filmmakers) to build technical solutions for the public interest.

Students will be presented with a unique set of design challenges directly from domain experts, and respond with hardware and software solutions specially-honed to meet the client’s need. This will require a lot of listening: together, we will work hard to understand the adversaries, threat models, and operational challenges frontline workers face daily.

Students will then be split into teams, and work together in a "sprint" tackling the needs of the client of their choice. First, we will get to know the field through the eyes of our client. Then, we’ll work with our client to design a solution. Finally, we’ll build using the Express framework and p5.js to turn our designs into usable prototypes.

This course will be production-heavy, and incorporate two fundamental principles:

Human-centered, collaborative design focus: In our design phases, students will work with people in the field. We will incorporate input and feedback from those who will ultimately use our tools.

Development in the open: Students will not only be graded on the work they produce, but also their development process. Students will be expected to master Github’s pull request and issue tracker features; learn to fork great code while respecting open source licensing; and use submodules to their advantage.

**Fridays 3:20 PM - 5:50 PM (03.24.17 - 05.05.17)**

**DWD Online - Mobile**

ITPG-GT.2575.1 Mon 6:30pm to 9:25pm Colleen Higgins

This 6-week, 2 point course will be focused on developing and deploying front-end mobile web applications using HTML5, CSS, JavaScript. Additional focus will be on capabilities suited to the mobile device such as the geolocation, touch interfaces, responsive design, sensor data (gyroscope, accelerometer, magnetometer), and media capture. Finally, the course will cover using the open-source Framework PhoneGap to export these web applications as cross-platform mobiles apps that can be distributed via Google Play and/or the Apple App Store.
Some programming experience with JavaScript is required (ICM with p5.js or Comm Lab Web).

**Mondays 6:30 PM - 9:25 PM (01.23.17 - 03.06.17)** Syllabus

### Electronic Rituals, Oracles and Fortune-Telling

**ITPG-GT.2120.1**

Wed 12:10pm to 3:05pm  
Allison Parrish

According to anthropologists Filip de Boeck and René Devisch, divination "constitutes a space in which cognitive structures are transformed and new relations are generated in and between the human body, the social body and the cosmos." In this class, students will learn the history of divination, engage in the practice of divination, and speculate on what forms divination might take in a world where the human body, the social body, and even the cosmos(!) are digitally mediated. Starting with an understanding of ritual and folk culture, we will track the history of fortune-telling from the casting of lots to computer-generated randomness to the contemporary revival of Tarot; from reading entrails to astrology to data science; from glossolalia to surrealist writing practices to the "ghost in the machine" of artificial intelligence. Weekly readings and assignments culminate in a final project.

*Th 12:10-2:40pm (01/25 - 05/03)*

### Fairy Tales for the 21st Century

**ITPG-GT.2139.1**

Mon 09:00am to 11:30am  
Marianne Petit

Throughout time, fairy tales, myths, and stories of magic have served as a way for both children and adults to make sense of the unpredictabilities of the world around them. How do these stories serve us today? How do new technologies allow us to present and reinterpret these tales so that they bring new meaning? Students will work with stories of their choosing and are free to work with the medium of their choice, however we will examine both traditional book art structures, as well as VR (Unreal Engine.) Weekly exercises, readings, final project.

**Mondays 9:00 AM - 11:30 AM (01.23.17 - 03.20.17)**

### Hacking the Browser

**ITPG-GT.2811.1**

Wed 6:30pm to 9:00pm  
Cory Forsyth

Web browsers were originally only used for displaying web pages, but over the years they have become supercharged all-powerful web execution machines. In this class we'll explore using experimental new browser capabilities and HTML5 APIs to build small web projects that augment and subvert the traditional browsing experience. We'll cover the mechanics of bookmarklets and Chrome extensions. Each week we will explore a different browser API or Chrome extension capability. APIs that will be covered may include: Battery Status, Geolocation, full-screen-mode, notifications, accelerometer usage, video camera access, speech recognition and text-to-speech. Class workshops will include projects such as building one's own ad blocker, programmatically replacing text and images on a website, and making sites that respond to external events. Students will give in-class presentations on web capabilities, complete small weekly assignments, and a final project. Some experience with HTML, CSS, and JavaScript (ICM with p5.js or CommLab Web/Networked Media) are requirements for this class.

*We 6:30-9:00pm (03/21 - 05/02)* Syllabus

### Impossible Maps

**ITPG-GT.2801.1**

Mon 3:20pm to 5:50pm  
Chisom Onuoha

Digital technologies have created new opportunities and resources for mapping, cartography, and geolocation-based visual investigation. They have also brought with them the need to consider issues concerning power, representation, and space.

In this course, students will learn the practical realities of working with spatial geographies in digital and web-based contexts. Time will also be devoted to investigating the conceptual questions that inform mapping and strategies for art-based counter-mapping. The course will address questions such as: What makes a good digital or web map? What kind of data can mapping represent, and what patterns can it reveal in datasets? What do maps represent as visual information artifacts? What happens when we consider claims to space as topics for art-based investigations?

Students will gain exposure to a broad range of techniques in web and digital mapping, with the goal that they eventually focus on one or two. Throughout the course, students will be challenged to make maps (or map-based creations) that function as artful objects and challenge common conventions of the capabilities of maps. The class will be taught primarily in JavaScript, with assignments making use of git and Github. Other technologies taught will include mapshaper, Leaflet.js, Mapbox, and Carto.

*Tu 12:10-2:40pm (03/20 - 05/01)* Syllabus

### Magic Windows

**ITPG-GT.2179.1**

Fri 09:00am to 11:30am  
Rui Pereira

Magic windows that allow us to peek into different realities without leaving our physical space, lenses that reveal hidden layers of objects or navigating new universes within the same room. More than ever, mobile devices are getting a human-scale understanding of space and motion allowing us to create more intimate interactions with our surrounding spaces, leveraging them as a canvas to experience other realities. We now have the potential to give life to inanimate objects, tell stories through space, customizing private views of public spaces and recognize places we've never been.

We'll question what it means and how can we blend reality exploring themes such as: augmented space and new paradigms in social interaction, public space and privacy; storytelling and navigating the physical space like turning pages in a book; tangible interfaces, mixed objects and animism; Magic windows, x-ray vision,
time-machines and impossible universes; Far away so close: telepresence and remote collaboration.

The course will survey the past, current and up and coming technologies and experiences in Mixed Reality including environmental augmented reality and interactive projection mapping, handheld devices while fostering a strong user experience perspective on the affordances and constraints of each. We'll research and discuss the design principles and guidelines for creating mixed reality experiences focusing on the links between real and virtual objects, interaction space and asymmetries between physical and digital worlds, environmental semantics and multimodal and tangible interaction.

Technologies explored will be focusing on mobile platforms (phones, tablets) including Vuforia, SLAM, image and object recognition, depth sensing, projection mapping.

Unity3D will be the development platform: students must have previous working knowledge of Unity3D and feel comfortable with independently developing using this platform.

A working knowledge of Unity3D may be gained by going through the Unity 5 3D Essential Training Lynda Course prior to the course (log in to Lynda for free via https://www.nyu.edu/lynda).

Students will create and develop ideas through sketches and functional prototypes for each of the weekly themes (see calendar below).

We 6:30-9:00pm (01/24 - 03/07) Syllabus

Making Pop-Up Books and Paper Engineering

ITPG-GT.2884.1 Wed 6:30pm to 9:25pm Sam Ida
This two-point workshop covers the basics of paper engineering techniques (including folds, layers, dials and pull-tabs) to make movable designs that can be incorporated into your work. Weekly assignments and a final project.

Wednesdays 6:30 PM - 9:25 PM (01.25.17 - 03.01.17) Syllabus

Mechanism: If It Moves It Breaks

ITPG-GT.2687.1 Mon 3:20pm to 6:15pm Stephan von Muehlen / Ben Cohen
We will introduce the delightful possibilities of simple machines and fundamental mechanical concepts—such as levers, gears, and linkages—through examples from the history of kinetic sculpture, interactive art, and manufacturing. Look to Alexander Calder's *Circus* and Theo Jansen's *Strandbeest* as examples.

This class will teach the students the joy of making things that move, the pain of watching them fail, and the knowledge they will need to ensure that what they design won’t fail when it’s most important. Students will quickly engage these concepts with their own initial projects. We will share the challenges professional engineers and artists face when making something move and begin to identify and address those challenges.

Discussions will focus on best practices in designing mechanical systems, determining requirements, simple prototyping, specifying, resourcing and manufacturing components, and testing. The students will find examples of things that work, and things that have failed. Site visits to shops where things are made will put these concepts into a real-world context. Students will also be required to design and build a final project that meets a basic set of requirements (e.g. includes at least 2 "simple machines," is resettable, works, and looks good).

Mondays 3:20 PM - 6:15 PM (01.23.17 - 03.06.17) Syllabus

Nature of Code (Animation and Physics)

ITPG-GT.2124.1 Tues 09:00am to 11:30am Daniel Shiffman
ITPG-GT.2124.2 Wed 09:00am to 11:30am Daniel Shiffman
Can we capture the unpredictable evolutionary and emergent properties of nature in software? Can understanding the mathematical principles behind our physical world help us to create digital worlds? This class focuses on the programming strategies and techniques behind computer simulations of natural systems. We explore topics ranging from basic mathematics and physics concepts to more advanced simulations of complex systems. This is a new 2 point version of the course. Topics covered are the mathematics of vectors and trigonometry, how to build your own physics engine as well as use existing ones. The course will end with an exploration of autonomous agents and complex systems. Examples will be demonstrated in JavaScript using p5.js, but students are welcome to develop their work in the environment of their choice. Students who have previously enrolled in Nature of Code should not take this course, but can choose to take the new "Intelligence and Learning" 2-point course.

Section 001: Tuesdays 9:00 AM - 11:30 AM (01.24.17 - 03.07.17)

Section 002: Wednesdays 9:00 AM - 11:30 AM (01.25.17 - 03.08.17) Syllabus

Nature of Code (Intelligence and Learning)

ITPG-GT.2123.1 Tues 09:00am to 11:30am Daniel Shiffman
ITPG-GT.2123.2 Wed 09:00am to 11:30am Daniel Shiffman
Can we capture the unpredictable evolutionary and emergent properties of nature in software? Can understanding the mathematical principles behind our physical world help us to create digital worlds? This 2 point course explores the latter half of The Nature of Code book in greater detail and with an eye towards expanding the content with recent developments in machine learning. The course will begin by examining classic machine learning algorithms: genetic algorithms and classification techniques like nearest
neighbor, bayesian classification, and decision trees. From there we'll explore recent advances in deep learning neural networks in the context of creative projects at ITP. Processing and p5.js will be the starting point, but we'll branch into other tools like python, node, wekinator and more when necessary. Students who took Nature of Code last year are welcome to register for this new 2-point, although it will include a small amount of repeat material. Part I is not required for Part 2, however, if you have not taken Part 1, you will likely want to read chapters 1-6 of the textbook as background.

Section 001:
Tuesdays 9:00 AM - 11:30 AM (03.21.17 - 05.02.17)

Section 002:
Wednesdays 9:00 AM - 11:30 AM (03.22.17 - 05.03.17) Syllabus

Neuromachina

ITPG-GT.2136.1

Course Description
This course will be focused on the convergence of man and machine. We will explore a variety of biosensing technologies, including but not limited to: brain sensors, muscle sensors, heart rate monitors, galvanic skin response devices, respiration sensors, neurostimulators, and eye trackers. The objective of this course is to explore what exists with regards to human-computer interface (HCI) devices, and to also push the field of HCI forward. The collision of design and technology is integral to the progression of the relationship between humans and computing technologies. We cannot simply engineer solutions to humanity's biggest challenges; we must also design intuitive, ergonomic, and socially responsible systems that improve the human experience. The human body is an ocean of electricity and data that we can both listen to and influence. This cybernetic dynamic—of input and output—will undoubtedly influence the evolution of our species.

What will students do?

Students will:
- Learn about a variety of different biosensing tools and approaches
- Learn about and discuss the ethics of introducing such tools into society
- Create projects that implement the tools studied in the course
- Go on occasional field trips to local NYC-based groups and institutions that are paving the way in the domain of HCI
- Be encouraged to work collaboratively (both inside and outside of ITP)

How will the course be structured?

The first half of the course will be primarily learning, through a series of in-class workshops where students will be learning how to implement a variety of different devices (EMG, ECG, EEG, GSR, eye-tracking, etc). The second half of the course will be implementation and creation. Students will work individually or in groups to creatively implement the technology studied in the first half of the course.

Conor Russomanno
Founder & CEO @ OpenBCI
cr121@nyu.edu / conor@openbci.com

Thursdays 3:20 PM - 6:15 PM (01.26.17 - 03.02.17) Syllabus

Open Source Cinema

ITPG-GT.2865.1

Democratizing media by breaking it down into discrete more easily remixable parts has historically led to an explosion of expression and knowledge creation. The invention of alphabets allowed for broad literacy and then the moveable type of the printing press ignited the enlightenment. The arrival of DNA allowed for our diversity and evolution of all life forms. Motion pictures, perhaps our most convincing medium, is now undergoing such a transformation thanks to virtual reality technologies. The iconic immersive headset is a distraction compare to the VR technologies for scanning, modeling and rendering reality using shared, reusable elements instead of just pixels.

Specifically we will look at tools like depth cameras that can gather foreground elements like people and props from a scene so they can be rearranged or substituted separately from the background. Superimposing panoramic video or rendered backgrounds can save the need to pull up a army of truck and crew to shoot on location and by allowing directors to later change their shot angles rather than pulling up the truck again to reshoot. New scanning, avatar generation and libraries of 3D objects has saved you the need of the army of modelers you see in 20 minutes of credits roll at the end of a sci fi movie. These scanning capabilities as well as the ability to realtime render those models is finding its way into small inexpensive devices like the phones that most people in the world are carrying around in their pocket. All of these cover the visible parts of cinema but we will also discuss how the less visible structure of story, the plots and sequences might be templated into reusable formulas for non experts to find emotionally satisfying dramatic arcs.

Most importantly cinema is made more out of reusable, shared elements and templates, it becomes comparable and conversational. You could find exactly how your story overlaps and intersects with other in a shared "space" of stories. In particular AI technology shows promise in finding clusters of similar compositions across the many permutations of possible stories. This would make it more fun to share your construction of reality with friends but also potentially more responsible that your construction of reality has to be put in context of others.

The purpose of this class is not for professional film directors (and politicians) who have already discovered these new tools for publishing their constructions of reality. Instead this class is about the true potential of virtual reality, its mutability, to put ordinary users in the role of director as they already are in their dreams and fantasies. The course will emphasize tools like cameras that for capturing the user's expression with the results display in conventional 16:9 format over tools of immersion like headsets that emphasize pushing thing to the person. The aesthetic will be rough juxtapositions in the traditions of comics, cubism, collage, storyboards and previs that quickly capture the your interior space without being slavish to verisimilitude of cartesian 3D scenes. Most importantly the output must delivered in the unflattened open source formats of the web where every element remains discrete and addressable with a URL. For these reasons the class examples will be in javascript using tools like three.js, kinectron, and mlabs. Students can possibly use Unity or Unreal supported by online resources.

Th 3:20-5:50pm (03/22 - 05/03) Syllabus

Rest of You
You live with illusions. The nature of these illusions has long been described in mystical practices but is now increasing corroborated by modern research such as neuroscience, behavioral economics, social psychology, embodied cognition and evolutionary psychology. What does this have to do with computational media? With technology do we have the ability to revisit some of the illusions that made sense for natural selection of your genes in other contexts but that might limit our personal happiness or the overall functioning of society. Will the the computer's ability to run more objective statistical analysis on data gathered tirelessly over time, across individuals and locations allow us to to more accurately see ourselves and the world as it is. Can we build computer interfaces that give a fuller expression of our experience when we are not limited by an illusory view of ourselves? The insights into how into how to reach people more fully comes with a responsibility to then ask what should say to them. As the computers are able to understand us better than we understand ourselves will we relinquish control to them?

At a practical level the class looks at interfaces for capturing the less consciously controlled parts of your body using things like biosensors and cameras. Then we look at such things as subliminal displays for reaching past the normal conscious model of human understanding. It then moves on to trying to find meaning in the mounds of already digitized expression you have produced everyday for years in emails, text etc.... Finally we will look at how we can manipulate shared media, for instance using browser extensions, to see if we can get beyond vestigial antisocial ways of perceiving the world. This class will use skills from Physical Computing and ICM.

**Th 3:20-5:50pm (01/25 - 03/08) Syllabus**

**Soft Robots and Other Engineered Softness**

ITPG-GT.2126.1

Emergent technologies increasingly leverage the advantage of soft and flexible materials. Integrated soft systems, particularly soft actuators, apply to health and assistive tech, human-object interaction, space and deep sea exploration, and more. This course covers concepts from soft innovation history, current state-of-the-art, sister disciplines of bio-inspired and hybrid (soft/hard) robotics paired with hands-on fabrication techniques (silicone casting in 3D printed molds, heat-sealed films, flexing).

Students start with a short exploration of historical context and current state-of-the-art to prevent reinvention of the wheel. Additional domains will be introduced by pairing of high-level concepts to grow-on combined with achievable hands-on fabrication and evaluation techniques: Cable controlled force/Flex and bend cabled structures, Pneumatics and inflatables/heat-sealed flat patterned prototypes, Embedded complexity/silicone casting in 3D printed molds, Hybrid robotics/Mini Tensegrity structures, Materials suitability/Swatching and collaborative or destructive testing. Final projects can be a soft/flexible/hybrid design concept presented with context, materials switches with justifications for choices, and physical or modeled proof-of-concept.

**Mo 12:10-2:40pm (01/22 - 05/07) Syllabus**

**Storytelling with Non-Linear Video**

ITPG-GT.2815.1

Throughout history, as new storytelling mediums have emerged, content has adapted to fit the developing form. From oral narratives to theater, cinema, and television, storytelling will always evolve to fit the possibilities enabled by the platform. Given its interactive nature, digital storytelling is gradually adapting to the medium. So - how is non-linear video shaping the future of digital storytelling?

This 7-week workshop will combine filmmaking and classic storytelling with narrative gaming structures. The class will introduce the depths of non-linear video and allow students to create their own interactive experience. The focus is on what makes a good story in an interactive narrative environment. Students will have access to the Eko platform - the industry leader in interactive video (behind videos such as Bob Dylan's "Like a Rolling Stone"). In addition they will be given "backdoor" access to further customize the software for their own projects.

During the course of the semester, they will work in teams of 2-3 students to produce a short interactive video experience. Weekly lessons will mimic their project creation process - providing tools and knowledge for creative ideation, scriptwriting, film production, and product integration. Students will acquire basic Javascript and CSS skills in the class.

**Mo 6:30-9:00pm (01/22 - 03/19) Syllabus**

**Tangible Interaction Workshop**

ITPG-GT.2126.1

Tangible interfaces are interfaces that you touch. You control them with your hands, feet, and other body parts. Their shape, feel, and arrangement provide feedback. In this seven-week class, you'll build devices with tangible controls in order to better understand how we learn about and manipulate the world through our sense of touch.

We'll discuss physical interaction concepts such as expressive interfaces and utilitarian ones, real-time control vs. delayed control, and implicit vs. explicit interactions. We'll discuss programming and electronic techniques to sense state change, thresholds, peaks, and other signs of user action. The primary tools will be the microcontroller and common tangible controls: pushbuttons, switches, rotary encoders, rotary and slide potentiometers, force sensors, touch sensors and others. The class will also cover on-device feedback through LEDs, speakers, and force-feedback actuators.

Weekly projects will be designed (and parts specified) in pairs in in-class design sessions, and executed as homework. Projects will be mostly microcontroller-driven, and will build on the programming and sensor-interfacing skills learned in Intro to Physical Computing.

Prerequisites: Intro to Physical Computing and Intro to Computational Media, or a working knowledge of microcontroller programming in Arduino; Intro to Fabrication or basic knowledge of laser cutter.

**We 9:00-11:30am (01/24 - 03/07)**
Teaching as Art

This class is for artists and creative technologists who want to teach. A good teacher is also a great student themselves. They transform their curiosity into knowledge and share their learning process with others. One can learn to become a better teacher by staying fearless about 'not knowing' something, embracing radically open ideas and connecting various expertise and knowledge. Teaching can be a form of artistic and creative practice in collaboration with a diverse community. Teachers can invent new forms of learning spaces, new kinds of collaboration and new sense of community.

In this class, students will learn about applying creative processes to teaching. Students will read about the history of artists in and out of academic institutions, Black Mountain College as well as more recent experiments. Students are expected to engage in a critical discussion about the topic.

Week 1: Learning
Week 2: Curriculum
Week 3: Syllabus
Week 4: Pedagogy
Week 5: Inclusive Learning
Week 6: Unlearning
Week 7: Platforms
Week 8: Museum as a school
Week 9: Community as a school
Week 10: Final project pitch
Week 11: Final presentation #1
Week 12: Final presentation #2

Full semester course based on a class offered in Spring 2017 https://github.com/tchoi8/teachingasart

Mo 3:20-6:15pm (01/22 - 04/23) Syllabus

Towers of Power

In NYC we take our cellphone and wifi signals for granted. Its always on and we are always connected. This not the case for 2 billion people who lack affordable communication and 700 Million people who have no coverage at all. New technologies are democratizing communications infrastructure; Software defined radios, lowered hardware pricing and open source solutions have made it possible to install low cost infrastructure that can be controlled by communities instead of multinational corporations.

In this class you learn how to create your own communications networks. We will cover the software, and hardware used today in community based cellular networks in Mexico and Nicaragua. We will also delve into the business of international development through guest speakers working in the development or telecommunications fields.

Week 1
Intros, Basic of GSM Infrastructure, Radio Spectrum, Politics of Telecommunications
Homework: BASH tutorial
Reading on Rhizomatica, Endaga, ObenBTS, Telecom Infra.

Week 2
Communication, Connectivity and Security.
History of Telecommunications and security from submarine telegraph cables to Internet fiber optic networks.
Virtual Private Networks (VPN) - Why its important and why we use it.
Guest Speaker: Peter Bloom / Rhizomatica

Homework: Set up your own VPN, and do something interesting.

Week 3
Building a GSM Network from software to hardware installation.
Installing Software: Osmocom Network in a Box, and Rhizomatica Front End.
Overview of Osmo-NITB, Osmo-TRX, Freeswitch, Kannel, RAI, etc.
Hardware: Nuran Litecel, Antennas, Cables, Solar, etc.
How to mount equipment on a tower.
Homework: Take 1 component of GSM software infrastructure and teach us how to do something interesting with it. Examples: Use Freeswitch to make your own hotline. Use Kannel to control p5.js.

Week 4
Business, Budgets, Proposal, and Raising Financial Capital.
All the important details a tech person needs to know to run a business.
Guests Speakers: David Mordecai and Samantha Kapadonga
Homework: In a group; find a community that could use an open source GSM network. Write a 2 page business proposal and budget to launch service.

Week 5
Backhaul Internet: How to get internet to rural regions. Long Distance Wifi, Fiber optic Networks.
Questions that are not covered in class - Software, Hardware or business.
Propose Final Projects.
Homework: Final Project

Week 6
Work on Final Project
Guest Speaker: Shaddi Hassan / Telecom Infra Project (Facebook)

Homework: Final Project

Week 7
Final Presentations

We 3:20-5:50pm (03/21 - 05/02)
Over the past decade, the "artbot" has emerged as an exciting new genre of artistic practice. Bots like @thinkpiecebot, @censusAmericans, and @tiny_star_field demonstrate that bots aren't limited to being anodyne conversational agents—they can be incisive satirists, insightful reporters, even graffiti artists. This class guides students through the process (both conceptual and technical) of making bots—not just as interfaces, but as vehicles for rhetoric and expression in and of themselves. Diving deep into the affordances of Twitter as a software platform, students will learn how to write computer programs that post tweets automatically, hold conversations, interact with other bots and make use of Twitter's search functionality. Weekly technical exercises and readings will culminate in a final project. Example code will be provided in both Python and Javascript.

**Wednesdays 12:10 PM - 3:05 PM (01.25.17 - 03.01.17)**

**Who Owns Digital Social Memory? Web Archiving and its Discontents**

This mixed studio/seminar will focus on ethics, aesthetics, and strategies for creating and reperforming narrative digital archives.

In this mixed studio/seminar, we will create and critique digital archives. We will consider the role of web archives as a site for the elaboration of social memory, and as a tool of state control. We will explore case studies such as UbuWeb, Documenting the Now, Wikileaks, and the GeoCities archive, as well as projects by artists who compile, narrate, and/or interrogate the archive, including Guadalupe Rosales, Dragan Espenschied and Olia Lialina, and Walid Raad.

The students will do readings on the subject of social memory; make use of digital archiving tools including curl and wget, webrecorder and web archive player, and various emulation tools; conduct case studies of digital archives for in-class presentation; and create their own archival projects.

How will the course be structured?
Each class will include discussion of the week's reading, presentation and discussion of case studies led by one or more students, and a focus on a particular practical topic within web archiving. There will be one final project.

Who will teach it?
Michael Connor
michael@michael-connor.com

**Mondays 6:30 PM - 9:25 PM (01.23.17 - 03.06.17)**

**XYZ**

In this class we will be creating robots that travel along the XYZ axes. Our bots will draw, paint, push, and plant. You will gain an understanding of both the best practices of design and the anatomy of gantry machines by assembling and working with existing CNC kits. We will exploit robust off-the-shelf solutions for the X and Y, and reinvent the Z. There will be a heavy focus on concept, mechatronics, and fabrication.

**Syllabus**

**Design for Accessibility**

This course will bring together students from NYU's Interactive Telecommunications & Integrated Digital Media programs in order to reimagine the exhibitions of the Cooper Hewitt, Smithsonian Design Museum for museum goers with disabilities. Set in the Andrew Carnegie Mansion on the Upper East Side and part of the Smithsonian Institution, the Cooper Hewitt is the national museum of design for the United States, and has engaged with the NYU Ability Project on a research pilot to develop better strategies for accessibility. With multiple site visits, the Cooper Hewitt will serve as both a client and playground for us to redesign without barriers to enjoying their collection. Students will learn and employ a human-centered approach to the development of an accessibility framework for the museum and reimagine their galleries, website, and API for a more inclusive museum-going experience.

**Expectations**

- Demonstrate an understanding of and implement iterative & human centered design research and prototyping processes (including client consultation, design/prototyping and user testing).
- Acquire an awareness of experiences for people with a variety disabilities.
- Demonstrate understanding of various technologies used by people with disabilities.
- Demonstrate the ability to communicate and work within a group to develop a prototype.
- Demonstrate critical and creative thinking in researching solutions to problems
- Develop a prototype device.
- Develop extensive documentation for your part of the project.
- Develop the ability to work under project constraints and client needs.

**Thursdays 6:30 PM - 9:20 PM (01.23.17 - 05.08.17)**

**Future Mobility and Infrastructure**

A wide-ranging course concerned with the fields of design and technology that define the interrelationships of mobility and the environment. We will be exploring the totality of relations between all types of vehicles and their fundamental patterns of movement in conditions of urban density. Vehicles mediate the experience of the city; they occupy vast quantities of real estate; they create a lot of clamor and they congest the streets. Yet
Designers mostly take them as given, and are satisfied to plan streets and public spaces around whatever few enduring vehicle manufacturers happen to produce. Here we test and reverse this well-worn supposition. We will design vehicles to fit a new concept of the city, not the city to conform to the arbitrary specifications of gasoline driven automobiles, buses, and trucks. The technologies that make this probable are those of miniaturized electronics, advance telecommunications, low-cost distributed computation, and sophisticated control software. They empower us to purge most of the old industrial clutter that presently encumbers vehicle engines, power trains, dashboards, and steering wheels. They allow us to define a profoundly new, revolutionized architecture for mobility. The objective is to design types of conveyance and/or transfer from one place to another by taking into account the human body and its hyper saturated digital surroundings. We will endeavor to re-envision anything ranging from bicycles to buses, skateboards to airships, and parking to infrastructure to meet the ecological needs of the future. Each student will individually critique, evaluate, and design multiple project-based urban mobility concepts and subsequently prescribe new innovations.

**Tuesdays 3:00 PM - 5:50 PM** Syllabus

### Always On, Always Connected

**ITPG-GT.2958.1**

Tues 12:10pm to 2:40pm  
Shawn Van Every

With their always on and always connected nature, mobile devices (phones and tablets) have become the center of our connected self. They offer us the ability to access the network anywhere at anytime, enabling us to share our experiences and share in the experiences of others. They are also starting to emerge as the hub of an emerging set of smart personal accessories such as watches, glasses and jewelry.

In this class, we'll examine the current state-of-the-art in mobile technology and smart devices. We'll focus on developing applications using Cordova, a set of cross-platform APIs for creating mobile applications with HTML, CSS, and JavaScript as well as connecting to and interacting other devices using BlueTooth.

ICM level programming experience is required.

**Tuesdays 12:10 PM - 2:40 PM (01.24.17 - 05.02.17)** Syllabus

### Basic Analog Circuits

**ITPG-GT.2728.1**

Tues 12:10pm to 3:05pm  
Eric Rosenthal

Today's mostly digital world also requires a basic knowledge of circuits that do not require computer processing. Analog circuits are simpler, lower cost, smaller and require less power and still perform many of the functions of digital circuits. In this course students will learn about the basic principles of electricity, components such as resistors, capacitors, diodes, transistors, audio amplifiers, power supplies and timers and circuits that interface to digital devices. The course includes circuits design and fabrication through lectures and hands on labs. Students will also learn the operation of electronic test equipment such as the digital multimeter, oscilloscope and function generator.

**Tu 12:10-3:05pm (01/23 - 04/17)** Syllabus

### BioDesigning the Future of Food

**ITPG-GT.2131.1**

Wed 12:10pm to 2:40pm  
Stefani Bardin

Modern farming is built for monocultures with its large scale machines dispersing synthetic fertilizers, pesticides and herbicides and the collateral destruction of biodiversity and seasonal harvesting. How can we design systems and hardware + software that address the individual needs of diverse ecosystems? How can we combine the ancient and analog practices of using biologicals (soil microbes, fungi, bio-pesticides) with sensor, light and robotic technologies to maximize our food yields without sacrificing taste and health benefits and not destroy our planet in the process?

In this class we will look at speculative and ecosystem design, biotechnologies related to agriculture, top down and bottom up design and the scalability of these systems and practices. We will be experimenting with bio-remediation of soil and using a custom microbial design studio to explore bio-fabrication. Students will work on small design-build projects that incorporate elements of contemporary technologies, current science and applicable methods of observation and analysis into centuries old practices of biodiversity and permaculture.

**We 12:10-2:40pm (01/24 - 05/02)**

### Creative Computing

**ITPG-GT.1000.1**

Mon 12:10pm to 3:05pm  
David Rios

This course combines two powerful areas of technology that will enable you to leap from being just a user of technology to becoming a creator with it: Physical Computing and Programming. The course begins with Physical Computing, which allows you to break free from both the limitations of mouse, keyboard & monitor interfaces and stationary locations at home or the office. We begin by exploring the expressive capabilities of the human body and how we experience our physical environment. The platform for the class is a microcontroller (Arduino brand), a very small inexpensive single-chip computer that can be embedded anywhere and sense and make things happen in the physical world. The core technical concepts include digital, analog and serial input and output.

The second portion of the course focuses on fundamentals of computer programming (variables, conditionals, iteration, functions & objects) as well as more advanced techniques such as data parsing, image processing, networking, computer vision. The Javascript 'p5' programming environment is the primary vehicle. P5 is more oriented towards visual displays on desktops, laptops, tablets or smartphones but can also connect back to the physical sensor & actuators from the first part of the class. The course is designed for computer programming novices but the project-centered pedagogy will allow more experienced programmers the opportunity to go further with their project ideas and collaborate with other students.

What can computation add to human communication? You will gain a deeper understanding of the possibilities of computation---possibilities that will augment and enhance the perspectives, abilities and knowledge you bring from your field of study (e.g. art, design, humanities, sciences, engineering). At first it may feel foreign, as foreign as learning a new language or way of thinking. But soon, once you get some basic skills under your belt, you'll be able to make projects that reflect your own interests and passions.

**Mo 12:10-3:05pm (01/22 - 02/23)** Syllabus
Data Art

ITPG-GT.2571.1 Mon 09:00am to 11:55am Jer Thorp

Fascinating and terrifying things are happening at the intersection of data and culture. Our lives are being constantly measured, and information about us is being surveilled, stolen, and commodified. Dialogue around this data revolution has been dominated by corporations, governments, and industry - but what about the arts? In this class, we’ll investigate the means by which artists can engage (and are engaging) in the collection, processing, and representation of data. Using a research-focused, prototype-based approach, we’ll build a series of collective and individual projects to interrogate the 'new data reality'. Students will use Processing, along with a variety of analog media or open-source data tools (such as D3.js, Miso, OpenRefine, MapBox & CartoDB).

Mondays 9:00 AM - 11:55 AM (09.11.17 - 12.04.17)

Design as Strategy and Practice

ITPG-GT.2132.1 Thur 6:30pm to 9:00pm Despina Papadopoulos

Jasper Johns once wrote in his notebook: “Take an object. Do something to it. Do something else to it.” In this class we investigate what it means to “do things” to objects in ways that transforms them and our relationship to them. We will experiment with materials and objects, stretching their limits and exploring their relationship to space and the self. These investigations are grounded in an understanding of the interactional possibilities of gestures, social and spatial dynamics, and on the recursive relationship between making and inventing.

Softness, modularity, adaptability and re-configurability, connectors and ways to engage the senses (and sensors), social and sustainable design are just some of the ideas and topics we examine through weekly assignments and social experiments.

The course is based on the idea that design is a practice that demands rigor, experimentation, curiosity and openness. Students will be asked to frame their work and uncover the essential tension of design artifacts and how they communicate meaning and intention. Students will be asked to create a new project each week in response to the previous week’s topic. Each week students will be exposed to readings and examples from various practices (architecture, dance, philosophy, music, computer science etc) and will be asked to create artifacts that capture the essential meaning of grounding concepts.

Thursdays 6:30 PM - 9:00 PM (01.26.17 - 05.04.17) Syllabus

Designing Games for Kids

ITPG-GT.2705.1 Mon 12:10pm to 3:05pm Gregory Trefry

Making games for kids ain’t easy, but it sure can be rewarding. Kids can be the harshest of critics and also the most appreciative of players.

Designing games for kids forces you to strip your games down to their essence honing your skills as an interaction designer. This class will lay out a basic framework for game design. Then we’ll use that framework to analyze and design games for different age ranges, skill levels and attention spans. We will also look at the interplay between games and education, focusing on ways to draw out learning through scaffolding. The class will focus heavily on production and playtesting. Students will make a series of games for different age ranges.

For questions about the class email Greg Trefry at gtrefry@iamtheeconomy.com.

Fr 9:30-12:15pm (01/26 - 05/04) Syllabus

Directing Virtual Reality

ITPG-GT.2831.1 Wed 3:20pm to 6:15pm Sarah Rothberg / Carol Dysinger

How does an interesting piece of technology become a tool for making art?

When the Steadicam was invented, it was revolutionary technology, because it was a way to move a camera without laying track. But when Kubrick and the cinematographer who invented it, Garret Brown, got together on The Shining, it began to have a language and a meaning all its own.

In this class, Grad Film directing and cinematography students and ITP students will look at Virtual Reality and experiment with VR storytelling techniques with the goal of a final collaborative project using a methodology of the teams choice or invention.

The difference from the last time this course was offered, is this is now more like project development studio - we will work together in class and with exercises for the first five weeks, and once you have found a collaborator -- you will begin developing and researching for a collaborative final project. This is to keep up with the changing nature of technology and reach in the VR landscape.

We will:
- investigate what has come before -- how it has been used narratively, for museum/art installations, and in documentary
- compare and contrast the medium’s affordances with those of film, and test what film style elements can be brought into VR --- 360 mise-en-scène
- look at the current delivery systems and publication platforms
- explore newest techniques used at different studios and by independent makers through site visits and guest lectures
- identify and create a vocabulary for the artistic effects created with our own experiments
- Focus on creating a shared language between storytellers and interaction designers.

Above all, this class will be experimental, focussing on the artistic possibilities of narrative or documentary VR -- an antidote to the tech industry’s impulse to churn out demos for the next newest hardware.
The first half of the class will be more exercise heavy, where the latter part will focus on production. The course is 12 weeks scheduled over the course of 14 weeks—with two weeks off (TBD) for out-of-class production. The students will form cross-departmental teams, creating several short experiments and one more developed final piece.

**Wednesday 3:20 PM - 6:15 PM (01.25.17 - 04.19.17) Syllabus**

**Doing Good is Good Business**

**ITPG-GT.2758.1**  
**Wed 09:00am to 11:30am**  
Benedetta Plantella

This course, in partnership with the UNICEF Office of Innovation, focuses on the two-to-five-year horizon of technology and human needs in order to evaluate emerging opportunities and investigate how public and private sectors can collaborate to create good businesses and solve pressing problems. The class will be structured around specific areas of global need and opportunity such as transport & delivery, identity and personal data, learning, lack of financial services. We will investigate how businesses and industries can be influenced and leveraged to address these growing needs. How can we provide identity to the 30% of children who don't have formal IDs? How do we create financial access for the approximately 2 billion unbanked adults? How do we work to protect the 50 million children who have been displaced because of conflict and violence? These issues can't be solved by any single technology or by any one organization but require a network of collaborations among entrepreneurs, governments and corporate entities. Interdisciplinary teams and partnerships are key for the success of any project. A series of workshops and conversations students will be exposed to both private sector companies as well as current needs and will work in groups to research and investigate where those worlds converge and overlap and which future opportunities exist for collaboration. Shorter assignments will have students focused on understanding potential technologies, their current limitations and future potential in the context of a specific problem, while the final project will allow for a more thorough exploration of a concept or strategy aimed at helping UNICEF think through future approaches. The final project could take the form of a working prototype or a lo-fi prototype that explores the potential for collaboration, a proof of concept, a design proposal, a business case or other. A series of workshops will help students on this path. At the end of the semester, students will present their work at UNICEF HQ to staff and invited guests. This class is all about collaboration, structuring partnerships (interdisciplinary and cross-sector), learning from failures, research and rapid iteration, forming and rejecting ideas, feedback and presentations to a larger audience.

**Wednesday 9:00 AM - 11:30 AM (01.25.17 - 05.03.17) Syllabus**

**Energy**

**ITPG-GT.2466.1**  
**Tues 12:10pm to 3:05pm**  
Jeffrey Feddersen

"Energy has been called the "universal currency" (Vaclav Smil) but also "a very subtle concept... very, very difficult to get right" (Richard Feynman). Building on skills developed in physical computing, we will, through generating and measuring electricity, gain a more nuanced and quantitative understanding of energy in various forms. We will turn kinetic and solar energy into electrical energy, store that in batteries and capacitors, and use it to power small projects. Several sessions will include hands-on labs. We will develop skills useful in a variety of undertakings, from citizen science to art installations, and address a range of topics through the lens of energy. Students will build a final project using skills learned in the class."

**Tu 9:00-11:55am (01/23 - 04/17)** Syllabus

**Homemade Hardware**

**ITPG-GT.2767.1**  
**2017-01-27 Fri 3:20pm to 6:15pm**  
Andrew Sigler

Hardware is not hard, and rapidly prototyping circuit boards is easier than ever with new tools available at ITP. Students will learn how to grow from a breadboard to a custom surface mount board, all without leaving the floor. This class is about artists and designers taking control of their hardware, and exploring the potential of embedding their projects into the world around them.

Students will learn the multitude of tools and processes required to make a DIY circuit board. These include Eagle CAD, micro-milling machines, drawing schematics, ordering parts, surface-mount components, acid etching, solder paste and stenciling, reflow, pick-and-place, and others. In-class demonstrations will be done for each of the above, and students will complete assignments using online reference notes and videos. Two smaller projects and one final project will be assigned (3 total), each a circuit of the student’s choosing. These three assignments will be designed to work off the most recently taught subjects, and to get the students to think through future approaches. The final project will allow for a more thorough exploration of a concept or strategy aimed at helping UNICEF think through future approaches. The final project could take the form of a working prototype or a lo-fi prototype that explores the potential for collaboration, a proof of concept, a design proposal, a business case or other. A series of workshops will help students on this path. At the end of the semester, students will present their work at UNICEF HQ to staff and invited guests. This class is all about collaboration, structuring partnerships (interdisciplinary and cross-sector), learning from failures, research and rapid iteration, forming and rejecting ideas, feedback and presentations to a larger audience.

**Th 3:20-6:15pm (01/25 - 04/19)**

**Interactive Music**

**ITPG-GT.2713.1**  
**Thur 3:20pm to 6:15pm**  
Yotam Mann

Sound and music play an integral part in an interactive experience. What about the reverse: how can interaction play a crucial role in a musical experience? Responsive, adaptive, and interactive audio have the ability to develop a mood, create a sense of space and material, cue and foreshadow events, and allow people to participate in significant ways in sound-making processes. This class will focus on the relationship between interaction and sound, creating sonically-driven experiences, interfaces and environments in which music is realized as a collaboration between the composer and listener. This class takes a broad view of music as "organized sound".

Prerequisites: willingness to listen critically, some programming experience (p5.js / js). No formal music training required.

The course will be structured around one final assignment: an interactive music experience. The technical part of the course will focus on Javascript, Web Audio (an HTML5 specification for audio synthesis, processing and playback) and Tone.js. Students will be encouraged to use Javascript, but for the final, the language or platform is up to the student. The class will focus on designing sound for interaction and designing interaction for sound. Topics will include exploring the spectrum of interactive music ranging from hitting a play button to full-fledged instruments or interactive songs. We will consider relevant artistic/aesthetic questions like how much and what kind of sonic control should composers give to their players/listeners. Students will be exposed to prior-art interactivities in contemporary music, game pieces, process-based music and video game music. Intermediate projects will give students a chance to learn and apply the lessons on Javascript and Tone.js.
Students will then combine the musical and technical lessons into their final projects. The format of the course will balance instruction, discussion, jamming and performance.

**Thursdays 3:20 PM - 6:15 PM (01.26.17 - 04.20.17)  Syllabus**

### Light and Interactivity

**ITPG-GT.2133.1  0000-00-00 Wed 3:20pm to 5:50pm  Thomas Igoe**

We use light in all aspects of our lives, yet we seldom notice it. Most of the time, that’s no accident. Lighting in everyday life, well-designed, doesn’t call attention to itself. Instead it draws focus to the subjects and activities which it supports. In this class, you'll learn how lighting design is used for utilitarian, expressive, and informational purposes. We'll consider the intersection of lighting design and interaction design, paying attention to how people interact with light. We’ll practice both analyzing lighting and describing its effects, in order to use it more effectively.

On the technical side, you'll learn the basics of the physics of light, its transmission and perception. We'll talk about sources of light, both current and historical. We'll work with computerized control systems for lighting and modern light sources, and we'll create a number of lighting designs for different purposes.

Projects in this class will range from indicator lighting on devices to task lighting to stage and environmental lighting. We won’t spend time on projection, but will look at lighting people, objects, and spaces instead.

This class will be production-intensive throughout the course of the spring semester. As a result, it is not recommended for second-year students who are focusing on their thesis.

**Wednesday 3:20 PM - 5:50 PM (01.25.17 - 05.03.17)  Syllabus**

### Live Image Processing and Performance

**ITPG-GT.2422.1  Call#5624  Thur 12:10pm to 2:40pm  R. Luke DuBois**

This course teaches the ins and outs of using imagery in real-time within a performance context. The class will use Max/MSP/Jitter to study various ways of manipulating visual media (video, still imagery, live camera feeds, data representations) in interogation with various interactive elements (sound, physical interfaces, sensors) in order to create dynamic and replicable performance systems. We will look at ways in which images are represented by a computer (2D, 3D, computer vision, media transcoding) in order to increase our understanding of these systems and expand our visual/digital pallete. The class will also study examples of video/imagery as a performance tool in a variety of mediums (video art, expanded cinema, vj/dj culture, glitch theory) and discuss strategies and techniques for creating compelling performances. Students will be assigned regular mini performances to demonstrate understanding of tools learned in class. Students will propose and perform a longer form performance as part of a final presentation in the form of a group performance that will be arranged by the instructor.

**Mo 6:30-9:00pm (01/22 - 05/07)  Syllabus**

### Networked Media

**ITPG-GT.2134.1  Wed 12:10pm to 2:40pm  Shawn Van Every**

The network has become a fundamental medium for interactivity. It makes possible our interaction with machines, data, and, most importantly, other people. Though the base interaction it supports is simple, a client sends a request to a server, which replies; an incredible variety of systems can be and have been built on top of it. An equally impressive body of media theory has also arisen around it's use.

This hybrid theory and technology course will be 50% project driven technical work and 50% theory and discussion. The technical work will utilize JavaScript as both a client and server side programming language to build creative systems on the web. Technical topics will include server and client web frameworks, such as Express and Angular, HTML, CSS, templating, and databases. The theory portion of the course will include reading and discussion of past and current media theory texts that relate to the networks of today; included in this will be works by Marshal Mcluhan, Wendy Chun, Lev Manovich, Philip Agre, Tiziana Terranova, and more.

In short, this course will be about developing full-stack web applications (such as anything from the beginnings of Google, YouTube, and Twitter to class registration systems and other purpose built system) as well as thinking, reading, and discussing the implications with a culture and media theory perspective.

**Wednesdays 12:10 PM - 2:40 PM (01.25.17 - 05.03.17)  Syllabus**

### Nothing: Creating Illusions

**ITPG-GT.2839.1  Tues 12:10pm to 2:40pm  Andrew Lazarow**

How do we make something from nothing, and nothing from something? The idea of nothing, and optical illusions have been linked since the western discovery of zero lead to the beginning of linear perspective. In this course we will explore an array of optical illusions, ranging from traditional approaches to new technologies. Structured as primarily a studio course, we will work directly with Pepper's Ghost, disappearing acts, making solid objects appear transparent, invisibility, false sense of depth, and approaches to designing negative space.

Assignments will include:

- Readings and blog post responses.
- Creating small-scale illusions with and without the aid of new technologies
- Exercises in camera analysis and projection mapping
- Calibrating camera values with projector values
- Making user interactions invisible, and then transmittable
- A Midterm: Creating a small scale prototype with controlled interactions
- A Final: Designing a full scale prototype accounting for user interactions

**Tu 12:10-2:40pm (01/23 - 05/01)  Syllabus**

### Piecing It Together
Designing and building physical objects can feel like putting together a puzzle without the box top. Even if you have all the pieces, an exact challenge is in figuring out how they fit together. Digital fabrication tools make it possible to newly imagine and produce pieces that allow us to recreate or modify the "puzzle" as we see fit. Utilizing historic mechanical equipment (e.g. windmills, clocks, speed governors) as design inspiration, we will explore the possibilities of digital fabrication tools to solve issues of fastening, synchronicity, replaceable parts, repeatability, and modification of existing designs. A central goal of this class is to come to terms, and work productively, with the limitations of these otherwise revolutionary digital fabrication tools—particularly in regards to materials, scale, and aesthetics. By the end of the semester, students will be familiar with Adobe Illustrator, 2D and 3D CAD software, laser cutting, CNC routing, and 3D printing. No prior fabrication or design background is required for this course.

**Wednesdays 6:30 PM - 9:00 PM (01.25.17 - 05.03.17)**  
Syllabus

**Playful Communication of Serious Research**

ITPG-GT.2974.1  
Mon 6:30pm to 9:25pm  
Lillian Preston

Exhibition design is the art of marrying experience and information. The best do so seamlessly; the very best surprise and delight you along the way. In this class you will explore the craft of interactive exhibition design through practice. Working in small groups, you will select an NYU researcher whose work is of interest to you and create an interactive experience that presents this research to a broader, public audience. In the process, you will learn to interogate content and form, audience and environment, medium and message to create a meaningful and playful exhibit experience.

**Mo 6:30-9:25pm (01/22 - 04/23)**  
Syllabus

**Project Development Studio**

ITPG-GT.2564.1  
Wed 12:10pm to 2:40pm  
Daniel Rozin

This is an environment for students to work on their existing project ideas that may fall outside the topic areas of existing classes. It is basically like an independent study with more structure and the opportunity for peer learning. This particular studio is appropriate for projects in the area of interactive art, programing, physical computing and digital fabrication. There are required weekly meetings to share project development and exchange critique. Students must devise and then complete their own weekly assignments updating the class wiki regularly. They also must present to the class every few weeks. When topics of general interest emerge, a member of the class or the instructor takes class time to cover them in depth. The rest of the meeting time is spent in breakout sessions with students working individually or in groups of students working on related projects.

**We 9:00-11:30am (01/24 - 05/02)**

**Reading and Writing Electronic Text**

ITPG-GT.2778.1  
Thur 12:10pm to 3:05pm  
Allison Parrish

This course introduces the Python programming language as a tool for reading and writing digital text. This course is specifically geared to serve as a general-purpose introduction to programming in Python, but will be of special interest to students interested in poetics, language, creative writing and text analysis. Weekly programming exercises work toward a midterm project and culminate in a final project. Poetics/text analysis topics covered include: character encodings (and other technical issues); cut-up and appropriated text; the algorithmic nature of poetic form (proposing poetic forms, generating text that conforms to poetic forms); transcoding/transcription (from challenge text); n-gram analysis and Markov chain generation; performing digital writing. Programming topics covered include: data structures (lists, sets, dictionaries); strategies for making code reusable (functions and modules); functional programming (list comprehensions, recursion); getting data from the web; simple web applications; and parsing data formats (e.g., markup languages). Prerequisites: Introduction to Computational Media or equivalent programming experience.

**Fr 3:20-5:50pm (01/26 - 05/04)**  
Syllabus

**Readymades**

ITPG-GT.2597.1  
0000-00-00 Wed 3:20pm to 5:50pm  
Gabe Barcia-Colombo

This course is about taking old things and making them new. Loosely based on the tradition of Marcel Duchamp’s “Readymades,” students will re-imagine old technological devices and antiques as new media installations or art objects in the form of scientific, ethnographic, artistic and historic relics. By embedding new technology (sensors, microcontrollers and small projectors) into found objects, students will explore a combination of anthropology and new-media storytelling. Can we create interactive art devices that tell a human story? How do we maintain artistic control while building artwork that requires human interaction? How can we re-appropriate found objects in a meaningful way to create new-media installations?

This is a production heavy four credit course taught in Max/Msp/Jitter and focused on making museum ready interactive durable installations. Possible projects include: time traveling typewriters, boomboxes from mars, ghost phones and musical bicycles. Pre-requisites include a flair for the absurd...and soldering.

**Wednesdays 3:20 PM - 5:50 PM (01.25.17 - 05.03.17)**  
Syllabus

**Rethinking Production Tools**

ITPG-GT.2135.1  
Mon 12:10pm to 3:05pm  
Rune Madsen / Patrick Hebron

In recent years, we have seen a proliferation of new technologies and techniques in the media industry. This has had a profound impact on most content creators: Film directors are now challenged to think in more dimensions, sculptors need thorough knowledge about 3D scanning and printing, and designers are increasingly taking advantage of machine learning to design for complex systems. However, the tools we use to produce these new types of content are still modeled on manual processes that existed before the computer.

This is a class dedicated to researching and developing new production tools for digital media. Over the course of the semester, students will work in groups to identify an aspect of this theme to work on, lay out a plan for execution, and follow this plan to success. Students are expected to create roles within their group, come up with user stories, develop feature sets, perform user testing to validate their assumptions, and create
documentation that explains how to use their tools. Class time will be dedicated to group demos and feature discussions, as students develop their ideas from simple prototypes to fully functional applications.

**Mondays 12:10 PM - 3:05 PM (01.23.17 - 04.24.17)**

**Sense Me, Move Me**  
ITPG-GT.2137.1  
Mon 12:10pm to 3:05pm  
Mimi Yin

A re-working of Choreographic Interventions (Spring 2016), this class is intended for anyone interested in using sensing technologies and movement to create interactive experiences.

We are surrounded by interfaces where swipes and taps control elements on a screen. Less familiar are systems designed to compel us to move in new and unexpected ways. How do you make someone feel soft inside? How do you shake an entire room? How do you orchestrate duets between strangers?

Every class, we will move in order to push the boundaries of how you think you're capable of moving while experimenting with computational methods for building interactions that excite our curiosity, engage our whole body and provide an outlet for expression through movement.

Pre-requisites: Introduction to Computational Media or its equivalent.

**Mondays 12:10 PM - 3:05 PM (01.23.17 - 04.24.17)**  
**Syllabus**

**Subtraction**  
ITPG-GT.2719.1  
Tues 09:00am to 11:30am  
Benjamin Light

Subtractive fabrication is a common manufacturing process that produces durable and functional objects. This class will cover multiple techniques on machining and milling raw material into custom parts. We will focus on both traditional and digital fabrication tools: lathe, CNC router, 4 axis mill, etc. We will cover CAD, CAM, and machine setups as well as research affordable desktop milling solutions for personal shops.

The class will be hands on and fabrication heavy, paying close attention to precision, accuracy, and craftsmanship.

There will be weekly fabrication exercises, a midterm, and a final project. It's mill-er time.

**Th 12:10-2:40pm (01/25 - 05/03)**

**Temporary Expert: Art/Science Research in the Anthropocene**  
ITPG-GT.2853.1  
Wed 3:20pm to 5:50pm  
Marina Zurkow

This course focuses on The Anthropocene (the proposed name for our current geological epoch, in which humans are making a significant geological impact on the planet).

Following the methodology of "The Temporary Expert," in which students combine traditional research with hands-on experimental project development, and idea exchange with experts in the field, students will develop art/design projects and interventions that interface with psychology, ecology, geology, energy, capitalism, policy and the economics of climate change.

The idea of becoming a "temporary expert" requires you to adopt the sometimes-dissonant roles of wild speculator and deep knowledge-collector. Weekly work consists of prototyping, scholarly research, interviews, writing, daily artistic practice and systems thinking exercises.

**Wednesdays 3:20 PM - 5:50 PM (01.25.17 - 05.03.17)**  
**Syllabus**

**The World, Pixel By Pixel**  
ITPG-GT.2273.1  
Thur 3:20pm to 5:50pm  
Daniel Rozin

This class focuses on the art of computer graphics and image processing. We explore the concepts of pixilation, image representation and granularity and the tension between reality and image. Students are introduced to the tools and techniques of creating dynamic and interactive computer images from scratch, manipulating and processing existing images and videos, compositing and transitioning multiple images, tracking and masking live video, compositing and manipulating live video as well as manipulating depth information from Kinect. The class uses Processing.

**Th 3:20-5:50pm (01/25 - 05/03)**  
**Syllabus**

**Thesis**

ITPG-GT.2102.7  
2017-01-24 Tues 3:20pm to 5:50pm  
Benedetta Piantella

ITPG-GT.2102.2  
2017-01-24 Tues 3:20pm to 5:50pm  
Robin Reid

ITPG-GT.2102.1  
0000-00-00 Tues 3:20pm to 5:50pm  
Nancy Hechinger

ITPG-GT.2102.5  
2017-01-24 Tues 3:20pm to 5:50pm  
Gabe Barcia-Colombo

ITPG-GT.2102.4  
0000-00-00 Tues 3:20pm to 5:50pm  
Katherine Dillon

ITPG-GT.2102.3  
0000-00-00 Tues 3:20pm to 5:50pm  
Kathleen Wilson

ITPG-GT.2102.6  
0000-00-00 Tues 3:20pm to 5:50pm  
Andrew Lazarow

This course is designed to help students define and execute their final thesis project in a setting that is both collegial and critical. It is structured as a series of critique and presentation sessions in which various aspects of individual projects are discussed: the project concept, the elaboration, the presentation, the process and time-table, the resources needed to accomplish it, and the documentation. Critique sessions are a combination of internal sessions (i.e., the class only) and reviews by external guest critics. Students are
expected to complete a fully articulated thesis project description and related documentation. Final project prototypes are displayed both on the web and in a public showcase either in May or the following semester.

Worlds on a Wire: Narrative Storytelling in VR
ITPG-GT.2138.1  Wed 6:30pm to 9:00pm  Todd Bryant

With the release of consumer head mounted displays the current wave of virtual reality is in full swing. It seems that everyone is making software and hardware for VR or is in the distribution game. One issue still remains and could be the biggest challenge for virtual reality to be embraced by the masses - there isn't that much good content yet. Worlds on a Wire will explore the history, current status, and future of head mounted displays for use in virtual, augmented, and mixed reality and teach the necessary tools for creating meaningful experiences and narratives that transcend the hardware and the hype. Students will work to produce a head mounted display experience using the Unreal Engine with strong physical computing and fabrication components.

Course Prerequisites: Introductory level coding skills and familiarity with 3D computer graphics workflow. Previous experience using 3D content creation tools and game engines is a plus.

We 12:10­2:40pm (01/24 - 05/02)  Syllabus