Applications (4.0 units)
ITPG-GT 2000-001 (21391)  Tu 3:30pm - 6:30pm (09/04 - 12/11)
Nancy Hechinger

This introductory class is designed to allow students to engage in a critical dialogue with leaders drawn from the artistic, non-profit and commercial sectors of the new media field, and to learn the value of collaborative projects by undertaking group presentations in response to issues raised by the guest speakers. Interactive media projects and approaches to the design of new media applications are presented weekly; students are thus exposed to both commercial as well as mission-driven applications by the actual designers and creators of these innovative and experimental projects. By way of this process, all first year students, for the first and only time in their ITP experience, are together in one room at one time, and as a community, encounter, and respond to, the challenges posed by the invited guests. The course at once provides an overview of current developments in this emerging field, and asks students to consider many questions about the state of the art. For example, with the new technologies and applications making their way into almost every phase of the economy and rooting themselves in our day to day lives, what can we learn from both the failures and successes? What are the impacts on our society? What is ubiquitous computing, embedded computing, physical computing? How is cyberspace merging with physical space? Class participation, group presentations, and a final paper are required.

Comm Lab: Animation (2.0 units)
ITPG-GT 2002-001 (24610)  Mo 3:20pm - 5:50pm (10/29 -12/10)
Instructor TBD

ITPG-GT 2002-002 (24611)  We 3:20pm - 5:50pm (10/24 - 12/12)
Instructor TBD

ITPG-GT 2002-003 (24612)  Th 12:10pm - 2:40pm (10/25 - 12/13)
Instructor TBD

ITPG-GT 2002-004 (24614)  Th 3:20pm - 5:50pm (10/25 - 12/13)
Instructor TBD

ITPG-GT 2002-005 (25364)  Mo 3:20pm - 5:50pm (09/10 - 10/22)
Instructor TBD
This course explores the fundamentals of storytelling through animation. Students will create two short animation pieces over the course of seven weeks. The first part of the course is devoted to the stop motion sing Dragon Stop Motion. The second part of the course is devoted to digital collage animation using After Effects. Drawing skills are not necessary for this class, however, you will keep a sketchbook. Basic video and sound skills are required.

Syllabus

Comm Lab: Video and Sound (2.0 units)
ITPG-GT 2001-001 (24616) We 6:30pm - 9:00pm (09/05 - 10/17)
Instructor TBD

ITPG-GT 2001-002 (24618) We 12:10pm - 2:40pm (09/05 - 10/17)
Instructor TBD

ITPG-GT 2001-003 (25365) We 3:20pm - 5:50pm (09/05 - 10/17)
Instructor TBD

This course explores the fundamentals of sound and video. Students will learn the basics of both audio and video recording using audio field recorders and a variety of cameras as well as editing and exporting in Adobe Premiere. Students will work in teams to produce both an audio soundscape and a three-minute video short. This 2-credit course meets for the first seven weeks of the semester.

Syllabus

Comm Lab: Visual Language (2.0 units)
ITPG-GT 2005-001 (24620) Th 3:20pm - 5:50pm (09/06 -10/18)
Instructor TBD

ITPG-GT 2005-002 (24622) We 6:30pm - 9:00pm (09/05 - 10/17)
Instructor TBD

ITPG-GT 2005-003 (25366) We 12:10pm - 2:40pm (10/24 - 12/12)
Instructor TBD

The goal of this course is to provide students who are new to the principles of visual design with the practical knowledge, critical skills and confidence to effectively express their ideas in a visually pleasing and effective way. Over the course of 7-weeks an overview of the many tools and techniques available to convey an idea, communicate a message and influence an experience will be presented, discussed and applied. Topics covered in the course include: typography, color, composition, branding, logo and information design. This class is intended for students
who do not have formal graphic design or visual arts training but recognize the powerful impact of visual decisions in their work.

COURSE OUTLINE
Class 1 – Principles of Visual Communication
Class 2 – Signage and Information Systems
Class 3 – Typography/Composition
Class 4 – Logo and Brand Design
Class 5 – Color Theory
Class 6 – Information Design

Each meeting a new topic will be presented. The format will be a class discussion with a focus on examples of the theme for the week. Each topic will have a related assignment that will done by each student individually and presented and critiqued in the following class. For students new to or with limited skills in Photoshop or Adobe Illustrator there will be a series of informal weekly workshops led by residents to teach the basics and answer questions on use of the software. Completion of the assignments and participation in the class discussion is required. Students must maintain a blog where they post their assignments.

Syllabus

Introduction to Computational Media (4.0 units)
ITPG-GT 2233-001 (24627) Tu 9:00am - 11:30am (09/04 - 12/11)
Instructor TBD

ITPG-GT 2233-002 (24628) We 12:10pm - 2:40pm (09/05 - 12/12)
Instructor TBD

ITPG-GT 2233-003 (24629) Th 12:10pm - 2:40pm (09/06 - 12/13)
Instructor TBD

ITPG-GT 2233-004 (24630) Tu 12:10pm - 2:40pm (09/04 - 12/11)
Instructor TBD

ITPG-GT 2233-005 (24632) We 9:00am - 11:30am (09/05 - 12/12)
Instructor TBD

ITPG-GT 2233-006 (24633) We 3:20pm - 5:50pm (09/05 - 12/12)
Instructor TBD

What can computation add to human communication? Creating computer applications, instead of just using them, will give you a deeper understanding of the essential possibilities of computation. The course focuses on the fundamentals of programming the computer (variables, conditionals, iteration, functions, and objects) and then touches on some more advanced
techniques such as data parsing, interfacing with hardware, mobile development, and HTML5/DOM. The JavaScript-based 'p5.js' programming framework is the primary vehicle for the class. All sections assume no programming experience at all. The end of the semester is spent developing an idea for a final project and implementing it using computer programming.

Syllabus

**Introduction to Physical Computing** (4.0 units)
ITPG-GT 2301-001 (24634)  
Instructor TBD  
We 3:20pm - 5:50pm (09/05 - 12/12)

ITPG-GT 2301-002 (24635)  
Instructor TBD  
Th 9:00am - 11:30am (09/06 - 12/13)

ITPG-GT 2301-003 (24636)  
Instructor TBD  
We 9:00am - 11:30am (09/05 - 12/12)

ITPG-GT 2301-004 (24637)  
Instructor TBD  
We 3:20pm - 5:50pm (09/05 - 12/12)

ITPG-GT 2301-005 (24638)  
Instructor TBD  
Th 12:10pm - 2:40pm (09/06 - 12/13)

ITPG-GT 2301-006 (24639)  
Instructor TBD  
We 9:00am - 11:30am (09/05 - 12/12)

ITPG-GT 2301-007 (24640)  
Instructor TBD  
Th 12:10pm - 2:40pm (09/06 - 12/13)

This course expands the students' palette for physical interaction design with computational media. We look away from the limitations of the mouse, keyboard and monitor interface of today's computers, and start instead with the expressive capabilities of the human body. We consider uses of the computer for more than just information retrieval and processing, and at locations other than the home or the office. The platform for the class is a microcontroller, a single-chip computer that can fit in your hand. The core technical concepts include digital, analog and serial input and output. Core interaction design concepts include user observation, affordances, and converting physical action into digital information. Students have weekly lab exercises to build skills with the microcontroller and related tools, and longer assignments in which they apply the principles from weekly labs in creative applications. Both individual work and group work is required.

Syllabus
Time to get your hands dirty. Prototypes need to be created, motors have to be mounted, enclosures must be built. Understanding how things are fabricated makes you a better maker.

But hardware is hard. You can’t simply copy and paste an object or working device (not yet anyway), fabrication skills and techniques need to be developed and practiced in order to create quality work. You learn to make by doing. In this class you will become familiar and comfortable with all the ITP shop has to offer. We will cover everything from basic hand tools to the beginnings of digital fabrication. You will learn to use the right tool for the job.

There will be weekly assignments created to develop your fabrication techniques. There will be in class lectures, demos, and building assignments. Emphasis will be put on good design practices, material choice, and craftsmanship.

[Syllabus](#)
gardens to create tools that help cultivate and harvest food in urban centres; developing interactive technologies to monitor and improve plant health in urban spaces.

This course will invite participants to interact with specific communities and sub-cultures in order to create user-centered designs that consider environmental factors, socio-economic conditions and cultural implications. What tools, technologies and methods can be designed in order to facilitate urban gardening?

Digital Self-Defense - Security for Everyone (1.0 unit)
ITPG-GT 2143-001 (22535) Sa 12:00pm - 6:00pm (09/15)
Dia Kayyali Su 12:00pm - 3:00pm (09/16)

“Why would the government care about me? — do I really have to worry about surveillance? Facebook and Google already know everything about me….I can’t really do anything, right?”

We'll answer these questions and more in this course. Students will walk away with some fundamental digital security skills, and the ability to learn new skills and think through security risks. This class is essential knowledge for every student at ITP, since your work inherently requires use of technology, including cutting-edge technology that could present new safety, security, and privacy risks. It's especially useful for any student who could be working with or belong to marginalized communities, or who is doing any work that could be deemed political.

We'll use hypothetical profiles to learn how to conduct a risk assessment. Students will learn the basics of how to assess digital security risks for themselves and for their projects, a process known as threat modeling or risk assessment. They will also learn some digital security basics, such as how to install and use encrypted messaging on their mobile devices, how to avoid phishing/malware attacks, and how to create and store secure passwords.

This 1 unit course will take place over three evenings. The first meeting will be an introduction to the concepts of risk assessment and digital harm reduction. The students will be assigned a risk assessment for themselves for the next class. In the second class, we’ll discuss some basic security measures. In the final class meeting, we’ll review the assignments and discuss specific security measures based on how the students assessed their own risks.

Drawing It Together (1.0 unit)
ITPG-GT 2538-001 (22537) Sa 10:30am - 4:30pm (10/20)
Alon Chitayat Su 10:30am - 1:30pm (10/21)

If we consider drawing as one of the most ancient forms of interaction, it has the power to engage users like no other technology. With the right setup and call for action - I’m always taken aback by how a cup full of crayons and a pile of paper can bring the child out of a serious businessman. But how do you pass the strong barriers of users who are afraid to draw? In this
weekend workshop we’ll examine various techniques that can spark an interaction which is all focused on the action of drawing.

Workshop topics include an exploring into collaborative drawing platforms, interactive drawing installations, drawing machines and drawing as a form of interactive storytelling. We’ll discuss the differences between digital and analog drawing and how to marry the benefits of both mediums. We’ll cover the work of important artist and researchers who are creating inspiring work in the field of drawing and interaction such as Shantell Martin, Zach Lieberman, Tobias Gutmann, David Ha and more. There will be various collaborative drawing exercises in class. This workshop is meant for students who wish to focus on drawing as the driving force of their interactions and possibly expand it into thesis. Each student will design and prototype an interaction which is based on the subject of drawing

---

**Haptics (1.0 unit)**

**ITPG-GT 2457-001 (22538)**

Sa 12:00pm - 6:00pm (10/27)

Kathryn Hartman

Su 12:00pm - 3:00pm (10/28)

From the crass rattle of early pager motors to the more sophisticated purr of the iPhone taptic engine the ability to buzz has slowly worked its way into our devices. This course focuses on interaction design for non-visual feedback. Specifically, it will explore how haptic feedback can be better utilized and integrated into handhelds, wearables, objects, and environments - basically anything that we touch or that touches us. Traditional tools such as eccentric rotating mass (ERM) motors, linear resonance actuators (LRAs), and haptic motor drivers will be introduced as well as less conventional methods such as gentle poking, prodding, warming, cooling, squeezing, and tickling. Through both hands on experimentation and a review of research to date, students will emerge from this course well-positioned to incorporate sophisticated non-visual feedback into their projects and prototypes.

---

**Making Media Making Devices (1.0 unit)**

**ITPG-GT 2998-001 (22540)**

Sa 12:00pm - 6:00pm (10/13)

Matt Richardson

Sa 12:00pm - 3:00pm (10/20)

Small, affordable single board computers enable you to blend the principles of Physical Computing with media playback and capture. This course uses the Raspberry Pi computer as a platform for creating portable devices that have the capability to display graphics, play video, play audio, take photographs, and capture video. As a foundation for the course, students will learn the basic workflow of using the Raspberry Pi computer for physical projects. This foundation includes gaining an understanding of the Linux software, Python, and digital input and output. Students will work independently or collaboratively to build on this foundation to create their own media playback and capture devices.
Soft Sensing (1.0 unit)
ITPG-GT 2455-001 (22544)  Sa 12:00pm - 6:00pm (09/29)
Kathryn Hartman  Su 12:00pm - 3:00pm (09/30)

When working with electronics we most often think about sensors as parts or components with clearly defined size, shape, and tactile properties. But what happens when we as designers start to consider sensors as materials rather than objects? How do we design with sensors that can be squishy, sticky, or slippery? And how do our designs change when we can sprinkle a sensor like fairly dust, spread it like paint, or knit it like yarn? This course will explore the softness of sensors both in physical form as well as in concept. Leveraging practices and research from the world of electronic textiles and material science, students in this course will learn to identify and utilize the conductive and resistive properties of materials that can be used for sensing.

Art Toy Design (2.0 units)
ITPG-GT 2196-001 (22545)  We 12:10pm - 2:40pm (09/05 - 10/17)
Benjamin Light

Is it a plaything? Sculpture? Nostalgia? A Product? Art toys exist at the center of a unique Venn diagram. Each student in this class will develop an original limited edition art toy. We will cover toy fabrication, character design, material selection, packaging design, and art toy culture. The class will be fabrication heavy, there will be weekly assignments, and a final project.

Automating Video (2.0 units)
ITPG-GT 2147-001 (22546)  Tu 6:30pm - 9:00pm (10/30 - 12/11)
Samuel Lavigne

In this experimental video class students will learn to use Python and command line tools to explore the possibilities of automating the film-making process. We will cover techniques for capturing, analyzing, editing and manipulating video with code. We’ll treat video as a textual as well as visual medium, repurposing found footage to generate new compositions and narratives, and experiment with home-made camera rigs that can be controlled remotely and algorithmically.

Syllabus

Circuit Design and Fabrication (2.0 units)
ITPG-GT 2197-001 (22547)  Mo 3:20pm - 6:15pm (10/29 - 12/03)
Eric Rosenthal
This class is a series of lectures and demonstrations focused on the technical criteria for design and fabrication of electronic circuits for ITP student projects. For example, when designing an analog audio circuit or an analog sensing circuit, a ground plane is needed to reduce electrical noise. When designing radio circuits, the physical geometry and location of the antenna on the circuit board matters. The class would introduce some common technical design considerations for electronic devices, and also explore some more experimental cases of circuit design, like flexible circuits, printing circuits, or preparing circuits on a fabric substrate. Students will be encouraged to engage in discussion of how to apply these concepts to their project work.

Prerequisite: Students coming to the class should understand the electronics concepts covered in Basic Analog Circuits, or have equivalent electronics experience. The Energy Class (Jeff’s), Homemade Hardware (Andy’s), Protoyping Electronic Devices (Deqing and Peiqi’s), or electronics experience prior to ITP would suffice.

**Computational Approaches to Narrative (2.0 units)**
ITPG-GT 2198-001 (22548)  
Allison Parrish

Beginning with the release of Crowther and Woods’ "Colossal Cave Adventure" in 1977, the potential and unique affordances of computation as a means of storytelling have become more and more apparent. Combining approaches from literary theory, anthropology, computational creativity and game design, this class considers how narrative structure can be represented as data and enacted through computation, and invites students to implement practical prototypes of their own interactive and procedurally-generated narratives using a variety of technologies.

Topics include (but are not limited to) hypertext fiction, "choose your own adventure"-style branching narratives, text adventures, visual novels, story generation from grammars and agent-based simulations. Students will complete a series of bite-size weekly assignments to present for in-class critique. Each session will also feature lectures, class discussion, and technical tutorials.

Prerequisites: Introduction to Computational Media or equivalent programming experience.

**Computational Approaches to Typography (2.0 units)**
ITPG-GT 2199-001 (22549)  
Allison Parrish

This course considers aspects of the materiality of typography and type design in the context of electronic media. Students will gain an understanding of how letterforms, typefaces and the layout of text have been represented as data throughout the history of electronic media, and experiment with different ways to author, manipulate and misuse that data through computation. Our eclectic and opinionated historical cross-section of topics includes (but is not limited to)
typewriter art, minimalist and asemic poetry, 8-bit home computer text modes, interactive/kinetic text, parametric and generative fonts, and emoji.

Students will complete a series of weekly assignments for presentation and critique in each session. In addition to critique, each session will feature lectures, class discussion, and technical tutorials.

Prerequisites: Introduction to Computational Media or equivalent programming experience.

**Content (and its Discontents) (2.0 units)**
ITPG-GT 2987-001 (22550) Mo 6:30pm - 9:00pm (09/10 - 10/22)
Sarah Rothberg

Ever make a cool platform, instrument, or some super abstract reusable code and told yourself you'd make some actual content for it...later? Ever see an awesome camera/display/musical instrument one of your classmates has made and say, wow I'd really like to use that thing to make something else!? Using a unique tool/framework/process invented by yourself or someone else at ITP, this class will focus on making compelling content, while also examining critically the rise of "the content creator" and the relationship between medium and message. This is a crash course in working with the affordances (and shortcomings) of a new tool, a skill which many real-world roles for "creative technologists" requires. We will go against the impulse to throw the paintbrush away after making one painting, and learn and practice creative and generative techniques for iterating, developing concepts, refining and presenting work. Come to this class with 2-3 ideas for a project that you or a fellow ITP-er has created in semesters prior that you want to develop content for. In special cases, you may also propose working with a platform/tool/framework created outside of ITP.

**Design for Discomfort (2.0 units)**
ITPG-GT 2159-001 (22551) We 6:30pm - 9:00pm (10/24 - 12/12)
Nicholas Hubbard

Experiences that lead to meaningful growth (for individuals, in relationships, in communities) nearly always involve discomfort. It can be inherent to the process--even a key aspect--of reaching a desired outcome for participants. Discomfort with good reason. This is the starting point for this course.

In The Art of Interactive Design, Chris Crawford makes an analogy between creating interactive media and holding a conversation. A standard design process often looks to set up "conversations" that are comfortable and pleasurable, with a low barrier to entry for users. But in pursuit of meaningful growth, we need to engineer what Douglas Stone at Harvard Law has termed "Difficult Conversations". As designers, artists, and creative-technologists, we can find unique insights and devise innovative solutions for leading people through them.
Weekly lectures and assignments will focus on identifying and prototyping creative experiences that involve one of four forms of discomfort (visceral, cultural, control-related, and intimacy-related). Examples will be considered from fields including visual art, performance, memorials, product design, and speculative design. Students will benefit from some prior familiarity with one or more of the following: psychology, conflict resolution, design-thinking, art-practice, or user-experience. All technical methodologies welcome.

**Design Research** (2.0 units)
ITPG-GT 2997-001 (22552)
Fr 9:00am - 11:55am (09/07 - 10/12)
Dave Derby & Heidi Brant

This course will focus on different design research and innovation workshop methodologies including Design Thinking, LEGO Serious Play, Service Design and Systems Design. The format will be a combination of seminar, presentation and practical application with students leading workshops both in and out of class. Students will learn how to design and facilitate workshops, creating deliverables such as roadmaps, journey maps and service blueprints along the way. The workshop methodologies and exercises we will cover include: Futurecasting and scenario planning, Life Design, DSL World Cafe, Google Ventures Design Sprints and Gamestorming. Both soft skills (reading the room, dealing with resistance, presentation skills) and organizational skills (setting ground rules, assigning pre-reads, being aware of hierarchy/dynamics in advance) will be discussed. The course will ask students to consider practical applications in a variety of contexts from personal to group to community to country to global and beyond. Students will be required to apply one or more of these workshop methodologies to an issue they’ve identified in one area of their daily life.

**Digital Imaging: Reset** (2.0 units)
ITPG-GT 2550-001 (22555)
Mo 3:20pm - 6:15pm (09/10 - 10/15)
Eric Rosenthal

This course is a series of lectures that focus on the mismatch between human vision and digital image capture, display and printing. By grasping a better understanding of the fundamentals and limitations of digital photography the student will learn how to produce better quality digital images. The lectures will include new theories of how human vision works, how digital cameras work, how inkjet and laser printers work and how displays work, how analog to digital conversion and digital compression work.

**Faking the News** (2.0 units)
ITPG-GT 2151-001 (22559)
Th 6:30pm - 9:25pm (09/06 - 10/11)
Ben Moskowitz

In this 6-week class, we will explore the cutting edge of “fake news” by engaging in ethical research and fabrication. Participants will manufacture and observe a controlled “fake news” event. We will experiment with command-line tools for doctoring video, neural nets and deepfakes to fabricate reality, Twitter bots, behavioral psychology, and the dark underbelly of the ad economy."

Syllabus

**Hello, Computer: Unconventional Uses of Voice Technology** (2.0 units)
ITPG-GT 2988-001 (22560) Mo 6:30pm - 9:00pm (09/10 - 10/22)
Nicole He

Computers are able to understand human speech better than ever before, but voice technology is still mostly used for practical (and boring!) purposes, like playing music, smart home control, or customer service phone trees. What else can we experience in the very weird, yet intuitive act of talking out loud to machines?

The goal of this course is to give students the technical ability to imagine and build more creative uses of voice technology. Students will be encouraged to examine and play with the ways in which this emerging field is still broken and strange. We will develop interactions, performances, artworks or apps exploring the unique experience of human and computer conversation.

Students will learn how to use text-to-speech and speech-to-text technologies, voice assistant devices, generative text techniques, open speech APIs, Node.js, and conversational UI design. There will be weekly assignments leading up to a final project. ICM or comparable programming experience required.

**Immersive Listening: Designing Sound for VR** (2.0 units)
ITPG-GT 2022-001 (22561) Th 6:30pm - 9:00pm (09/06 - 10/18)
T. K. Broderick

Until recently 3D sound was a novelty reserved for special uses and reaching a limited audience, no medium in popular culture has been as inherently dependent upon spatial audio as virtual reality. The widespread and standardized implementation of surround sound in film brought cinema to a new level of immersion, but is limited to theatrical exhibition and home theater systems. Today a considerable amount of content is consumed on mobile devices and laptops which excludes the cinematic experience of spatial sound. With the current rise of cinematic VR
and the blurring line between gaming and experiential VR, spatial audio is no longer just an added bonus, but rather a necessity in designing immersive VR experiences. In this course we will explore the emerging field of 3D sound design and for both 360 video and game engine-built VR using a digital audio workstation, game engines, and 3D audio plugins.

Syllabus

---

**Machine Learning for the Web** (2.0 units)
ITPG-GT 2465-001 (25559) Tu 6:30pm - 9:00pm (10/30 - 12/11)
Yining Shi

Libraries like TensorFlow.js and ml5.js unlocked new opportunities for interactive machine learning projects in the browser. The goal of this class is to learn and understand common machine learning techniques and apply them to generate creative outputs in the browser.

This class will start with running models in the browser using high-level APIs from ml5.js, as well as explore the Layer APIs from TensorFlow.js to train models using custom data. This class will also cover preparing the dataset for training models. At the completion of this course, students will have a better understanding of a few machine learning models, how do they work, how to train these models, and their use case to creative projects. Students will also be able to create interactive ML web applications with pre-trained models or their own models.

Prospective students are expected to have taken an ICM (Introduction to Computational Media) course, or have an equivalent programming experience with JavaScript, HTML, CSS.

---

**Mindfulness and Transformative Technologies** (2.0 units)
ITPG-GT 2145-001 (22563) Tu 3:20pm - 5:50pm (09/04 - 10/23)
Zoran Josipovic

Transformative technologies (a.k.a. Transtech) are the wave of the future, yet many challenges remain before their use can become as effective and widespread as that of personal computers and cell phones today. This course will introduce students to this exciting field, starting with the examination of the potential for optimizing experience through mindfulness and meditation, the understanding of basic issues in obtaining and interpreting physiological signals, toward the aim of generating ideas for wearable transtech projects.

Students will examine the ideas behind efforts to optimize human experience; practice different meditation techniques to experience the variety of cognitive and affective strategies they use and the varied effects they generate; explore the basic issues in obtaining and interpreting physiological data, and the use of brain stimulation methods such as TMS, dTCS, etc., and use this info to come up with ideas for wearable transtech devices.
The class will be mix of lectures, exercises and demos.

Syllabus

**Performative Avatars** (2.0 units)
ITPG-GT 2153-001 (22564) | Tu 6:30pm - 9:00pm (09/04 - 10/23)
Matt Romein

Whether it’s through photo realistic scans found in current-gen video games or the cartoonish and low-fi aesthetic of Bitmoji there is no limit to ways in which the body and the self are represented in digital spaces.

This 2 credit class will look at how avatars have been historically used in the realm of art, commerce, and entertainment and utilize existing avatar creation tools to develop projects that examine identity, body politics, and contemporary performance. In class we will cover the basics of Unreal Engine, photogrammetry, 3D scanning, and model rigging although students will be encouraged to use existing skill sets and creative thinking to complete some of the smaller week-by-week assignments. The class will culminate with a short performance, small installation or single/multi-channel video piece using one or more of the techniques covered in class. This can be a solo project or a group project.

In this class students will:
- Explore how avatars can be utilized in your creative practice
- Gain an introductory understanding of Unreal Engine, photogrammetry, model rigging, and 3D scanning.
- Learn how to re-contextualize digital spaces for the purposes of art, installation, and performance.
- Broaden your thinking of what performance can be, both in a physical setting and digital setting.
- Think critically about how physical bodies inhabit digital spaces and how the hardware and software we use reinforces the acceptance and value of certain kinds of bodies.

Syllabus

**Performing the Internet** (2.0 units)
ITPG-GT 2989-001 (22565) | Tu 3:20pm - 5:50pm (10/30 - 12/11)
Todd Anderson

This class seeks to use the internet and web browsers in new and disruptive ways. Rather than the traditional use of websites as static means of one-to-many communication, we will use websites as stages to perform and intervene in front of a live audience. Students will learn HTML/JavaScript as a means of making interactive websites/instruments to be played for an
audience and chrome extensions that will allow us to modify the content of existing websites to political or dramatic ends. We will draw on the art historical traditions of detournement and culture jamming to study what it means to make art out of other material with received authority. The class will also include readings and discussions on digital performing arts, and the implications of digital tools on the aesthetics of theater and performance art.

Students will learn HTML and Javascript with a focus on interaction design with themselves or another skilled performer as the intended user, a departure from traditional user experience design. They will read and discuss critical theory and artistic examples of digital performing arts, culture jamming, mashup culture and performance art. Students will create digital instruments and performances and thoughtfully workshop the work of their classmates. Students will perform their work in front of strangers and learn to do so confidently.

The first-third of the course will be focused on making single-page instruments, first in p5js and then in HTML/jQuery. The next third of the course will focus on chrome extensions, both applying the same interactive principles onto existing web pages and making site-specific interventions for dramatic effect. In the final third of the class students will create and rehearse a larger more polished performance using the techniques practiced thus far in the course and culminating in a public performance night for the larger ITP community.

Talking and Storytelling: The Art of Effective Communication (2.0 units)
ITPG-GT 2157-001 (22567)  Tu 3:20pm - 5:50pm (10/30 - 12/11)
Adaora Udoji

Successfully communicating is a critical skill not only for a graduate thesis, but also in the career that will follow. It boils down to this question: Are you persuading, influencing, or communicating your thoughts and ideas effectively, to any audience be it three people or three hundred? In this class we will systematically work our way through a four-step method to improve your ability to connect with your audience. We will explore the science that explains why stories work. We will tackle a basic framework for what a story is, using a process and foundation to develop any talk or presentation. Now that we have what you are going to say, we will also focus on how you say it, along with strategies to give you confidence to be your best self when speaking in front of a crowd. This is a particularly good class to take in preparation for your thesis in the Spring. This seminar examines and deconstructs verbal storytelling as a discipline in its own right. It is an exploration of speaking and storytelling as a fundamental building block of human evolution and innovation. We will look at the learnings from ancient times through modern scientific research—looking at theories attempting to explain what happens physiologically and psychologically when we are moved by a spoken narrative. This is a contextual approach that will focus on both the theory and the application in the marketplace of developing and delivering narrative as it relates to presenting oneself, a product or a service. As such, we seek to understand what drives current trends toward narrative education and storytelling as a competitive advantage in learning, communicating, persuading and influencing. Students will also contribute to designing a collaborative verbal communication template for the
class and for the Final Project: a presentation that applies some of the concepts learned to themselves or their projects, products, ventures and/or service concepts.

---

**Voice as a Performance Technology (2.0 units)**
ITPG-GT 2991-001 (22568)  Th 6:30pm - 9:00pm (10/25 - 12/13)
Ian Hatcher

This course will focus on the use of voice in live performance. We will discuss the voice as it relates to identity and semantics, study relevant precedents in performance and sound art, explore a range of aesthetic and compositional strategies, and become familiar with microphones and audio editing software. We will also consider the voice conceptually in light of recent technological advances in dictation software and synthesis. Students will complete small weekly assignments which will culminate in a final project.

The course will focus primarily on speech, not singing, but we will do some singing and breath control exercises. Trained vocalists and musicians are welcome. No vocal or performance experience is required.

---

**Weather Worlds at UNFCCC COP24 (2.0 units)**
ITPG-GT 2992-001 (22569)  Tu 3:20pm - 5:50pm (09/04 - 10/23)
Chris Woebken & Karolina Sobecka

Weather Worlds is a studio course that explores the role that design plays in public engagement on climate disruption. In this outcome-focused course the students will design a popup Weather Worlds studio platform for the 24th Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC COP24) that will take place in December 2018 in Katowice, Poland.

Students will design the format of the engagement in consultation with Red Cross Climate Centre experts, and produce it during the semester. The Weather Worlds studio will be a traveling platform that further can take place in different countries and occasions, serving local participation, and adaptable to local settings and contexts. At the COP24 conference in December 2018 the engagement will be facilitated by the Red Cross facilitators and volunteers, and by the course instructors. The aim for the format of the engagement is to create a blueprint that can be adapted and replayed subsequently in different to create social interventions in various settings. An example of such a flexible format can be a game design session through which participants model the local dynamics surrounding a local context-specific issue. The partnership with Red Cross will exponentially broaden and amplify the impact of this project, facilitating and developing engagements worldwide.

Today we rely increasingly on effective engagement of multiple stakeholders in order to impact public opinion, government policy and private sector’s commitments and struggles aimed at
climate change mitigation and adaptation. This course produces a platform that will explore the roles of design and art in influencing climate action, and investigate forms of experimental pedagogy, engagement, and participation in engaging issues linked to climate disruption.

What Happens When The Internet Dies? (2.0 units)
ITPG-GT 2158-001 (22570) Th 6:30pm - 9:25pm (10/25 - 12/06)
Christina Goodness

What do we do when the Internet is killed or dies? Or when the network is taken down by natural circumstances? How can we re-establish standalone or minimally dependent communications? How can we detect and differentiate between natural interference and designed interference, or can we? This class will investigate the design of the Internet itself, current communications protocols, and emerging techniques to supplement the Internet or establish separate networks. Besides architectural basics, we will look at case studies on how communities, activists, and organizations have reacted to network outage. Guest speakers will describe what they learned about the consequences of dependency on cloud and grid based communications. Topics covered will include meshnets, online-offline synch, re-utilization of non-Internet networks, layers of the current family of Internet protocols, alternate analog techniques, and case studies from Standing Rock, humanitarian disasters, Red Hook Brooklyn, and others. The goal of the class is to challenge students to conceptualize at least one other workable alternative to the Internet in the case of interruption of service. Students with or without network background are both highly encouraged to enroll.

Syllabus

Culinary Physics (3.0 units)
ITPG-GT 2569-001 (22571) Th 7:00pm - 8:40pm (09/06 - 12/13)
Stefani Bardin

This studio and seminar course explores the basic principles of food biochemistry, enzymology and food processing and how they relate to memory, the senses and the processing of information. Students will also learn basic principles of molecular gastronomy and modernist cuisine as framing devices for understanding how food also functions in the context of bodily health, environmental health as well as cultural and political narratives. Our food system consists of more than food production and consumption and this class will address how science and food science plays a more integral role in this system and how this knowledge can be mined for work that creatively and functionally contributes to this emerging field. Assignments for the class will be based on the incorporation of food science into design and technology projects that uses food as a substrate to explore and illuminate information within the food system. Workshops involve using liquid nitrogen + hydrocolloids as well as creating performative food objects and a Futurist meal.
Syllabus

**Developing Assistive Technologies** (3.0 units)
ITPG-GT 2446-001 (22572)  
Tu 6:45pm - 9:00pm (09/04 - 12/11)  
Claire Kearney-Volpe, Scott Fitzgerald & Anita Perr

This multi-disciplinary course allows students from a variety of backgrounds to work together to learn about and develop assistive technology. Partnering with outside organizations, students will work in teams to identify a clinical need relevant to a certain clinical site or client population, and learn the process of developing an idea and following that through to the development of a prototype product.

This course provides an overview of some of the assistive technologies currently used by people with disabilities to participate in life’s activities, including those used for computer access, mobility, and activities of daily living (ADLs). Working in small groups, you will work with a mentor with a disability to solve a problem by creating a tech solution making the problem easier to deal with. We have a number of ongoing projects such as developing interactive activities to improve balance of preschoolers with hearing impairments and cochlear implants, or working with a deaf woman in Argentina to develop a tool that can allow her to participate in group discussions. Other projects may include working with people with physical and sensory disabilities. This course provides you your own evidence of the benefit of using client centered design with input from multiple professionals.

**Basic Analog Circuits** (4.0 units)
ITPG-GT 2728-001 (22573)  
Mo 12:10pm - 3:05pm (09/10 - 11/26)  
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.

Syllabus

**Big Screens** (4.0 units)
This class is dedicated to experimenting with interactivity on large-scale screens. Students will work in pairs to develop one project over the course of the semester, culminating with a showing at InterActive Corps’ 120 X 11-foot video wall at their corporate headquarters on 18th St. and the West Side Highway. A mock-up of the system is available at ITP for testing. Class time is divided between independent project development, critique, technical demonstrations, and field trips to IAC. Registration for this course will happen through a separate lottery which you will enter in pairs (ITP-only) or groups (ITP + collaborators from other Tisch departments).

**Syllabus**

---

**Bodies in Motion** (4.0 units)
ITPG-GT 2773-001 (22575)  
We 9:00am - 11:30am (09/05 - 12/12)
Todd Bryant & Kathleen Sullivan

This course provides an introduction to the concepts of motion capture and the motion capture production pipeline to perform and record 3D animations for film and video games as well as stream for live performances. Students will learn all of the tools for tracking props and performers using MAGNET’s cutting edge motion capture studio. Students will also develop concepts around the technology and integrate their data into 3D computer graphics along with keyframe and procedural animation and custom 3D assets to build final projects using the Unreal game engine.

Program Learning Objectives:

To design a workflow of MoCap and ‘how to’ guides for diverse type of projects using motion capture and the basics of world and character building in the game engine Unreal. Reading assignments introduce students to constructed historical perspective of MoCap and investigates principles particular to animation and performance.

The objective of the course is to allow students to understand the importance of pre-production and planning which includes notions of storytelling, 3D modelling and texturing, best practices to capture the sessions, world building methods in video art and game development, and live show running.

Course Objectives:

- To create storyboards and define recording shots before capturing data.
- To understand and use the correct motion capture pipeline
- To learn the skills to direct an effective motion capture session (best calibration)
- To learn the best practices for capturing and cleaning data
- To be able to apply the data to models in Maya, Unreal Engine, and Max/Jitter
To be able to perform real-time retargeting for Live Performances

Course Structure:

The class consists of a weekly lecture and a weekly 2-hour lab session. Students will work in groups and will be required to attend a self-selected lab session on weekends. Examples of motion capture projects will be presented in lectures and discussed in the classroom. Students must demonstrate satisfactory achievement of course objectives through fulfillment of one final project at the end of the semester and a mandatory submission for the programs showcase. Final projects will require students to use a wide variety of software and studio time at MAGNET’s black box mocap studio. Students will be able to process their motion capture data for use in an animation or live performance. Collaboration with students and faculty from other programs is encouraged.

Syllabus

Cabinets of Wonder (4.0 units)
ITPG-GT 2470-001 (22576) Mo 12:10pm - 2:40pm (09/10 - 12/10)
Nancy Hechinger

If you were inventing a museum today, what would it look like? Who would be there? What would its main purpose be? The first museums were called Cabinets of Wonder. Usually, a viewer with a guide, often the collector, would open doors and drawers to see what was inside--amazing things from different parts of the world, different times. They were windows on the world to places the visitors would probably never be able to go; to see things they would never otherwise be able to see. And now there’s television, movies, the internet and travel. Why do people go to museums now? Will they in the future? Today, most museums seek to educate and to include more and more diverse visitors than they used to. How do people learn in public spaces? How do we know that they do? How can they make use of the new interactive technologies and not lose what’s special about them? The class is an exploration, observation and theory class with some design mixed in. Museum and exhibit visits are your primary assignments for the first half of the course—usually accompanied by a reading. You will also make some record of your visit (including a sketchbook, a diorama, reviews). There will be guest speakers from Museums and exhibit design firms, and several field trips. In the second half of the course, you begin to imagine how you might reinvent a museum and develop a full-scale presentation of your own Cabinet of Wonder.

Citizen Science: Biotechnology (4.0 units)
ITPG-GT 2995-001 (22577) Th 12:10pm - 3:05pm (09/06 - 11/29)
Stefani Bardin & Daniel Grushkin
Genspace is collaborating on this course with ITP so that students can learn science literacy through several specialized workshops that will take place Genspace – topics include Biohacking (with an introduction to CRISPR) + Biomaterials. Students will create projects throughout the semester utilizing both Genspace and ITP resources. Additionally, students will learn the basics of biodesign and bioinformatics to help them frame and conceptualize their research and their projects and how best to use these skills ethically and responsibly in aesthetic and scientific ways.

Since 2009 Genspace has operated a community biology laboratory in Brooklyn stemming from the hacking, biohacking, and DIYbio movements. It currently supports citizen science and public access to biology, biotechnology, synthetic biology, genetic engineering, citizen science, open source software, open source hardware.

---

**Data Art** (4.0 units)
ITPG-GT 2571-001 (22578)  
Genevieve Hoffman

Tu 6:30pm - 9:00pm (09/04 - 12/11)

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 p5.js, along with a variety of analog media or open-source data tools (such as D3.js, Miso, OpenRefine, MapBox & Leaflet).

---

**Desert of the Real: Deep Dive into Social VR** (4.0 units)
ITPG-GT 2461-001 (22579)  
Igal Nassima

Fr 3:20pm - 6:15pm (09/07 - 11/30)

The virtual expansion of screens began during the 1960’s with the exploration of head-mounted displays. Since the 60’s, virtual reality has been explored in a multi-disciplinary context including philosophy, design, arts, behavioral therapy. Baudrillard, with his publication of Simulacra and Simulation (1981), declared that human experience is being replaced by a simulation of reality (HyperReality). His theories brought the dystopian narrative of the virtual to mainstream pop-culture, as seen in films such as The Lawnmower Man and The Matrix. Contrary to Baudrillard, Canadian VR Pioneer Char Davies brings a more positive perspective to Virtual Reality, “facilitating a temporary release from our haitial perceptions and culturally biased assumptions about being in the world, to enable us, however momentarily, to perceive ourselves and the world us freshly.”
Throughout the class, the friction between Baudrillard and Davies will create the foundation of our exploration of Virtual Reality, where we will use room scale headsets and game engines to create meaningful “temporal experiences” exploring themes from behavioral sciences to narrative storytelling.

We will be exploring:

- existing VR projects, popular culture references and theory.
- concepts such as sense of embodiment (SoE), social VR design, and interactive storytelling techniques.
- methods for designing, modeling and rigging avatars for VR.
- live and pre-recorded animation.
- spatial audio techniques such as ambisonic sounds engines.
- packaging and distributing applications for social VR.

This is a production class, along with a theoretical foundation, in which we will prototype projects with networking, inverse kinematics, raycasting and face tracking technologies to explore questions such as “how does the viewer become part of the experience?” and “how does the real space relate to the virtual worlds we design?” In the second half of the class, students will work in groups to build a final social VR project based on their exploration of the above framework.

---

**Designing for Digital Fabrication** (4.0 units)

ITPG-GT 2890-001 (22580)  
Th 3:20pm - 5:50pm (09/06 - 12/13)

Daniel Rozin

The ability to digitally fabricate parts and whole pieces directly from our computers or design files used to be an exotic and expensive option not really suitable for student or designer projects, but changes in this field in the past 5 years have brought these capabilities much closer to our means, especially as ITP students. ITP and NYU now offer us access to laser cutting, CNC routing, and 3D stereolithography. In this class we will learn how to design for and operate these machines. Emphasis will be put on designing functional parts that can fit into a larger project or support other components as well as being successful on a conceptual and aesthetic level. In this class we will discover methods to design projects on CAD applications for total control of the result, and we will develop algorithmic ways to create designs from software (Processing) to take advantage of the ability to make parts and projects that are unique, customizable, dependent on external data or random. The class will include 3 assignments to create projects using the three machines (laser, router, 3D) and the opportunity to work on a final project.

**Syllabus**

---

**Designing for Live Performance** (4.0 units)
For centuries, great works of music, theater, and dance, have combined art and science to make integrated performances that move audiences. Today, we are seeing exciting changes as artists experiment with video and real-time interactivity to draw audiences even deeper into the performance, and enhance the shared experience of the moment. This class explores conceptual approaches to design, industry-standard software, prototyping frameworks, and data flow programming to provide student designers with the cutting-edge tools necessary to confidently collaborate with writers, directors, and performers. Structured as a studio course, students will make designs for contemporary performance pieces, and collaborate with working artists to design original projects.

Syllabus

---

**Drawing on Everything** (4.0 units)
ITPG-GT 2964-001 (22583)  
Tu 9:00am - 11:55am (09/04 - 11/27)
Shantell Martin

The objective of this course is to explore analog and digital drawing, not only as a static exercise, but also as a tool for performance, installation and collaborative experiences. The course will also explore the development and discipline of one's own personal style and artistic identity which can often be muted (if not wholly lost), when solely focusing on technology and innovation, yet plays an important role in the body of work you will create over a lifetime. Throughout the course we will also hear from active professionals from different industries whose work is strongly informed by an ever present and informed artistic identity.

Syllabus

---

**Game Design and the Psychology of Choice** (4.0 units)
ITPG-GT 2161-001 (22584)  
Fr 9:30am - 12:15pm (09/04 - 12/14)
Gregory Trefry

As game and interaction designers we create systems and choices that can either prey upon our psychological foibles or help us avoid decision pitfalls. It is our responsibility to understand how we decide, to consider the ethics of the systems we create and to practice designing systems in a purposeful manner.

Game Design & The Psychology of Choice will provide interaction and game designers with an understanding of the factors that influence behavior and decision-making by looking at the intertwining of cognitive psychology and economics through the development of behavioral economics. These disciplines study behavior on the individual and group level, often revealing
some of the why behind the rules of thumb and folk wisdom that game designers come to intuitively. But understanding the why—why we fall into decision traps; why certain tradeoffs tax our brain more than others; why we are overconfident about our abilities; why certain decisions make us uncomfortable—allows us to more purposefully apply our design craft, both in and out of games. Finally, as a class, we will take what we learn about how we think and create series of game experiences based around key cognitive science concepts.

Assignments may include:
- Mod a cognitive science experiment into a game or experience
- Analyze and present a game through the lens of cognitive science and behavioral economics
- Create game or experience based around a particular insight from cognitive science or behavioral economics

**Syllabus**

---

**Generative Music (4.0 units)**
ITPG-GT 2993-001 (22585)  
Hannah Davis

This course will go over the field of generative music, from its inception to the current state. The course would focus on both the history and technical implementation of generative music systems. Some topics of discussion will include mechanical and analog processes of algorithmic composition, genetic algorithms and other biological systems, generative grammars and other overlaps with natural language (such as audio Twitter bots), and data sonification. We will work up to what has been done at the intersection of music and machine learning, examining both older practices (such as Markov chains) and current practices (such as clustering algorithms like T-SNE, and deep learning with the work of Google’s Magenta project).

This course will include some basic music theory as well as an overview of the various implementation tools. Students will come out of the course with several small generative music projects of their own.

---

**Live Web (4.0 units)**
ITPG-GT 2734-001 (22691)  
Shawn Van Every

The World Wide Web has grown up to be a great platform for asynchronous communication such as email and message boards which has extended into media posting and sharing. Recently, with the rise of broadband, more powerful computers and the prevalence of networked media devices, synchronous communications have become more viable. Streaming media, audio and
video conference rooms and text based chat give us the ability to create new forms of interactive content for live participants.

In this course, we’ll focus on the types of content and interaction that can be supported through web based and live interactive technologies as well as explore new concepts around participation. Specifically, we’ll look at new and emerging platforms on the web such as HTML5, WebSockets and WebRTC using JavaScript and Node.js.

Experience with web technologies are (HTML and JavaScript) are helpful but not required. ICM level programming experience is required.

Syllabus

Magic Windows and Mixed-Up Realities (4.0 units)
ITPG-GT 2122-001 (22588) We 6:30pm - 9:00pm (09/05 - 12/12)
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/wearable 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 and head mounted displays 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 include and are not exclusive to Unity3D, Vuforia, Microsoft Hololens, Google Project Tango, volumetric video, SLAM, image and object recognition, depth sensing, projection mapping. Students should have previous working knowledge of Unity3D and feel comfortable with independently developing using this platform. Code samples will be provided for each technology/platform taught.
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 should feel free and are invited to use any other technologies they might find suitable to develop their ideas.

**Syllabus**

---

**New Interfaces for Musical Expression** (4.0 units)
ITPG-GT 2227-001 (22589)  
Greg Shakar  
Tu 6:30pm - 9:00pm (09/04 - 12/11)

The course focus is on the design and creation of digital musical instruments. Music in performance is the primary subject of this class. We approach questions such as "What is performance?" "What makes a musical interface intuitive and emotionally immediate?" and "How do we create meaningful correlations between performance gestures and their musical consequences?" Over the semester, we look at many examples of current work by creators of musical interfaces, and discuss a wide range of issues facing technology-enabled performance - such as novice versus virtuoso performers, discrete versus continuous data control, the importance of haptic responsiveness as well as the relationship between musical performance and visual display. Extensive readings and case studies provide background for class discussions on the theory and practice of designing gestural controllers for musical performance. Students design and prototype a musical instrument - a complete system encompassing musical controller, algorithm for mapping input to sound, and the sound output itself. A technical framework for prototyping performance controllers is made available. Students focus on musical composition and improvisation techniques as they prepare their prototypes for live performance. The class culminates in a musical performance where students (or invited musicians) will demonstrate their instruments. Prerequisites: ITPG-GT.2233 (Introduction to Computational Media) and ITPG-GT.2301 (Physical Computing).

**Syllabus**

---

**Open Source Studio** (4.0 units)
ITPG-GT 2996-001 (22590)  
Daniel Shiffman  
Tu 12:10pm - 2:40pm (09/04 - 12/11)

Open Source Studio is a class about maintaining an inclusive, healthy open source project. The first half of the semester will focus on the technical aspects of project management and open source software development (Git, Github, Unit Testing, Continuous Integration). Students will be complete weekly short exercises around contributing to open source projects. The second half of the semester will transition to a "studio" style course. Students will work together and propose a contribution to an open source project or develop their own project. We'll use a broad...
definition for "open source" project with an emphasis on documentation and collaboration. Guest speakers will visit the class in person or over skype to talk about their experience maintaining an open source project.

**Syllabus**

---

**Pop Up Window Displays** (4.0 units)
ITPG-GT 2162-001 (22591)  
We 6:30pm - 9:25pm (09/05 - 11/28)  
Gabe Barcia-Colombo

In New York City, every storefront window has the possibility to tell a story, spark a conversation or inspire an interaction. This workshop will focus on creating innovative interactive pop up installations designed for public window displays. A successful window is one that clearly delivers a message directly to the public. How do we create interactive displays that engage the public with a distinctive voice or style? Over seven weeks, students will concept, prototype and build an interactive experience meant to be installed in a storefront or commercial display. This course will explore lighting, design, and budgeting of durable interactive window installations. Previous fabrication or programming experience is encouraged.

**Syllabus**

---

**Programming from A to Z** (4.0 units)
ITPG-GT 2536-001 (22592)  
We 12:10pm - 2:40pm (09/05 - 12/12)  
Daniel Shiffman

This course focuses on programming strategies and techniques behind procedural analysis and generation of text-based data. We'll explore topics ranging from evaluating text according to its statistical properties to the automated production of text with probabilistic methods to text visualization. Students will learn server-side and client-side JavaScript programming and develop projects that can be shared and interacted with online. This fall the course will also explore topics in machine learning as related to text. There will be weekly homework assignments as well as a final project.

**Syllabus**

---

**Prototyping Electronic Devices** (4.0 units)
ITPG-GT 2845-001 (22599)  
Mo 6:30pm - 9:00pm (09/10 - 12/10)  
Deqing Sun
The most difficult part of prototyping is not the building process, but the process of deciding how to build. If we choose proper technology for prototypes, we can improve their robustness and simplicity.

This course will cover available and affordable technologies for ITP students to build prototypes. The course will start with soldering, wiring and LED basics. Then students will design an Arduino compatible board in Eagle, get it fabricated, assembled. And then using the debugger to dig deeper to understand how a microcontroller works.

The class will also cover multitasking, signal processing, communication, document writing and advanced skills beyond the Intro to Physical Computing class.

Each session will have lectures followed by in-class practices with guidance. The 14-week long assignment is called Do It Once – Do It Again. Bringing an idea or ongoing projects is highly encouraged.

**Syllabus**

---

**Socially Engaged Art and Digital Practice** (4.0 units)
ITPG-GT 2156-001 (22600)  
Tu 12:10pm - 2:40pm (09/04 - 12/11)  
Clarinda Mac Low

This course will explore how digital tools are and can be used in socially engaged art practice, where art and creative work intersect directly with people and civic life. Students will be asked to propose several projects as thought experiments, and fully realize one online/digital socially engaged project. The different definitions of “socially engaged practice” will be reviewed and discussed, including discussion of “best practices” when in conversation with different communities, and the politics of how we interact, as well as how we approach the physical as well as social space around us. We will work on how digital tools have been used in socially engaged art and how they could be used further, and experiment with how online life can functions as a public space. We will have some meetings in public spaces, and there will be some writing and reading as well as practical applications of methodology, as well as two or three guest lecturers.

**Syllabus**

---

**The Future of Sculpture** (4.0 units)
ITPG-GT 2164-001 (22601)  
Mo 6:30pm - 9:00pm (09/10 - 12/10)  
Kevin Siwoff

This is an advanced seminar exploring the themes, production methodologies, and dynamic definition of sculpture in the 21st century. Much of the class will look with a critical eye through
the lens of technology - What is technology’s role in the motivation, production, and proliferation of sculpture?

Students in this course will: Gain understanding of major topics/themes in contemporary sculpture; Learn about the various digital and historical processes used in sculpture / object making; Apply critical thinking and discourse to weekly readings and discussions; Visit studios / museums / facilities dedicated to the production and support of sculpture in NYC.

The class will consist of weekly discussions, based on readings, lectures, guest artist visits and a class trip to a fabrication facility. The decision to split the class into 3 sections: Production, Themes of power / the politics of objectification today, and A multi-sensory, multimedia definition of sculpture, was inspired by the Sculpture Center’s publication series Inquiries Into Contemporary Sculpture.

Syllabus

The Neural Aesthetic (4.0 units)  
ITPG-GT 2994-001 (22604)  
Tu 12:10pm - 3:05pm (09/04 - 11/27)  
Gene Kogan

This course introduces machine learning for art and creativity. It is a broad survey of the tools, techniques, and theory needed to understand emerging AI technology and re-appropriate it for critical inquiry and creative exploration.

The contents include an accessible introduction to how modern neural networks function and their real-time and non-real-time applications, as well as an overview of current state-of-the-art techniques in deep learning. We'll build interactive systems which incorporate real-time learning into creative code environments such as Processing, p5.js, openFrameworks, Max/MSP, and PureData, as well as control software instruments which produce music and visual art. We will also explore the frontiers of generative models such as GANs and autoencoders, showing how these methods can learn how to synthesize complex and information-rich images, sounds, and text.

Course materials will be based on the tools and instructional guides being developed on ml4a.github.io, along with a suite of deep learning libraries that perform important and novel tasks. A high-level, non-comprehensive introduction to coding machine learning in Python using Keras and Tensorflow will be included. Students will be provided with all of the code and supporting materials, integrated into a cloud-based computational environment ahead of time.

Although this course has no official pre-requisites, students will find it useful to catch up on fundamental computer science skills, including using a terminal and coding basic Python. One or more optional sessions for students who wish to catch up on or refresh these skills will be offered within the first two weeks.
The Temporary Expert: Research-based Art and Design Practice (4.0 units)
ITPG-GT 2853-001 (22602)  
Marina Zurkow

What does it mean to become a “temporary expert?” How does one develop one’s own creative research-based practice?

The Temporary Expert identifies problems, challenges and questions as a basis for research and imaginative art/design opportunities. In this course, students will adopt a wide variety of tools and strategies in order to lay the foundations of a research-based art practice that considers materials, media, context, and audience, as well as one’s personal strengths and desires. Students will develop art/design projects that interface with a multiplicity of other disciplines, and engage in idea exchange with experts in the field.

A research-based art practice brings together an eccentric mixture of skills, including traditional forms of research (library and interview techniques, informal ethnographies) and experimental hands-on research (experimentation, systems thinking, prototyping, daily practice and user-testing).

Through hands-on practice, case studies, and readings on systems thinking, communication, and the idea of "a public," we will explore method, documentation and presentation of your research, as well as the merits of both success and failure. Weekly work consists of readings, interviews, writing, daily artistic practice and systems thinking exercises.

Syllabus

Understanding Networks (4.0 units)
ITPG-GT 2808-001 (22603)  
Thomas Igoe

Interactive technologies seldom stand alone. They exist in networks, and they facilitate networked connections between people. Designing technologies for communications requires an understanding of networks. This course is a foundation in how networks work. Through weekly readings and class discussions and a series of short hands-on projects, students gain an understanding of network topologies, how the elements of a network are connected and addressed, what protocols hold them together, and what dynamics arise in networked environments. This class is intended to supplement the many network-centric classes at ITP. It is a broad survey, both of contemporary thinking about networks, and of current technologies and methods used in creating them.

Prerequisites: Students should have an understanding of basic programming (Intro to Computational Media or equivalent). Familiarity with physical computing (Intro to Physical
Computing or equivalent) is helpful, but not essential. Some, though not all, production work in the class requires programming and possibly physical and electronic construction. There is a significant reading component to this class as well.

Possible topics include:

- topologies: how to think about them (nodes and links), how few workable ones there are, and how there's no topology so stupid it isn't in use some place.
- addressing and routing: what a namespace is, three ways to generate a name (nesting, serial uniqueness, random pseudo- uniqueness), the difference between smart and dumb networks, why the phone network and the internet differ even though they use the same wires
- protocols: envelopes and contents, the stack and the reference lie, end-to-end principles, reliability vs. speed tradeoffs
- scale: more is different, scale breaks otherwise workable systems, makes redundancy and degeneracy critical, tends to push systems
- a discussion of security and its effects

Possible exercises include:

- Basic socket communication, both software and embedded hardware versions
- Client-server programming
- A group protocol/messaging exercise
- An HTTP/RESTian model exercise

Syllabus

**The Code of Music** (4.0 units)
ITPG-GT 2653-001 (24602) Mo 3:20pm - 5:50pm (09/10 - 12/10)
Luisa Pereira Hors

This course explores music through the lenses of computation and interactivity.

The first part of the semester is a structured exploration of rhythm, melody, timbre, and harmony. We will look into each of these elements from the standpoint of music, code, and design: each class, we will listen to examples from different periods and styles, manipulate the element programmatical, and create an interactive study around it.

During the second half of the semester we will cover algorithmic composition techniques such as Markov Chains, Neural Networks and L-systems. As students work toward their final projects, the class takes on a more self-directed approach. Final projects might be digital applications, spatial installations, or physical devices.
In-class coding and exercises will be done in P5.js, but students will be free to use other languages and frameworks for their final projects. ICM or equivalent programming experience is required.

Syllabus