**IDeATe Courses**
**Spring 2016**

For more information on these courses and IDeATe, please contact Kelly Delaney at kellydel@andrew.cmu.edu or 412-268-6440
http://ideate.cmu.edu

Please note that this packet is for information only. Students should refer to the HUB Schedule of Classes (http://www.cmu.edu/hub/courses/index.html) when preparing their course selections to ensure that they have the most updated schedule details.

**Collaborative Courses**
These courses are the new collaborative courses and studios that were created specifically for IDeATe. Students participating in the IDeATe concentrations and minors will have priority access to these courses.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Instructor</th>
<th>Meetings</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Primary IDeATe Area</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-292 A4</td>
<td>Learning Media Methods</td>
<td>M. Louw</td>
<td>TR 10:30 - 11:50 a.m.</td>
<td>6</td>
<td>80-292 A3 Learning Media Principles</td>
<td>Learning Media</td>
<td>IDeATe@Hunt Studio B (HL 106C)</td>
<td>This course should be taken in conjunction with 80-292 A3 Learning Science Principles (see below) There will be a studio usage fee associated with this course</td>
</tr>
</tbody>
</table>

Learning Media Methods brings together students from across the disciplines to consider the design of mediated learning experiences though a project-based inquiry course. Students will be introduced to a range of design research methods and associated frameworks that explore the cognitive, social and affective dimensions of learning in everyday contexts through readings, invited lectures, in-class activities and assignments. Students will conduct a series of short design research studies to define learning goals and develop supporting design concepts that improve learning outcomes for diverse participants in informal learning settings (e.g. museums, after school programs, maker spaces or online). In concept development, we will look at how to position technology and question its role in the setting to engage and foster positive learning interactions. The course will culminate in a media-rich presentation of design concepts to a stakeholder audience, and include an evaluation plan describing how learning outcomes for the project would be assessed.
15-294 A3/A4  Rapid Prototyping Technologies
Instructor: D. Touretzky
Meetings: MW 6:30 – 7:50 p.m.
Units: 5
Prerequisites: 15-104 or 15-112
Primary IDeATe Area: Media Design, Physical Computing
Location: IDeATe@Hunt Physical Computing Lab (HLA10)
Note: There will be a lab usage/materials fee associated with this course

This mini-course introduces students to rapid prototyping technologies with a focus on laser cutting and 3D printing. The course has three components: 1) a survey of rapid prototyping and additive manufacturing technologies, the maker and open source movements, and societal impacts of these technologies; 2) an introduction to the computer science behind these technologies: CAD tools, file formats, slicing algorithms; 3) hands-on experience with SolidWorks, laser cutting, and 3D printing, culminating in student projects (e.g. artistic creations, functional objects, replicas of famous calculating machines, etc.).

16-457/48-559  Reality Computing II
Instructors: J. Folan, P. Matikainen
Meetings: 16-457: MW 12:30 – 2:20 p.m.
48-559: MW 12:30 – 4:20 p.m.
Units: 16-457: 12
48-559: 18, 24
Prerequisites: 
Primary IDeATe Area: Media Design, Physical Computing
Location: IDeATe@Hunt Physical Computing Lab (HLA10)
Note: There will be a lab usage/materials fee associated with this course

Reality computing encompasses a constellation of technologies focused around capturing reality (laser scanning, photogrammetry), working with spatial data (CAD, physical modeling, simulation), and using data to interact with and influence the physical world (augmented/virtual reality, projector systems, 3D printing, robotics). This iteration of the reality computing course will focus on “design realization:” the translation from digital design to fully realized tangible artifact. Collaborating with the UDBS design studio, and within the context of a full-scale residential prototype, students will investigate how reality computing technologies can be used to accelerate and advance the process of design realization by using reality computing to understand existing homes, map design data into the real world, and highlight conflicts between design and reality. Topics of special focus within the course are residential design (John Folan) and augmented reality and robotics (Pyry Matikainen).

16-455/48-530  Human-Machine Virtuosity
Instructors: G. Zeglin, J. Bard
Meetings: TR 10:00 – 11:20 a.m.
Units: 12
Prerequisites: 16-223 or 60-223
Primary IDeATe Area: Intelligent Environments, Physical Computing
Location: IDeATe@Hunt Experimental Fabrication Lab (HLA5)
Note: There will be a lab usage/materials fee associated with this course

Human dexterous skill embodies a wealth of physical understanding which complements computer-based design and machine fabrication. This project-oriented course explores the duality between hand and machine through the practical development of innovative design and fabrication systems. These systems fluidly combine the expressivity and intuition of physical tools with the scalability and precision of the digital realm. Students will develop novel hybrid design and production workflows combining analog and digital
processes to support the design and fabrication of their chosen projects. Specific skills covered include 3D 
scanning, 3D modeling (CAD), 3D printing (additive manufacturing), computer based sensing, and human-
robot interaction design. Areas of interest include architecture, art, and product design.

**48-390 Physical Computing Studio**
**Instructors:** E. Brockmeyer
**Meetings:** TR 10:30 - 11:50 a.m.
**Units:** 10
**Prerequisites:** 16-223 or 60-223
**Primary IDeATe Area:** Physical Computing
**Location:** IDeATe@Hunt Physical Computing Lab (HLA10)
**Note:** There will be a lab usage/materials fee associated with this course

This collaborative studio course will allow interdisciplinary teams to develop wearables with a focus 
on assistive technology. The ubiquitous nature of mobile devices coupled with low-cost and easily integrated 
sensors and actuators make this a good time to approach real problems for a range of users from the 
physically disabled to athletes. Teams will learn skills in hardware, software, fabrication, and design 
communication in order to effectively develop and share their ideas.

**48-528 Responsive Mobile Environments**
**Instructors:** D. Byrne
**Meetings:** TF 10:30 - 11:50 a.m.
**Units:** 9
**Prerequisites:** None
**Primary IDeATe Area:** Intelligent Environments
**Location:** T: CFA 214  
F: IDeATe@Hunt Physical Computing Lab (HLA10)
**Note:** There will be a lab usage/materials fee associated with this course

Embedded, connected and mobile computing combine to create powerful platforms for sensing 
human behavior and personalizing experiences in situated spaces. Creating intelligent, meaningful, and 
opportune feedback to provide serendipitous support for the people and activities within these spaces still 
remains an important problem. Students will seek creative solutions to this challenge in this hands-on 
introduction to real-time interactive environments. The course will introduce foundational theories, methods 
and techniques that range across the aesthetic, the human-centered and the technical. Students will apply this 
knowledge by working in teams to collaborative prototype an responsive environment which adapts in real-
time to activities within it. In these teams, students will work across disciplines to integrate technical and 
aesthetic frameworks for sensing, analysis and feedback of human activity in intelligent and augmented 
spaces.

**51-236 Information Design**
**Instructors:** M. Mages
**Meetings:** TR 12:30 - 2:20 p.m.
**Units:** 9
**Prerequisites:** None
**Primary IDeATe Area:** Media Design
**Location:** IDeATe@Hunt Studio A (HL106B)
**Note:** There will be a studio usage fee associated with this course

This undergraduate IDeATe design course focuses on teaching a basic visual design process from 
start to finish. Students will work individually and in teams to gain proficiency in applying specific design 
methods to information design challenges at each stage of the design process.
Game design sits at the crossroads of many different disciplines—programming, art, writing, design, engineering, psychology, and more. This course takes a practical approach to programming and how it can be used to make one a better game designer. Through individual & collaborative projects, students will learn programming tools, techniques for working with data, methods of working with teams, and prototyping strategies. This course is geared toward non-programmers looking to add programming to their game design toolset.

53-471  Game Design, Prototyping, and Production
Instructors:  T. Corbett
Meetings:  MF 10:30 a.m. - 12:20 p.m.
W 10:30 a.m. - 12:20 p.m. (lab)
Units:  12
Prerequisites:  15-104 or 62-150
Primary IDeATe Area:  Game Design
Location:  IDeATe@Hunt Studio A (HL 106B)
Note:  There will be a studio usage fee associated with this course

This is a lecture and project based course focused on the design and development of video games. The course instruction will cover principals of game design and mechanics, rapid prototyping and iterative design processes, and project management. It will examine business aspects of the industry that impact designs, including demographics, economic models, budgets, and marketing. Students will work in collaborative, cross-disciplinary teams, forming their own “game studios” to tackle design challenges and create games of their own. Teams will engage in hands-on development, and will have roles for artists, programmers, designers, producers and more. Students from all disciplines are encouraged to join.

57-344  Experimental Sound Synthesis
Instructors:  J. Stiles
Meetings:  MW 10:30 a.m. - 12:20 p.m.
Units:  9
Prerequisites:  15-104 or 62-150 or 18-090
Primary IDeATe Area:  Sound Design
Location:  IDeATe@Hunt Media Lab (HL A10A)
Note:  There will be a lab usage/materials fee associated with this course

In this course we will explore a variety of experimental approaches to music, sound design, and sonic artwork. Topics will include: composing and mixing in multichannel sound formats, building analog smart-synthesizers, electroacoustic music performance, 3D sound recording, reactive sound environments, sonic sculpture, and beyond. In this course students from a variety of disciplines will work together to design, prototype, and execute a series of ambitious projects.

This course is part of the new Integrative Design, Arts, and Technology (IDeATe) program at Carnegie Mellon University and makes use of the new IDeATE@Hunt Media Lab, an adaptable multimedia “black box” located in the lower level of Hunt Library.

Students are expected to be proficient in one or more of the following areas:
•  Real-time graphical programming environments (Max or PD),
• Physical computing platforms (Arduino, Raspberry Pi)
• Experimental music composition/performance
• Instrument design
• Interactive art

60-125 A3  Introduction to 3D Animation
Instructors:  S. Diaz
Meetings:  MWF 9:00 - 10:20 a.m.
Units:  6
Prerequisites:  15-104 or 62-150
Primary IDeATe Area:  Animation & Special Effects
Location:  CFA 317 plus some use of the IDeATe@Hunt facility
Note:  There will be a lab usage/materials fee associated with this course

This mini on introductory animation is designed to explore the wonderful world of computer animation from initial concept to final production. In a mixture of class discussions, training workshops, and guest lectures from industry experts, students will become acquainted with the necessary skills needed to create their own characters and animations. Both artistic and technical elements within animation production will be covered, and workshops will help to delve into more specific elements within a topic. Some specific topics include modeling, rigging, character/object animation, texturing, and rendering. By completion of the course, students will understand how to use Maya - the software used by many industry professionals - and be capable of taking on more advanced courses related to animation, vfx, and video games in the future.

60-126 A4  Introduction to Performance Capture and Rendering
Instructors:  S. Diaz
Meetings:  MWF 9:00 - 10:20 a.m.
Units:  6
Prerequisites:  15-104 or 62-150
Primary IDeATe Area:  Animation & Special Effects
Location:  IDeATe@Hunt Integrative Media Lab (HLA10A)

This mini is designed for those interested in the growing world of performance capture and visual effects. Utilizing the advanced motion capture facilities at Carnegie Mellon and the Kinect, students will learn how to capture motion from performance and apply it to CG characters and objects. While this technique is found in many video games and vfx movies, it has the ability to create endless possibilities within the realm of computer graphics and experimental animation/art. Students will also become more familiar with the process of rendering to create the necessary polish for their animations/visualizations. CG Lighting, camera work, and material shading are just a few of the many topics covered in this course.

76-374  Mediated Narrative
Instructors:  R. Vituccio
Meetings:  TR 1:30 - 2:50 p.m.
Units:  9
Prerequisites:  None
Primary IDeATe Area:  Media Design
Location:  IDeATe@Hunt Studio B (HL 106C)
Note:  There will be a studio usage fee associated with this course

This course is designed to expose students to a range of multidisciplinary perspectives on narrative. Narrative has a long and distinguished history and many theoretical schools of thought have evolved to identify what narrative is and its various instantiations in thought, language, poetry and prose writing, the identity of self and character, politics, theatre, art, games, and media and life generally. The first unit provides an overview of the History/Theory of narrative as a portal into the way all the subsequent units discuss
narrative. The second unit focuses on features of language that are conventionally associated with narrative as established from the scientific study of large corpora of texts. The third unit examines how narrative works in both poetry and prose fiction. The fourth unit focuses on life writing as a written form in which individuals rely on narrative as a tool for exploring concepts of self, and self in relation to a community (local, national, etc.). The fifth unit deepens the examination of embodied narrative by focusing on narrative on stage and screen, illustrating how action is character and character is action and the importance of voice for giving a character life. The sixth and final unit looks at exploratory narrative, the relationship of narrative, games, and interactivity. This unit looks at video games and narrative structures used within a game world and discusses, among other things, what works and what doesn’t.

<table>
<thead>
<tr>
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<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-292 A3</td>
<td>Learning Science Principles</td>
<td>D. Danks</td>
<td>TR 10:30 - 11:50 a.m.</td>
<td>6</td>
<td>15-104 or 62-150</td>
<td>Learning Media</td>
<td>IDeATe@Hunt Studio B (HL 106C)</td>
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</tr>
</tbody>
</table>

The ability to learn, that is, to change and adapt to one’s environment, is one of the hallmarks of intelligence, whether in humans, animals, or machines. In this course, we will examine the nature, components, and significance of learning in many different manifestations, with a particular focus on the fundamental concepts that underlie the ways in which we understand “learning” in different disciplines. This course will principally focus on different conceptualizations of learning, rather than its technical aspects, whether mathematical, experimental, or computational. This course will be almost entirely project-based: you will work in groups (with students from different backgrounds) to identify opportunities for learning using and within media, and then develop designs that appropriately address those opportunities. In the course of developing these media designs, you will have to learn, and come to understand, concepts and principles of learning from different disciplines. The emphasis throughout will be on careful conceptualization, description, and design of the learning through and about media.
Supportive Courses

These courses are existing courses and studios that are options for IDeATe. Students participating in the IDeATe concentrations and minors will not have priority access to these courses.

**05-418**  
Instructor: A. Ogan  
Meetings: TR 3:00 - 4:20 p.m.  
Units: 12  
Prerequisites: None  
Primary IDeATe Areas: Game Design, Learning Media  
Location: GHC 4102

The potential of digital games to improve education is enormous. However, it is a significant challenge to create a game that is both fun and educational. In this course, students will learn to meet this challenge by combining processes and principles from game design and instructional design. Students will also learn to evaluate their games for fun, learning, and the integration of the two. They will be guided by the EDGE framework for the analysis and design educational games. The course will involve a significant hands-on portion, in which students learn a design process to create educational games — digital or non-digital. They will also read about existing educational games and discuss game design, instructional design, learning and transfer, and the educational effectiveness of digital games. They will analyze an educational game and present their analysis to the class.

**12-750**  
Instructor: D. Coffelt, Z. Qian  
Meetings: TR 3:00 - 4:20 p.m.  
Units: 12  
Prerequisites: None  
Primary IDeATe Area: Intelligent Environments  
Location: WEH 5409

This course takes a broad view of infrastructure systems to include physical infrastructure and information networks. The course will consider the need to protect these critical infrastructures from both degradation as well as malicious attacks. Infrastructure management generally depends on public-private partnerships to ensure long-term viability. We will look at relevant academic literature on the topics of infrastructure needs and requirements. We will explore the use of automated sensing and computer network systems to facilitate management.

**15-322**  
Instructors: J. Stiles  
Meetings: TR 10:30 - 11:50 a.m.  
Units: 9  
Prerequisites: 15-112 or 15-104  
Primary IDeATe Area: Sound Design  
Location: MM 103

Computers are used to synthesize sound, process signals, and compose music. Personal computers have replaced studios full of sound recording and processing equipment, completing a revolution that began with recording and electronics. In this course, students will learn the fundamentals of digital audio, basic sound synthesis algorithms, and techniques for digital audio effects and processing. Students will apply their knowledge in programming assignments using a very high-level programming language for sound synthesis and composition. In a final project, students will demonstrate their mastery of tools and techniques through music composition or by the implementation of a significant sound-processing technique.
Animation Art and Technology is an interdisciplinary course cross-listed between Art and Computer Science. Faculty and teaching assistants from computer science and art teach the class as a team. It is a project-based course in which four to five interdisciplinary teams of students produce animations. Most of the animations have a substantive technical component and the students are challenged to consider innovation with content to be equal with the technical. The class includes basic tutorials for work in Maya leading toward more advanced applications and extensions of the software such as motion capture and algorithms for animating cloth, hair, particles, and grouping behaviors. The first class will meet in CFA room 303.

This is a project-oriented course which will deal with all four aspects of project development; the application, the artifact, the computer-aided design environment, and the physical prototyping facilities. The class, in conjunction with the instructors, will develop specifications for a mobile computer to assist in inspection and maintenance. The application will be partitioned between human computer interaction, electronics, industrial design, mechanical, and software components. The class will be divided into groups to specify, design, and implement the various subsystems. The goal is to produce a working hardware/software prototype of the system and to evaluate the user acceptability of the system. We will also monitor our progress in the design process by capturing our design escapes (errors) with the Orthogonal Defect Classification (ODC). Upon completion of this course the student will be able to: generate systems specifications from a perceived need; partition functionality between hardware and software; produce interface specifications for a system composed of numerous subsystems; use computer-aided design tools; fabricate, integrate, and debug a hardware/software system; and evaluate the system in the context of an end user application. Senior standing is required.

This course provides the student with a rich, in-depth design and application hardware project experience in the areas of digital communications and/or signal processing systems using DSP hardware. Teams of students work on a semester-long project of their choice. Topics include: speech and music processing, digital communications, multimedia processing, data compression, data storage, wireless
Communications, CD, image and/or signal processing, etc. One month of introductory laboratories familiarize the students with DSP hardware and support software. Lectures address z-transforms, IIR and FIR filter design using MATLAB and DSP hardware, LPC and adaptive filters, channel coding, time and frequency multiplexing, short time Fourier and wavelet transforms, and spread spectrum techniques. 4 hrs. lec., 3 hrs. lab.

18-578 Mechatronic Design
Instructors: J. Dolan
Meetings: MW 2:30 - 4:20
Units: 12
Prerequisites: (18-348 and 18-320) or (18-348 and 15-313) or (18-348 and 18-370) or (18-370 and 18-349) or (15-313 and 18-349) or (18-320 and 18-349) or (18-320 and 18-370)
Primary IDeATe Area: Physical Computing
Location: HH B103

Mechatronics is the synergistic integration of mechanism, electronics, and computer control to achieve a functional system. Because of the emphasis upon integration, this course will center around system integration in which small teams of students will configure, design, and implement a succession of mechatronic subsystems, leading to a main project. Lectures will complement the laboratory experience with comparative surveys, operational principles, and integrated design issues associated with the spectrum of mechanism, electronics, and control components. Class lectures will cover topics intended to complement the laboratory work, including mechanisms, actuators, motor drives, sensors and electronic interfaces, microcontroller hardware and programming and basic controls. During the first week of class, each student will be asked to complete a questionnaire about their technical background. The class will then be divided into multi-disciplinary teams of three students. During the first half of the class, lab assignments will be made every 1-2 weeks to construct useful subsystems based on material learned in lecture. The lab assignments are geared to build to the main project. This course is cross-listed as 16-778 and 24-778. Students in other departments may take the course upon availability of slots with permission of instructor. Non-ECE students may take the course upon availability of slots with permission of the instructor.

39-245 Rapid Prototype Design
Instructors: S. Finger
Meetings: TR 3:00 - 4:20 p.m.
Units: 9
Prerequisites: None
Primary IDeATe Area: Physical Computing
Location: IDeATe@Hunt Experimental Fabrication Lab (HL A5)
Note: There will be a lab usage/materials fee associated with this course

This course provides an introduction to rapid design through virtual and physical prototyping. The class covers the engineering design process, problem solving methods, interdisciplinary team work, current industrial practice, and manufacturing process capabilities. The course emphasizes hands on learning. Sophomores have priority while registering for this course. Juniors and seniors will be put on the waitlist, then released once sophomores have registered.
In this project course, students work in multidisciplinary teams to design products or processes. The course is open to juniors, seniors and graduate students from all parts of the campus community. Each project is sponsored by an industry, government or non-profit partner, and is of real commercial interest to that partner. Students work directly with their partner throughout the semester to establish goals and requirements, evaluate their design as it progresses, and produce a final report, presentation, and, if appropriate, a prototype. Design reviews, held twice during the semester, give students a chance to present their preliminary designs and receive feedback and advice. In completing their designs, teams must consider not only the functionality of their designs, but also the look, feel, appearance, and societal impact. Skills built in this course will include: developing the product statement, establishing goals and constraints for the product, project management, and generating and evaluating design alternatives. As some projects may span multiple semesters with new groups of students, careful documentation of project work is emphasized. Students may take this course for either one or two semesters.

This course introduces the themes of product planning and the development of products within systems and as systems. The projects are broad in scope and require students to develop products that reflect an understanding of the entire development cycle. Tools and skills for the studio and model shop are required; lab fee. Instructor permission required for non-Industrial Design majors.

Role playing games-mainly traditional pencil-and-paper, but recently, video game RPGs as well-have matured over the last 40 years into a viable medium for modern interactive storytelling. There is now a generation of novelists, screenwriters, playwrights and TV writers who first honed their story-telling chops when they were a Gamemaster of a Role Playing Game (RPG). The course instructor is one of those writers, having won three Game of the Year awards for his RPG stories and designs and then moved on to become a playwright, greatly influenced by his time Gamesmastering role playing games. The class will first examine and dissect RPG story and design (using pencil and paper examples) seeking an understanding of both design as well as storytelling ‘best practices.’ Once the groundwork has been laid, the class will be divided into three-to-five-person writing teams. Then, taking an existing pen-and-paper RPG system proceed to create and pitch a set of campaign adventure stories for that system and that story intellectual property. The pitch will then be fine-tuned and approved, and the students proceed to “flesh out” their new story, delivering a full prose treatment, followed by Act breakdowns, mission arcs, dialogue for select scenes, and one shooting script for a
two-minute cinematic. The final product is a hard copy story bible portfolio-quality piece. The class grade will primarily be based on every student's individual quality of writing and story crafting. It should be emphasized this is a writing course, not an RPG design course.

53-409  Game Design
Instructors: J. Schell
Meetings: TR 1:00 - 3:00 p.m.
Units: 12
Prerequisites: None
Primary IDeATe Area: Game Design
Location: PTC MPR

As part of the IDeATe game design concentration, the goal of this course is to prepare you for a career involving design of computer games and other interactive experiences. Students in this course will read and write about game design, and design many games of their own. Do not mistake this for a course in computer game development. This course is focused on the rules and methods of game design, which remain fairly constant regardless of the technology used to develop a game. While technology will play a significant role in our studies, technological details will not be our focus. You will study and design games of all sorts: card games, dice games, athletic games, story games, and yes, even video games. How to design games, how to design them well, and how to see your designs to completion will be what you study here. Students not meeting the prerequisite will gain access to the course by answering questions to the course instructor. Question 1: What is your name, and what degree program are you in? Question 2: What is your current GPA? Question 3: What are three of your favorite games? What is it you like about them? Question 4: Have you ever designed any games? If so, tell me about them, and what you learned while making them. If not, why not? Question 5: What is it that you hope to accomplish as a game designer?

54-509  Theatrical Sound System Design
Instructors: C. Evans, J. Pino
Meetings: F 9:00 - 11:20 a.m.
Units: 9
Prerequisites: 54-666 and 54-166
Primary IDeATe Area: Sound Design
Location: PCA 210

Intensive course exploring the theory, art and technology of large scale sound system design for entertainment, specifically live theater productions. Prerequisites: Intro to Sound Design for Theatre and Production Audio, OR permission of instructor.

57-347  Electronic and Computer Music
Instructors: B. Opie
Meetings: TR 9:30 - 10:20 a.m.
Units: 6
Prerequisites: 57171 or 57101
Primary IDeATe Area: Sound Design
Location: MM 119A

This course builds on the concepts learned in Introduction to Music Technology (57-101) and gives added knowledge in the areas of composition using digital and analog devices as well as various computer programs. Building computer models of both analog and digital synthesizers as well as drum machines, loop players and various other sound processing effects will be covered in detail. Students will be required to produce several projects throughout the course demonstrating their understanding of various concepts in electronic music. More emphasis is placed on the overall quality of the end musical product than in 57-101 in order to prepare students for music production in a professional setting.
Electronic Media Studio: Introduction to the Moving Image is an introduction to the computer as a dynamic tool for time-based media production. In this course students develop skills in digital video and audio production through the exploration of narrative, experimental, performance, documentary and animation themes and forms. Historical and contemporary works are presented and discussed to provide a context for studio projects.

Interactive Art and Computational Design

This is an advanced studio course in arts-engineering and new media practice, with a special emphasis on information visualization and software art. Topics surveyed in the course will be tailored to student interests, and may include: experimental interface design, game design, real-time audiovisuals, locative and mobile media, computational form-generation, image processing and vision-based interactions, simulation, and other topics. Through a small number of exploratory assignments and a public capstone project, students will bolster interdisciplinary problem-solving abilities and explore computation as a medium for curiosity-driven experimentation. Enrolling students are expected to have demonstrable programming skills, without exception, beyond the level of an introductory class such as 15-110. Although the course will provide technical overviews of major visualization toolkits (including D3, Processing, and openFrameworks), assignments may be executed in the student's preferred programming environment. Graduate students should register for section 51-882 or 62-726 (12 units), which meets with the undergraduate sections 60-412 and 51-482 (10 units).

Advanced ETB: 2D Animation

This course introduces students to digital 2D animation techniques and processes through hands-on lab projects. Emphasis is on creative content, experimentation, critical thinking and collaboration. Through a series of tutorial, screenings, and discussions, this class will explore contemporary trends in animation and character design, and expose students to tools such as Adobe After Effects and Flash.
60-439 Hybrid Instrument Building
Instructors: A. Momeni
Meetings: R 6:30 - 7:50 p.m., F 1:30 - 4:20 p.m.
Units: 10
Prerequisites: None
Primary IDEATe Area: Physical Computing, Sound Design
Location: DH C200

This course introduces students to the theories, practices, aesthetics and communities surrounding the design, building and performance with hybrid interactive instruments. We espouse an expansive definition of the word instrument that includes “a device for the production of sound/music,” as well as “a means whereby something is achieved, performed, or furthered” (from merriam-webster.com). We study the process of translating gesture into another sensory medium (e.g. sound or light). Our approach to instrument design will depart from the double meaning embedded in the notion of composing instruments: first, consideration of instrument building as an act of composition; second, instruments that compose of their own right. While emphasis is placed on musical instruments, course work will also encompass instruments that produce light, image, movement, etc. This course unfolds in two phases: literature review and individualized projects. The first half of the course will introduce students to a wide range of existing examples from contemporary music and composition, installation art and human-computer-interaction. Students will study theoretical and computational frameworks for working with gesture in instrument design. Topics of interest include: gesture data acquisition, data analysis, and mapping gesture data to hybrid-software-hardware computational systems that generate sound/image/movement. We will investigate the software and hardware technologies underlying the design and fabrication of hybrid instruments with electronics, sensors, signal processing, digital fabrication. The second half of the course will allow teams of students to choose an area of specialization, design and fabricate a functioning instrument. The course culminates in an event where all students demonstrate their final instruments in a performance setting.

60-441 Urban Intervention
Instructors: A. Momeni, I. Nourbakhsh
Meetings: R 8:00 - 9:20 p.m., F 9:30 a.m. - 12:20 p.m.
Units: 10
Prerequisites: None
Primary IDEATe Area: Media Design
Location: DH C200

This course introduces students to theories, practices, and communities for critical investigation of urban spaces and play within them.

The course unfolds along two parallel trajectories: research (literature review, lectures, readings, demonstrations) and design (three iterated individualized projects and a fourth larger scale final project). The first half of the course will introduce students to a wide range of theories and techniques within urban intervention that draw from fluxus, the situationist international, activism and hacktivism, as well as public policy, philosophy, psychology and economics. Students will study theoretical and practical frameworks for artistic intervention into public urban spaces, while concurrently researching actual sites and communities within Pittsburgh for experimentation. Students are required to conceptualized projects on larger (urban) scales, and find ways to implement their projects safely and legally by pursuing the necessary administrative, social, technical, financial steps required to create meaningful interventions in public spaces.

This class will specifically explore three media for urban intervention: Sound, Outdoor video projection, Robotics, Autonomy and Mobility in the way of remote control vehicles (e.g. cars, quad-copters, etc.). For each theme, students are required to produce one project that is iterated twice or more.

The undergraduate (60441) and graduate (60741) sections of the course meet concurrently and follow the same syllabus and assignments. In addition to the coursework documented in the syllabus, Graduate level students are expected to write a research paper suitable for submission to a notable relevant academic
conference. This process includes a rough draft, revisions and a completed and formatted paper ready for submission.

62-478 A3/A4  
digiTOOL  
Instructors:  
Z. Ali  
Meetings:  
MW 10:30 - 11:50 a.m.  
Units:  
6  
Prerequisites:  
None  
Primary IDeATe Area:  
Media Design, Physical Computing  
Location:  
IDeATe@Hunt Experimental Fabrication Lab (HLA5)  
Note:  
There will be a lab usage/materials fee associated with this course

This IDeATe-affiliated course serves as an introduction to the fundamental concepts, processes, and procedures to utilize digital and traditional equipment within the IDeATe@Hunt Library facilities. After completion, participating students should leave with a thorough understanding of laser cutting/engraving, 3D printing, CNC routing, and traditional woodworking equipment/processes; and how to operate in a safe, responsible, and efficient manner. This comprehension and experience proves useful for all creative disciplines, and participants are certified for future fabrication equipment access.

70-416  
New Venture Creation  
Instructors:  
D. Mawhinney  
Meetings:  
M 6:30 - 9:20 p.m.  
Units:  
9  
Prerequisites:  
70-421 or 70-420 or 15-390 or 70-415 or 70-414  
Primary IDeATe Area:  
Entrepreneurship for Creative Industries  
Location:  
PH 226A

This course exposes students to the nuances of financing new ventures, getting them started legally and marketing their products or services. Students pull together all the ideas and information from different functional aspects of their projects into coherent and persuasive mini-business plans that serve as roadmaps for building their businesses; and useful instruments to find sufficient financing for the new ventures, so that they can convince the outside world that these opportunities are viable, with substantial potential for success. Prerequisite: 70-414 or 70-415 or 70-420 or 70-421 or 15-390

70-425  
Entrepreneurship for Creative Industries  
Instructors:  
T. Cunningham  
Meetings:  
TR 9:00 - 10:20 a.m.  
Units:  
9  
Prerequisites:  
None  
Primary IDeATe Area:  
Entrepreneurship for Creative Industries  
Location:  
BH 235B

This is an introductory course designed primarily for undergraduates in the College of Fine Arts who want to create new businesses, products, services, or thriving careers as independent artists. Students can expect to develop an entrepreneurial mindset, learn how creative firms and industries are structured, and build practical skills for finding, evaluating and putting entrepreneurial opportunities into action. We will analyze real world examples, for-profit and not-for-profit, from film, art, architecture, fashion, music, media, theater, retail, and design. The class will explore the core functional areas critical to building entrepreneurial entities, including teams, ideation, marketing and sales, financial analysis, and funding. Interdisciplinary teams will generate ideas and explore their potential as viable businesses or sustainable not-for-profits. Lectures, guest speakers, case studies, and exercises will also be integrated. There are no prerequisites.
| 73-100 Priniciples of Economics |
| Instructors: Multiple |
| Meetings: Multiple |
| Units: 9 |
| Prerequisites: None |
| Primary IDeAte Area: Entrepreneurship for Creative Industries |
| Location: Multiple |

Literally, an introduction to economic principles, the goal of this course is to give students an understanding as to what constitutes good "economic thinking". This thought process is grounded in the construction and use of economics models. Drawing on issues in both microeconomics and macroeconomics, fundamental principles are shown to transcend particular examples and allow the field to be seen as a coherent, unified whole. (Lecture, 2 hours; Recitation, 1 hour).