**Portal Courses**

These are the cross-training courses that serve as prerequisites for many of the IDeATe collaborative courses. Students should take a portal course in the fall semester of the sophomore or junior year.

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
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<tbody>
<tr>
<td>15-104</td>
<td>Introduction to Computing for Creative Practice</td>
</tr>
<tr>
<td>Instructor</td>
<td>R. Dannenberg, G. Levin</td>
</tr>
</tbody>
</table>
| Meetings | Section 1: MWF 12:30 - 1:20 p.m. (labs on Tuesdays, 10:30 - 11:50 a.m., 1:30 - 2:50 p.m., and 3:30 - 4:20 p.m. )
| | Section 2: TR 8:30 - 11:20 a.m. (lab on Tuesdays, 12:00 - 1:20 p.m.) |
| Units | 10 |
| Prerequisites | None |
| Primary IDeATe Areas | Game Design, Animation & Special Effects, Media Design, Learning Media, Sound Design, Entrepreneurship for Creative Industries |
| Location | Various |
| Note | For students from DC, CFA, TSB |

An introduction to fundamental computing principles and programming techniques for creative cultural practices, with special consideration to applications in music, design and the visual arts. Intended for students with little to no prior programming experience, the course develops skills and understanding of text-based programming in a procedural style, including idioms of sequencing, selection, iteration, and recursion. Topics include data organization (arrays, files, trees), interfaces and abstraction (modular software design, using sensor data and software libraries), basic algorithms (searching and sorting), and computational principles (randomness, concurrency, complexity). Intended for students following an IDeATe concentration or minor who have not taken 15-110 or 15-112.
Introduction to Physical Computing

Instructor: G. Zeglin
Meetings: MW 8:30 - 10:20 a.m.
Units: 10
Prerequisites: None
Primary IDeATe Area: Intelligent Environments, Physical Computing
Location: HL A10 (IDeATe@Hunt Physical Computing Lab)
Notes: 
- For students from DC, CFA, TSB
- There will be lab usage and materials fees associated with this course

Physical computing refers to the design and construction of physical systems that use a mix of software and hardware to sense and respond to the surrounding world. Such systems blend digital and physical processes into toys and gadgets, kinetic sculpture, functional sensing and assessment tools, mobile instruments, interactive wearables, and more. This is a project-based course that deals with all aspects of conceiving, designing and developing projects with physical computing: the application, the artifact, the computer-aided design environment, and the physical prototyping facilities. The course is organized around a series of practical hands-on exercises which introduce the fundamentals of circuits, embedded programming, sensor signal processing, simple mechanisms, actuation, and time-based behavior. The key objective is gaining an intuitive understanding of how information and energy move between the physical, electronic, and computational domains to create a desired behavior. The exercises provide building blocks for collaborative projects which utilize the essential skills and challenge students to not only consider how to make things, but also for whom we design, and why the making is worthwhile.

This course is an IDeATe Portal Course for entry into either of the IDeATe Intelligent Environments or Physical Computing programs. CFA/DC/TSB students can enroll under 16-223; CIT/MCS/SCS students can enroll in the 60-223 version of the course. Please note that there will be lab usage and materials fees associated with this course.

Upon completion of this course the students will be able to:

- work in a mixed physical-digital environment and laboratory
- make effective use of standard hardware and software tools for physical computing
- approach complex physical computing problems with a systematic overview that integrates iterative research and design steps
- 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 development tools for design, fabrication and testing and debugging
- evaluate the system in the context of an end user application or experience.

Digital Media Interactions: Signal Processing for the Arts

Instructor: J. Stiles
Meetings: MW 9:00 - 10:50 a.m.
Units: 10
Prerequisites: None
Primary IDeATe Area: Sound Design, Entrepreneurship for Creative Industries, Intelligent Environments
Location: HL 106B (IDeATe@Hunt Studio A)
Notes: 
- For students from DC, CFA, TPR
- There will be a lab usage fee associated with this course

This course presents an overview on manipulating and synthesizing sound, video, and control signals. Signals are the raw materials used in many forms of electronic art and design - electronic music, interactive art, video art, kinetic sculpture, and more. In these fields, signals are used to represent information about sound, images, sensors, and movement. By transforming and manipulating these types of signals, we are able to create powerful new tools for digital art, multimedia applications, music, responsive environments, video and sound installation, smart products, and beyond. In this course we will study Signal Processing from a
practical point-of-view, developing tools that can be easily integrated into art-making using the graphical
programming environment Max (a.k.a. Max/MSP/Jitter). We will present a survey of Signal Processing
techniques used in the sonic and visual arts, and will discuss the mathematical theories underlying these
techniques. Students will be encouraged to combine, modify, and extend working examples of software to
create original digital artworks. Please note that there will be usage/materials fees associated with this course.

Physical computing refers to the design and construction of physical systems that use a mix of
software and hardware in order to sense and respond to the surrounding world. Such systems include
digital+physical toys and gadgets, kinetic sculpture, functional sensing and assessment tools, mobile
instruments, interactive wearables, etc. This is a project-based course that deals with all aspects of conceiving,
designing and developing projects with physical computing: the application, the artifact, the computer-aided
design environment, and the physical prototyping facilities. The class consists of students from different
disciplines who collaboratively synthesize and implement several systems in a short period of time. The
course is organized around a large set of essential skills that students must gain in order to effectively tackle
physical computing problems. It is then deployed through a series of quick group projects that utilize the
essential skills and challenge students to not only consider HOW to make things, but also for WHOM we
design, WHEN the time is ripe, and WHY the making is worthwhile/necessary. Upon completion of this
course the students will be able to: work in a mixed physical-digital environment and laboratory make
effective use of standard hardware and software tools for physical computing approach complex physical
computing problems with a systematic overview that integrates iterative research and design steps 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 development
tools for design, fabrication and testing and debugging evaluate the system in the context of an end user
application or experience.

New creative industries are empowering new modes of collaborative consumption, creation and
reuse of media. This often relies on successful collaborations between cross-trained artists, designers and
technologists as well as critical reflection on distribution, participation, interaction and audience. This course
is designed to prepare engineers and scientists to work in these contexts. By the end of the course, students
will be able to think critically across several media theory paradigms; formulate the intent of their creative
work; articulate relationships to art/design practice and theory; and respond insightfully to creative outcomes. The goal is not just to make creative media rich outcomes but also to think critically about their production.

Organized as three related 7-week modules, all students will take ‘Critical Media Analysis’ and can then choose to focus on ‘Visual Synthesis’ or ‘Sound Synthesis.’ Modules will introduce core concepts through foundational texts, in-class exercises, collaborative projects, and group critique. Students will ground concepts such as critical design, computational performance, embodiment, emergence, composition, participatory interfaces, and media editing through hands-on, applied exploration. Weekly lab sessions will also support the development of new skills and practical development of digitally mediated content.
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>xx-xxx</th>
<th>Mobile App Design and Development</th>
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<tbody>
<tr>
<td>Instructors:</td>
<td>TBD</td>
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<td>Meetings:</td>
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<td>Units:</td>
<td>TBD</td>
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<tr>
<td>Prerequisites:</td>
<td>TBD</td>
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<tr>
<td>Primary IDeATe Area:</td>
<td>Media Design</td>
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<tr>
<td>Location:</td>
<td>TBD</td>
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<tr>
<td>Note:</td>
<td>There will be lab and/or materials usage fees associated with this course</td>
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</table>

For Fall 2015, IDeATe is partnering with YinzCam to develop and offer a studio course on mobile app design and development. The course will leverage the extensive expertise of YinzCam on mobile-app development in the sports and entertainment space, both for real-time and asynchronous enrichment of the fan experience and the stadium experience. However, the lessons learned will apply to mobile-app development broadly. Issues covered will include cross-platform development, mobile video, streaming media, real-time content delivery, along with best practices in server-side cloud management for large-scale mobile-app deployment.

<table>
<thead>
<tr>
<th>05-291</th>
<th>Learning Media Design</th>
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<tbody>
<tr>
<td>Instructors:</td>
<td>M. Louw</td>
</tr>
<tr>
<td>Meetings:</td>
<td>TR 9:30 - 10:50 a.m.</td>
</tr>
<tr>
<td>Units:</td>
<td>9</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>05-292</td>
</tr>
<tr>
<td>Primary IDeATe Area:</td>
<td>Learning Media</td>
</tr>
<tr>
<td>Location:</td>
<td>HL 106C (IDeATe@Hunt Studio B)</td>
</tr>
<tr>
<td>Note:</td>
<td>There will be a lab usage fee associated with this course</td>
</tr>
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</table>

Learning is a complex human phenomenon with cognitive, social and personal dimensions that need to be accounted for in the design of technology enhanced learning experiences. In this studio course students will apply learning science concepts to critique existing forms of learning media, establish a set of design precedents to guide project work and produce a series of design concepts that support learning interactions in a real-world context. Collaborating in small interdisciplinary teams, students will partner with a local informal learning organization (e.g. museum, after school program provider, maker space) to conduct learning design research studies, synthesize findings, establish learning goals and iteratively prototype and assess design concepts. As final deliverables, students will present their design research findings, design concepts, and prototypes to stakeholders, and draft a media-rich proposal for their learning media concept to pitch to a local funder.
Environmental factors have a significant impact on mood and productivity. Creating responsive environments necessitates the design of surroundings that are able to metamorphose in order to optimize user strengths and available resources and evolve in stride with user needs.

This course will investigate the development of spaces that adapt to user preferences, moods, and task specific demands. Both the design and engineering of such personalized environments will be explored. Central course concepts will include, understanding the user, integrating various modalities (e.g., light, heat, sound) to support the changing needs of task and user, and the creation of adaptive environments that learn user preferences over time.
and robotics (Pyry Matikainen), and indoor flying robots (Manuela Veloso and Nina Barbuto). This course is presented with the support and cooperation of Autodesk, Inc. Fall 2015 course website: http://www.rc16456.com/

16-461 Experimental Capture
Instructor: Y. Sheikh
Meetings: MW 1:30 - 2:50 p.m.
Units: 9
Prerequisites: 15-365 or 60-422
Primary IDeATe Area: Animation & Special Effects
Location: HL A10A (IDeATe@Hunt Integrative Media Lab)
Note: There will be a lab usage fee associated with this course

Performance capture is used in applications as varied as special effects in movies, animation, sports training, physical rehabilitation, and human-robot/human-computer interaction. This course will survey state-of-the-art techniques, in the industry and in academia, to capture, model, and render human motion. The course will be a mix between lectures and discussion of recent progress in human motion capture and analysis. The course evaluation will be project-based, in which students will capture their own body and face motion, and build projects around the data they collect individually and as a group. We will cover:

- Capture Techniques: We will describe and use various systems including motion capture, video-based capture, depth sensors, scanners, and eye-gaze trackers.
- Modeling and Representation: We will cover classic and contemporary representations of face and body pose and motion, including statistical and physics-based techniques.
- Rendering Applications: As human motion analysis becomes increasingly mature, new applications are emerging. We will study recent progress in animation, synthesis, classification, and rehabilitation.

49-300 Integrative Product Conceptualization
Instructors: TBA
Meetings: TR 1:30 - 4:20 p.m.
Units: 12
Prerequisites: 15-104 or 16-223 or 18-090 or 62-150
Primary IDeATe Area: Entrepreneurship for Creative Industries
Location: HL 106B (IDeATe@Hunt Studio A)
Note: There will be a lab usage fee associated with this course

The IPC course focuses on introducing students to some of the thinking, basic skills and methods used by industrial design, engineering, and business to generate new consumer product proposals within integrated teams. Teams will progress through three phases 1) identifying opportunities for new products or services, 2) understanding those opportunities through stakeholder research, value opportunity analysis, and competitive landscape assessment, then selecting one of which to focus, 3) conceptualizing the opportunity with the goal of meeting the value proposition. This course will combine lecture, and studio activities including the generation of 2D visual representation skills and 3D low-fidelity physical modeling in support of course work.
Research Issues in Game Development

Instructors: T. Corbett
Meetings: MWF 10:30 - 11:50 a.m.
Units: 10
Prerequisites: 15-104 or 16-223 or 18-090 or 60-223 or 62-150
Primary IDeATe Area: Game Design
Location: HL 106C (IDeATe@Hunt Studio B)
Note: There will be a lab usage fee associated with this course

This course covers evolving trends in technology and how they can apply to game design. Recent advancements in virtual reality, augmented reality, cloud computing, 4K video streaming, and alternative input devices are changing the way that we create, deliver, and experience games. Students will form collaborative teams to explore these platforms and address design challenges by creating games for them and testing their designs.

Expanded Theater Fusion Studio

Instructors: A. Momeni, L. Shea
Meetings: TR 10:30 a.m. - 12:20 p.m.
F 10:00 a.m. - 1:50 p.m.
Units: 10
Prerequisites: Permission of instructors
Primary IDeATe Areas: Intelligent Environments, Media Design
Location: HLA10A (IDeATe@Hunt Integrative Media Lab)
Note: There will be a lab usage fee associated with this course

As the boundaries between theater, art, entertainment and everyday life continue to expand through engagement with new technologies, it is critical that emerging artists and technologists be provided with the tools, language, and vision to thrive in the new millennium. As part of Carnegie Mellon’s Integrated Media Program based in Pittsburgh and New York City, Expanded Theater will reanimate classical modes of performance with media, networks, robotics, locative applications, mobile systems.

Considering theater as an ancient technology of mass participation and social cohesion, this fusion studio explores how emerging technologies can expand upon the basic theatrical relationships in new and culturally relevant ways. Collaboration and integration of design, media and storytelling is critical to this approach. Experimentation with new forms can reanimate the basic values of theater; the essential nature of a live event, the possibility of visionary spectacle, and the creation of meaning in dialogue with an audience.

By providing a true laboratory environment with access to advanced computational, fabrication and production resources, Expanded Theater brings students, faculty and researchers from across diverse disciplines into collaborative research and production that explore how technology and narrative intersect in the cultural sphere. Expanded Theater leverages a wide range of networks and venues in New York City to push projects from proof of concept into real-world applications that generate meaning and impact culture.

Expanded Theater is an opportunity to explore avenues outside of traditional theatrical production modes and beyond each student’s individual discipline. The curriculum combines resources from Carnegie Mellon’s Schools of Art and Drama, Integrative Design, Arts, and Technology (IDeATe), the Emerging Media Masters (EM2), Computer Science, the Robotics Institute, and their collaborators across the university in a new configuration. Expanded Theater will explore domains ranging from site specific and networked-based performance and interventionist practices, to pervasive social media technologies and their influence on interpersonal communication. The goal is to investigate contemporary languages that allow authors, actors and technologists to collaborate in ways that push beyond our present understanding of theatrical production and reception.

Expanded Theater questions:
- How can social media evolve as a performance platform?
- How can we create new performance experiences that connect proscenium theater to public spaces?
• How can we lower the bar for creating experiences of expanded theater (by creating new instruments and methodologies), while raising the bar for what new performance with technology tries to achieve (beyond advertising, consumerism, spectacle)?

Expanded Theater theoretical approach:
• Re-imagining audiences as emancipated spectators, engaged citizens, co-creators.
• Re-imagining liveness in a radically interconnected digital world
• Spectacle and politics: The influence of entertainment technologies and industries on the relevance of theater in contemporary culture?

Expanded Theater technology:
• Design and fabrication of mobile and rapidly deployable performance instruments in real-world situations
• Mixed Realities and Immersive Environments, including virtual and augmented reality, installation art
• Actor-centric technologies including performance capture, gestural control and real-time generative audio and video

In this course we will perform a series of real-world experiments that examine new models for music creation, promotion, and distribution. We will produce original music videos, explore social media marketing & optimization, examine new platforms for monetization, and officially release digital albums and apps.

The proliferation of digital music distribution has revolutionized how music is experienced in the 21st century. Technologies for music listening, music sharing, and music discovery are in a state of rapid and limitless evolution. There is no longer a single model for a rewarding life in the world of music – we must learn to adapt to the constantly evolving landscape of the 21st century. We must hack the music world!

While examining new approaches to distribution and publication, we will also explore the question of how electronic media is redefining our understanding of music-making itself. Does a new album necessarily need to be a fixed set of sound recordings? What if it was a mobile app that reacts to the listener's environment? What if our new album used mutating algorithms to generate new musical experiences every time the listener hits play?

Throughout the semester we will form teams combining musicians, software programmers, artists, and entrepreneurs. Our teams will work together to produce new music, to design new music distribution methodologies, and to perform social media experiments that enhance the visibility of our work.

Students participating in the course should have proficiency in one or more of the following areas:
• Social Media Optimization
• Music Recording or Video Production
• Leveraging Web Application API's
• Mobile Application Design & Implementation
60-220  Technical Character Animation
Instructors:  S. Diaz
Meetings:  MW 3:00 – 4:20 p.m.
Units:  10
Prerequisites:  15-104 or 62-150
Primary IDeATe Area:  Animation & Special Effects
Location:  HL Far Cluster

With an emphasis on character animation, this course will explore the whole production pipeline of 3D Animation from initial concept to rendered result through the use of Maya. Through a series of technical assignments, in class demonstrations, and guest lectures from industry professionals, students will come to learn the basic principles of animation and work up to more advanced techniques. Some specific animation areas that will be covered include locomotion, pantomime/acting, dialogue, set driven keys, and blend shapes. Students will also learn more technical/advanced approaches to other production areas such as modeling, texturing, rigging, rendering/lighting, and layout.

62-478 A1/A2  digiTOOL
Instructors:  Z. Ali
Meetings:  MW 10:30 – 11:50 a.m.
Units:  6
Prerequisites:  None
Primary IDeATe Area:  Media Design, Physical Computing
Location:  HLA5

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.
**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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructors</th>
<th>Meetings</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Primary IDeATe Area</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>05-432</td>
<td>Personalized Online Learning</td>
<td>V. Aleven</td>
<td>MW 3:00 – 4:50 p.m.</td>
<td>12</td>
<td>Permission of instructor</td>
<td>Learning Media</td>
<td>GHC 4301</td>
</tr>
<tr>
<td>05-823</td>
<td>E-Learning Design Principles</td>
<td>K. Koedinger</td>
<td>TR 9:00 - 10:20 a.m.</td>
<td>12</td>
<td>Permission of instructor</td>
<td>Learning Media</td>
<td>GHC 5222</td>
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</tbody>
</table>

Online learning has become widespread (e.g., MOOCs, online and blended courses, and Khan Academy) and many claim it will revolutionize higher education and K-12. How can we make sure online learning is maximally effective? Learners differ along many dimensions and they change over time. Therefore, advanced learning technologies must adapt to learners to provide individualized learning experiences. This course covers a number of proven personalization techniques used in advanced learning technologies. One of the techniques is the use of cognitive modeling to personalize practice of complex cognitive skills in intelligent tutoring systems. This approach, developed at CMU, may well be the most significant application of cognitive science in education and is commercially successful. We will also survey newer techniques, such as personalizing based on student meta-cognition, affect, and motivation. Finally, we will look at personalization approaches that are widely believed to be effective but have not proven to be so. The course involves readings and discussion of different ways of personalizing instruction, with an emphasis on cognitive modeling approaches. Students will learn to use the Cognitive Tutor Authoring Tools (CTAT, http://ctat.pact.cs.cmu.edu) to implement tutor prototypes that rely on computer-executable models of human problem solving to personalize instruction. The course is meant for graduate or advanced undergraduate students in Human-Computer Interaction, Psychology, Computer Science, Design, or related fields, who are interested in educational applications. Students should either have some programming skills or experience in the cognitive psychology of human problem solving, or experience with instructional design.

This course is about e-learning design principles, the evidence and theory behind them, and how to apply these principles to develop effective educational technologies. It is organized around the book “e-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning” by Clark & Mayer with further readings drawn from cognitive science, educational psychology, and human-computer interaction. You will learn design principles 1) for combining words, audio, and graphics in multimedia instruction, 2) for combining examples, explanations, practice and feedback in online support for learning by doing, and 3) for balancing learner versus system control and supporting student metacognition. You will read about the experiments that support these design principles, see examples of how to design such experiments, and practice applying the principles in educational technology development.
15-294 A1/A2  Rapid Prototyping Technologies
Instructors:  D. Touretzky
Meetings:  MW 6:30 - 7:50 p.m.
Units:  5
Prerequisites:  15-112 or 15-104
Primary IDeATe Area:  Media Design, Physical Computing
Location:  HLA10 (IDeATe@Hunt Physical Computing Lab)

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.). Please note that there will be a usage/materials fee for this course.

15-463  Computational Photography
Instructor:  K. Kitani
Meetings:  MW 12:00 - 1:20 p.m.
Units:  12
Prerequisites:  15-213 AND 18-202 or 21-241
Primary IDeATe Area:  Animation & Special Effects
Location:  GHC 4303

Computational Photography is an emerging new field created by the convergence of computer graphics, computer vision and photography. Its role is to overcome the limitations of the traditional camera by using computational techniques to produce a richer, more vivid, perhaps more perceptually meaningful representation of our visual world. The aim of this advanced undergraduate course is to study ways in which samples from the real world (images and video) can be used to generate compelling computer graphics imagery. We will learn how to acquire, represent, and render scenes from digitized photographs. Several popular image-based algorithms will be presented, with an emphasis on using these techniques to build practical systems. This hands-on emphasis will be reflected in the programming assignments, in which students will have the opportunity to acquire their own images of indoor and outdoor scenes and develop the image analysis and synthesis tools needed to render and view the scenes on the computer.

15-466  Computer Game Programming
Instructor:  M. Likhachev
Meetings:  TR 3:00 - 4:20 p.m.
Units:  12
Prerequisites:  15-462 or Instructor Permission
Primary IDeATe Area:  Game Design
Location:  GHC 4215

The goal of the course is two-fold. The first goal is to teach students some of the higher-level techniques that are necessary to implement interesting computer games. In particular, a large emphasis will be on game AI. The class will also cover such topics as game networking, scheduling of tasks in computationally intensive games, and game design. The class will also briefly cover few selected topics such as collision detection and physically-based animation that are good to know even if one is developing games using a game engine. The second goal of the class is to get students familiar with programming games on various platforms using state-of-the-art game engines. To this end, the course will have a heavy programming focus. It will have a number of projects requiring students to apply the learned material to develop games using Unity 3D game engine. The students will develop games that run on a standalone PC, games that run on an Android platform and games that work in a multi-user mode. In addition to learning the material and learning how to use game
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.

Role playing games, mainly traditional pencil-and-paper, but recently to an extent, video RPGs as well, have matured over the last 40 years into a viable medium for modern storytelling. There is now a generation of novelists, screenwriters, playwrights and TV writers who first felt capable of telling a good story while they were an RPG games master. The course instructor is one of those writers, having won three Game of the Year awards for his RPG writing. Primarily for writers looking to work in games, this class also serves anyone interested in creating interactive stories. Additionally, more traditional linear writers who want to try their hand at “new media” will find a home in this class. The class will first examine and dissect existing RPGs (mainly using pencil and paper examples) seeking guidance for both design of RPGs as well as storytelling “best practices.” Once the groundwork has been laid, the class will take an original draft story for an existing RPG world -- one from a game that was actually built -- and, having been given only the treatment document, form writing teams and 'flesh out' the story, transforming a hazy idea into form and substance, beats, missions, dialogue, Acts. Each student will be part of a three-person writing team which will first pitch a story idea for their own expanded version of the original story. Once their idea is approved, the team then design out a complete structure for that idea, followed by beat sheets, supporting characters, mission arcs, scene breakdowns, dialogue for some interactive scenes and also scripts for a single cut scene. By the end of the semester the students are delivering the backbone of their own story.
Students explore the unique qualities of audio as a design element and the development of a design process through script analysis. Emphasis on the creative application and utilization of the studio in sound shaping and soundscape design. PREREQUISITE: 54-166 Introduction to Sound Design for Theater, 54-231 Design For The Stage. Drama majors have priority, however this course is also open to Music Technology majors and minors, or with permission of instructor.

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.

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.

An introduction to three-dimensional form. Various materials and methods are explored through projects covering a broad range of sculptural concerns. Art majors must complete one Mini-1 course and one Mini-2 course to satisfy the 3DI requirement. Students are required to select two of the following four sections: The Structural Imagination (Wood and Steel); Clay Sculpture; Wearables; and Hey Robot, Let’s
Make Something. Materials fee may be required. Open to freshmen in the School of Art, or by instructor permission.

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<tr>
<th>Course</th>
<th>Title</th>
<th>Instructors</th>
<th>Meetings</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Primary IDeATe Area</th>
<th>Location</th>
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<tbody>
<tr>
<td>60-210</td>
<td>Electronic Media Studio: Introduction to Interactivity</td>
<td></td>
<td>Section A: TBA</td>
<td>10</td>
<td>Permission of instructor</td>
<td>Media Design</td>
<td>CFA 318</td>
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<td>Section B: P. Pedercini</td>
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<td>Section A: MW 1:30 – 4:20 p.m.</td>
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<td>Section B: MW 6:30 – 9:20 p.m.</td>
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<td>60-419</td>
<td>Advanced ETB: Experimental Game Design</td>
<td>P. Pedercini</td>
<td>MW 1:30 – 4:20 p.m.</td>
<td>10</td>
<td>60-210</td>
<td>Game Design</td>
<td>CFA 303</td>
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<tr>
<td>70-415</td>
<td>Introduction to Entrepreneurship</td>
<td>H. Jones</td>
<td>TR 1:30 – 2:50 p.m.</td>
<td>9</td>
<td>None</td>
<td>Entrepreneurship for Creative Industries</td>
<td>HH B103</td>
</tr>
</tbody>
</table>

Electronic Media Studio: Introduction to Interactivity is an introduction to software programming and physical computing within the context of the arts. In this course students develop the skills and confidence to produce interactive artworks using audiovisual, networked and tangible media.

Experimental Game Design - Critical Games. A practical and theoretical game design course focused on innovative forms of gameplay. In this installment of Experimental Game Design the emphasis is placed on critical games: self-reflexive, subversive, inquiring, genre-bending artifacts that aim to interrogate gaming culture and the nature of play. Activities include analog and digital design exercises, frontal lectures, readings and in-depth analysis of works from the digital arts and the independent gaming world.

This course is designed primarily to provide an overview of entrepreneurship, develop an entrepreneurial frame of mind and learn the rudiments of how to differentiate an idea from an opportunity. Students come up with a business idea and explore its potential for becoming a viable business. They learn to do market research and experience first-hand the rewards and difficulties in dealing with people in the real world. They will meet entrepreneurs and business professionals as part of the course and learn how to make effective presentations - both written and oral. Other important aspects of the course include self-assessment to determine one's strengths and weaknesses, understanding the “magic” of leadership and gaining an entrepreneurial perspective on life.
73-100  Principles 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).