

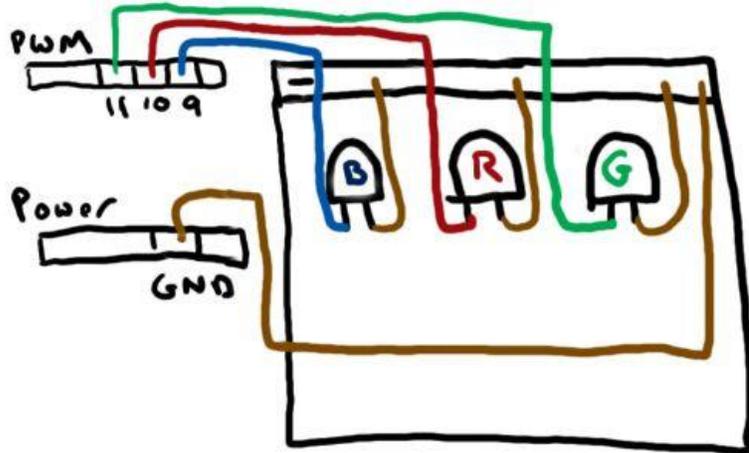
Course Syllabus

IP 295 – Introduction to Humanities Physical Computing

Section 001

FALL 2011

3 Credit Hours



Course Description

Building is, for us, a new kind of hermeneutic — one that is quite a bit more radical than taking the traditional methods of humanistic inquiry and applying them to digital objects. Media studies, game studies, critical code studies, and various other disciplines have brought wonderful new things to humanistic study, but I will say (at my peril) that none of these represent as radical a shift as the move from reading to making.

– Stephen Ramsay, —On Building”

It’s time to bridge the gap between the physical and the virtual—time to use more than just your fingers to interact with your computer. Step outside of the confines of the basic computer and into the broader world of computing.

-- Tom Igoe, *Physical Computing*

This course will introduce students to humanities physical computing, which is a growing sub-field of Digital Humanities. With the introduction of inexpensive electronics equipment, such as the Arduino prototyping platform, a growing number of digital humanists are taking a turn toward the physical. The reason is that physical computing offers digital humanists opportunities to move beyond the usual forms of I/O (i.e., keyboard, mouse, and screen) as well as the opportunity to expand their creative thoughts beyond desktop computing. In this course, creativity and invention will be emphasized. Learning how to work productively and creatively in computational new media will contribute to deeper engagements with language, writing, and textuality .

The Arduino UNO electronics prototyping platform and the Processing programming language will be the basis for the 5 projects developed in this course. Both of these technologies were explicitly designed to introduce non-programmers and -engineers to the possibilities of computational media production. Moreover, they are open-source and inexpensive.

Course Structure

The course structure is based on three types of activities for learning: 1) readings that represent the distinct approaches to language, writing, and textuality in the humanities and computer science/electrical engineering; 2) blog posts and a final reflection paper, which will help reinforce the concepts and approaches described in the readings, and 3) hands-on work developing technical projects, so students confidence and understanding working in computational media. Most weeks represent both theory and practice: Mondays are usually days during which one or more readings will be discussed; Wednesdays are for in-class work on computing projects.

Instructors

David M Rieder (dmrieder) - *Instructor*

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Office Hours: Tba

Kevin Brock (kmbrock) - *Teaching Assistant*

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Office Location: Ricks Hall Addition

Office Hours: Tba

Course Meetings

Lecture

Days: MW

Time: 4:30pm - 5:45pm

Campus: Main

Location: 1911 Building, room 110

This meeting is required.

Course Materials

Textbooks

Getting Started with Arduino - *Massimo Banzi*

Edition: 1st

ISBN: 0596155514

Web Link: <http://oreilly.com/catalog/9780596155520>

Cost: \$10.50

This textbook is required.

Getting Started with Processing - *Casey Reas and Ben Fry*

Edition: 1st

ISBN: 144937980X

Web Link: <http://oreilly.com/catalog/0636920000570/>

Cost: \$13.50

This textbook is required.

The New Media Reader – Noah Wardrip-Fruin and Nick Montfort

Edition: 1st

ISBN: 0262232278

Web Link: <http://mitpress.mit.edu/catalog/item/default.asp?tid=9604&ttype=2>

Cost: \$33.66

This textbook is required.

Expenses

None.

Materials

Adafruit ARDX - v1.3 Experimentation Kit for Arduino (Uno) - \$85

This material is required.

Requisites and Restrictions

Prerequisites

None.

Co-requisites

None.

Restrictions

None.

General Education Program (GEP) Information

GEP Category

Interdisciplinary Perspectives

Objectives:

Each course in Interdisciplinary Perspectives will provide instruction and guidance that help students to:

1. Distinguish between the distinct approaches of two or more disciplines; and
2. Identify and apply authentic connections between two or more disciplines; and
3. Explore and synthesize the approaches or views of the two or more disciplines.

GEP Category Outcomes

- Students will learn to distinguish the ways in which language, writing, and textuality are valued and practiced in by humanists and engineers programming. Specifically, they will be able to distinguish between qualitative and quantitative approaches as well as how the media in which a scholar or practitioner works introduces differences in the values and definitions of language, writing, and textuality. [objective 1]

- Students will know about a century-long tradition of experimental practices in the humanities that is background and precedent for the growing field of the digital humanities and the more recent turn toward the physical. [objective 1]

- Hands-on computing projects and readings will demonstrate how to identify and apply authentic connections among the humanities, computer science, and engineering. [objective 2]

- Students will learn how to explore and synthesize the approaches or views of the "two cultures," the (qualitative) humanities and the (quantitative) sciences in order to recognize the importance of interdisciplinarity in fields like digital humanities and humanities physical computing. [objective 3]

- Students will understand how language, writing, and textuality are transformed by computing environments as well as about some of the new opportunities for humanities-based creativity in computational media. [objective 3]

- Students will gain confidence and enough technical knowledge to invent and plan small-scale, humanities-based projects in Arduino- and Processing-based programming environments.

How This Course Will Fulfill GEP Category Outcomes

Each outcome will be met by offering both theoretical and practical/technical approaches to the subject. A combination of readings and hands-on computing projects will offer students numerous opportunities to recognize the distinctions in approach and how the distinct approaches are combining in the burgeoning interdisciplinary field of humanities physical computing.

Which disciplines will be synthesized, connected, and/or considered in this course?

The technical fields of Computer Science and (Electrical) Engineering will be connected to the humanities-based fields of experimental writing and rhetoric.

How will the instructor present the material so that these disciplines are addressed in a way that allows the students "to integrate the multiple points of view into a cohesive understanding"?

Lectures, readings, in-class discussions, a blog, and hands-on technical work with Arduino and Processing will enable students to integrate the multiple points of view into a cohesive understanding. Also, TA with experience in with the topics and activities in the course will be available for both in-class and out-of-class support.

GEP Co-requisites

This course does not fulfill a General Education Program co-requisite.

Transportation

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

Safety & Risk Assumptions

None.

Grading**Grade Components**

Component	Weight	Details
Project 1: Hello, Worlds!	10%	Comprised of three "Hello, World" projects that will introduce to students to the basics of 1) the Arduino, 2) Processing, and 3) sensor-based interaction from the Arduino to a Processing sketch through a serial port.
Project2: "Literate" Particle System	10%	A two-stage project that will introduce students to a novel form of based on user interactions with a particle system. The first stage will focus on Processing and mouse-driven interactions. The second will focus on use two potentiometers on an Arduino breadboard to interact with the same Processing script.
Project 3: Networked Lamp and Web 2.0	15%	A two-stage project that will introduce students to a novel form of visualizing social media writing. The first stage will demonstrate the uses of Processing to visualize twitter feeds . The visualizations will be based on basic forms of textual analysis. The second process will demonstrate how to output the data on which the visualizations are based to a series of LCDs comprising a desk lamp.
Project 4: Inventing a Physical Interface	15%	The Processing sketch for this project will be provided, so this is a one-stage project. The goal is to introduce students to using Arduino...
Project 5: Final project and paper	30%	Working in small, collaborative groups the final physical computing project will be an opportunity for students to explore some of the tenets of humanities-driven perspectives on language, writing, and textuality—as well as to recognize the ways in which computer-based approaches. In addition to the collaboratively-developed project, each student will write a 5-7 page reflection paper about the ways in which computer- and humanities-based approaches to language, writing, and textuality are both interrelated and transformed by each other.
Blog posts	20%	Students will respond to the assigned readings and to other students' posts throughout the semester. One of the goals of these posts is to write about the differences in approach to language, writing, and textuality introduced by their project work. They will be required to write a total of 10 posts.

Letter Grades

This Course uses Standard NCSU Letter Grading:

97	≤	A+	≤	100
93	≤	A	<	97
90	≤	A-	<	93
87	≤	B+	<	90
83	≤	B	<	87
80	≤	B-	<	83
77	≤	C+	<	80
73	≤	C	<	77
70	≤	C-	<	73
67	≤	D+	<	70
63	≤	D	<	67
60	≤	D-	<	63
0	≤	F	<	60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.15.php.

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.5.php.

Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at http://www.ncsu.edu/policies/academic_affairs/grades_undergrad/REG02.50.3.php.

Late Assignments

For each class period after the due date, a half-letter grade will be deducted.

Attendance Policy

Attendance

Attendance is mandatory. You are allowed to miss 3 class periods without penalty. After your third absence, 5 points will be deducted from your final course grade for each unexcused absence.

Absences

Excused absences must be properly documented in accordance with university policies. See the attendance policy for the rules concerning unexcused absences.

Makeup Work

Makeup work will be determined by the instructor and the student.

Additional Excuses Policy

None.

Academic Integrity

Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at

http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php

Academic Honesty

See http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php for a detailed explanation of academic honesty.

Honor Pledge

Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

Electronically-Hosted Course Components

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

Electronically-hosted Components: Moodle course site (will be available in August 2011)

Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office (<http://www.ncsu.edu/dso>) located at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php.

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in

the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://www.ncsu.edu/policies/campus_environ or http://www.ncsu.edu/equal_op. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 515-3148.

Course Schedule

WEEK 1

Wed, Aug 17, 3:00pm - 4:15pm

Introductions

- Overview of the course
- Brief explanation of digital humanities, humanities physical computing, and differences between them
- The importance of overcoming the "two cultures" split between the humanities and the sciences
 - o In-class reading of excerpts from C.P. Snow's "The Two Cultures and the Scientific Revolution"

WEEK 2

Mon, Aug 22, 3:00pm - 4:15pm

In-class technical work [Project 1]:

- Introduction to the Arduino and Processing (and Wiring)
 - o Hands-on exercise writing a "Hello, World" sketch in Processing
 - o Hands-on exercise writing a "Hello, World" sketch in Wiring for the Arduino (blinking LED)
- READ Chapters 1 – 2 (pgs 1 – 15), *Getting Started with Processing*
- READ Chapter 1 and pgs 29 - 34, *Getting Started with Arduino*

Wed, Aug 24, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings about the critique of *logocentrism* and the ways in which humanities-affiliated writers, philosophers, and artists have endeavored to break free of it
- Introduction to electricity and magnetism
- READ Chapter 1 (pgs 1 – 7, Tom Igoe's *Physical Computing*)
- READ Chapter 5 (pgs 95 – 103), Dustyn Robert's *Making Things Move*

WEEK 3

Mon, Aug 29, 3:00pm - 4:15pm

In-class technical work [Project 1, cont]:

- "Hello, World' Back"
 - o Using a sensor connected to the Arduino to interact with a Processing sketch
- READ Chapters 2, 3, and pgs 35 - 41, *Getting Started with Arduino*
- READ Chapter 4 (pgs 49 - 51), Tom Igoe's *Physical Computing*

Wed, Aug 31, 3:00pm - 4:15pm

In-class reading/discussion day:

- The differences between languages of quality and quantity
 - o In-class reading of excerpts from Lancelot Hogben's chapter, "The Grammar of Size, Order, and Shape" in *Mathematics of the Million*.
- Readings about "post-representational" approaches to language, writing, and textuality in the humanities
- READ "Perspectives on New Media: Two Introductions" (pgs 3 - 28) and Chapters 7 - 8 (pgs 89 - 108), *The New Media Reader*

WEEK 4

Mon, Sept 5, 3:00pm - 4:15pm

NO CLASS

Wed, Sept 7, 3:00pm - 4:15pm

DUE: Project 1

In-class technical work [Project 2]:

- Mouse-driven, 2d drawing in a Processing Sketch
- READ Chapter 3 (pgs 15 - 36), *Getting Started with Processing*
- READ Chapter 5 (pgs 65 - 86), Tom Igoe's *Physical Computing*

WEEK 5

Mon, Sept 12, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings about "post-representational" approaches to language, writing, and textuality in the humanities
 - o The Oulipo
 - Mathematical explorations of language, literature, and poetry
- READ Chapter 12 (pgs 147 - 192), *The New Media Reader*

Wed, Sept 14, 3:00pm - 4:15pm

In-class technical work [Project 2, cont]:

- A "lettered" particle system in Processing
- READ Chapter 4 (pgs 37 – 50), *Getting Started with Processing*

WEEK 6

Mon, Sept 19, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings about "post-representational" approaches to language, writing, and textuality in the humanities
 - o Writing as a script for action
 - John Cage's 4'11 and its impact on conceptualist approaches to language, writing, and textuality
- READ Chapters 13 - 15 (pgs 193 - 230), *The New Media Reader*

Wed, Sept 21, 3:00pm - 4:15pm

In-class technical work [Project 2, cont]:

- Replacing mouse-driven interaction with two Arduino-driven potentiometers
- READ Chapter 8 (pgs 115 - 128), *Getting Started with Processing*
- READ 42 – 51, *Getting Started with Arduino*

WEEK 7

Mon, Sept 26, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings about "post-representational" approaches to language, writing, and textuality in the humanities
 - o Conceptualist approaches, cont.
- READ Chapters 10 – 11, 26 – 27 (pgs 127 – 146, 391 - 411), *The New Media Reader*

Wed, Sept 28, 3:00pm - 4:15pm

DUE: Project 2

In-class technical work [Project 3]:

- Visualizing a twitter feed in a Processing sketch
 - o How to connect to a twitter feed with Processing
- READ Chapter 6 (pgs 73 – 87), *Getting Started with Arduino*

WEEK 8

Mon, Oct 3, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings from engineers and computer scientists on topics of interest in humanists
 - o Excerpts from Vannevar Bush's "As We May Think"
- Readings about "post-representational" approaches to language, writing, and textuality in the humanities
 - o Post-structuralism and the rise of hypertext in the humanities
- READ Chapters 1 -2 (pgs 29 - 48), *The New Media Reader*

Wed, Oct 5, 3:00pm - 4:15pm

In-class technical work [Project 3, cont]:

- Extracting numerical data from the feed
- READ Chapter 4, 10 (pgs 37 – 50, 141 – 156), *Getting Started with Processing*

WEEK 9

Mon, Oct 10, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings about "post-representational" approaches to language, writing, and textuality in the humanities
 - o The fall of hypertext and the rise of cybertext
- READ Chapter 52 (pgs 761 - 780), *The New Media Reader*

Wed, Oct 12, 3:00pm - 4:15pm

In-class technical work [Project 3, cont]:

- Developing the visualization with LCDs in Arduino
- READ Chapter 5 (53 – 72), *Getting Started with Arduino*

WEEK 10

Mon, Oct 17, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings from engineers and computer scientists on topics of interest in humanists
 - o Donald Knuth's call for "literate programming"
- Readings about "post-representational" approaches to language, writing, and textuality in the humanities
 - o The rise of "codework" and "writing machines"
- READ Chapters 1 – 3 (pgs 1 - 45), N. Katherine Hayles' *Writing Machines*

- READ Excerpts from Donald Knuth's *Literate Programming*

Wed, Oct 19, 3:00pm - 4:15pm

DUE: Work to-date on Project 3

In-class technical work [Project 3, cont]:

- Completing the project with a novel "lamp"

WEEK 11

Mon, Oct 24, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings about "post-representational" approaches to language, writing, and textuality in the humanities:
 - o The turn to software studies and code studies in the humanities
- READ "Critical Code Studies" by Mark Marino

Wed, Oct 26, 3:00pm - 4:15pm

In-class technical work [Project 4, cont]:

- Developing a novel Arduino-driven object
 - o Focus on creativity and "thinking outside the box"
 - o Choosing an object based on audience and appeal
- READ Chapter 9 (255 - 278), Dustyn Robert's *Making Things Move*

WEEK 12

Mon, Oct 31, 3:00pm - 4:15pm

DUE: Project 3

In-class technical work [Project 4]:

- Developing a novel Arduino-driven object
 - o Embedding Arduino into your object

Wed, Nov 2, 3:00pm - 4:15pm

In-class reading/discussion day:

- Readings from engineers and computer scientists on topics of interest to humanists:
 - o Selections from archives of the *Humanistic Mathematics Networked Journal*

- http://www2.hmc.edu/www_common/hmnj/

WEEK 13

Mon, Nov 7, 3:00pm - 4:15pm

In-class technical work [Project 4, cont]:

- Continued work on project
- READ Chapter 11 (pgs 157 – 176), *Getting Started with Processing*

Wed, Nov 9, 3:00pm - 4:15pm

DUE: Project 4

- Presenting project 4 to the class
 - o Offer an explanation related to audience and appeal
- Introduction to Project 5

WEEK 14

Mon, Nov 14, 3:00pm - 4:15pm

DUE: Group proposals for Project 5 due

In-class reading/discussion day:

- Readings about “post-representational” approaches to language, writing, and textuality in the humanities
 - o The role of the visual and performance arts in the humanities
- READ Chapters 32 - 34 (pgs 471 - 514), *The New Media Reader*

Wed, Nov 16, 3:00pm - 4:15pm

In-class technical work [Project 5, cont]:

- Working on Project 5

WEEK 15

Mon, Nov 21, 3:00pm - 4:15pm

In-class technical work [Project 5, cont]:

- Working on Project 5
- READ Chapters 37 – 39 (pgs 551 - 586), *The New Media Reader*

Wed, Nov 23, 3:00pm - 4:15pm

NO CLASS: Thanksgiving Break

WEEK 16

Mon, Nov 28, 3:00pm - 4:15pm

In-class technical work [Project 5, cont]:

- Working on Project 5
 - o Presentation of progress to-date

Final Exam Period

Day/time TBA (schedule not available)

DUE: Final projects and essays due

In-class presentations and discussion of projects and value of humanities computing