New York University
Department of Media, Culture, and Communication

Critical Making
MCC-UE 1033

COURSE DESCRIPTION
Critical making is hands-on hardware practice as a form of reflection and analysis: a way of thinking through what (and how) computing and digital media mean by understanding how they work, building on the literature of media studies and the digital humanities. By turning from software to hardware, to the physicality of computation and communications infrastructure, we will take objects apart, literally and figuratively, and in the process will learn to interpret and to intervene -- using prototyping, reverse engineering, hardware hacking and circuit bending, design fiction, electronics fabrication and other approaches -- in the material layer of digital technologies.

LEARNING OUTCOMES
After completing this course, students will be able to effectively:

• Contextualize and evaluate particular digital technologies in a frame of both practical/material and theoretic/critical approaches.
• Produce electronic and computational systems and prototypes at a proof-of-concept level.
• Participate in current debates in critical and theoretical making and infrastructure.
• Conceptualize and produce, as individuals and in teams, objects that intervene in the space of politics, labor, economics or culture.

REQUIRED TEXTS
See Schedule, below, for readings. Readings will be uploaded via the NYU Classes page via PDF.

ASSIGNMENTS
Participation will be based on attendance, diligent reading, and active participation in all class activities. Students will be responsible for producing a “provocation project,” a critical hardware intervention done by individual students to critically reflect on one of the class themes, and a “final project,” done in teams to produce a more complex object to intervene in one of the areas discussed in class. Detailed instructions will be provided to students in class for these assignments.

Evaluation
Participation: 15%
Provocation Project: 35%
Final Project: 50%

Evaluation Rubric
A= Excellent
This project is comprehensive and detailed, integrating themes and concepts from discussions, lectures and readings, and reflecting critical and technical topics covered in class. Students who
earn this grade are prepared for class, synthesize course materials and contribute insightfully in every class meeting.

B=Good
This project meets the general requirements, offering contributions at a general level of understanding. Classroom participation is consistent and thoughtful in nearly all class meetings.

C=Average
This project is adequate but nothing more, meeting the minimum requirements but without significant original thought, reflection, or inventiveness, whether theoretically or practically. Classroom participation is inarticulate or infrequent.

D= Unsatisfactory
This project is incomplete, and evidences little understanding of the projects and discussions. Critique and implementation demonstrate inattention to detail, misunderstand course material and overlook significant themes. Classroom participation is spotty, unprepared and off topic, or rare.

F=Failed
This grade indicates a failure to participate and/or incomplete assignments

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\begin{align*}
B+ &= 87-89 \\
C+ &= 77-79 \\
D+ &= 65-69 \\
F &= 0-59 \\
A &= 94-100 \\
B &= 84-86 \\
C &= 74-76 \\
D &= 60-64 \\
A- &= 90-93 \\
B- &= 80-83 \\
C- &= 70-73
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**Course Policies**

Absences and Lateness
Attendance is mandatory. More than two unexcused absences will automatically result in a lower grade. Chronic lateness will also be reflected in your evaluation of participation. Regardless of the reason for your absence you will be responsible for any missed work.

Format
We will provide specific format requirements for the different project assignments. As for written work, please type and double-space submissions. Please also number and staple multiple pages. You are free to use your preferred citation style. Please use it consistently throughout your writing. If sending a document electronically, please name the file in the following format Yourlastname Coursenumber Assignment1.doc

Grade Appeals
Please allow two days to pass before you submit a grade appeal. This gives you time to reflect on our assessment. If you still want to appeal your grade, please submit a short but considered paragraph detailing your concerns. Based on this paragraph, we will review the question and either augment your grade or refine our explanation for the lost points.

General Decorum
Slipping in late or leaving early, sleeping, text messaging, surfing the Internet, doing homework, eating, etc. are distracting and disrespectful to all participants in the course.
Academic Dishonesty and Plagiarism (http://steinhardt.nyu.edu/policies/academic_integrity)
The relationship between students and faculty is the keystone of the educational experience at New York University in the Steinhardt School of Culture, Education, and Human Development. This relationship takes an honor code for granted and mutual trust, respect, and responsibility as foundational requirements. Thus, how you learn is as important as what you learn. A university education aims not only to produce high-quality scholars, but also cultivate honorable citizens.

Academic integrity is the guiding principle for all that you do, from taking exams to making oral presentations to writing term papers. It requires that you recognize and acknowledge information derived from others and take credit only for ideas and work that are yours.

You violate the principle of academic integrity when you
• cheat on an exam,
• submit the same work for two different courses without prior permission from your professors,
• receive help on a take home examination that calls for independent work, or
• plagiarize.

Plagiarism, one of the gravest forms of academic dishonesty in university life, whether intended or not, is academic fraud. In a community of scholars, whose members are teaching, learning, and discovering knowledge, plagiarism cannot be tolerated. Plagiarism is failure to properly assign authorship to a paper, a document, an oral presentation, a musical score, and/or other materials that are not your original work. You plagiarize when, without proper attribution, you do any of the following:
• copy verbatim from a book, an article, or other media;
• download documents from the Internet;
• purchase documents;
• report from other’s oral work;
• paraphrase or restate someone else’s facts, analysis, and/or conclusions; or
• copy directly from a classmate or allow a classmate to copy from you.

Your professors are responsible for helping you to understand other people’s ideas, to use resources and conscientiously acknowledge them, and to develop and clarify your own thinking. You should know what constitutes good and honest scholarship, style guide preferences, and formats for assignments for each of your courses. Consult your professors for help with problems related to fulfilling course assignments, including questions related to attribution of sources. Through reading, writing, and discussion, you will undoubtedly acquire ideas from others, and exchange ideas and opinions with others, including your classmates and professors. You will be expected, and often required, to build your own work on that of other people. In so doing, you are expected to credit those sources that have contributed to the development of your ideas.

Avoiding Academic Dishonesty
• Organize your time appropriately to avoid undue pressure, and acquire good study habits, including note taking.
• Learn proper forms of citation. Always check with your professors of record for their preferred style guides. Directly copied material must always be in quotes; paraphrased
material must be acknowledged; even ideas and organization derived from your own
previous work or another's work need to be acknowledged.
• Always proofread your finished work to be sure that quotation marks, footnotes and other
references were not inadvertently omitted. Know the source of each citation.
• Do not submit the same work for more than one class without first obtaining the
permission of both professors even if you believe that work you have already completed
satisfies the requirements of another assignment.
• Save your notes and drafts of your papers as evidence of your original work.

**Disciplinary Sanctions**
If a professor suspects cheating, plagiarism, or other forms of academic dishonesty, appropriate
disciplinary action may be taken following the department procedure or through referral to the
Committee on Student Discipline. The Steinhardt School Statement on Academic Integrity is
consistent with the NYU Policy on Student Conduct, published in the NYU Student Guide.

**Student Resources**
- Students with physical or learning disabilities are required to register with the Moses
Center for Students with Disabilities, 726 Broadway, 2nd Floor, (212-998-4980) and are
required to present a letter from the Center to the instructor at the start of the semester in
order to be considered for appropriate accommodation.
- Writing Center: 411 Lafayette, 4th Floor. Schedule appts at rich15.com/nyu/ or walk-in.
SCHEDULE OF CLASSES, READINGS AND ASSIGNMENTS

All class meetings will include both discussion of the readings and an in-class exercise, combined directly when possible.

Weeks 1-4: Thinking Through Making
An introduction to critical making, digital humanities, hardware literacy, and infrastructure studies, bridging from other classes (sound studies, visual culture, gaming, values in design).

Week 1: Introductions
Introduction to the course concepts and process; we all meet each other; overview of projects, readings, ideas and methodologies.

Week 2: Making and Thinking Hardware
Exercise Building a simple synthesizer using provided materials – introduction to circuit diagrams, waveforms, oscillators, the multimeter.

Week 3: Diegetic Prototyping and Critical Design Scenarios
Exercise Producing a design fiction prototype, in teams, using materials provided.

Week 4: Doing (and Questioning) Carpentry
Reading Bogost, Ian: Chapters 2 and 4, Alien Phenomenology (University of Minnesota Press, 2011), and Barad, Karen: “Posthumanist Performativity” (Signs, 2003).
Exercise Developing object critiques.

Weeks 5-8: The Big Teardown
The class votes on an object to spend four weeks exploring -- an object we'll actually take apart, as a group. The students break into teams to take on particular facets, depending on the object, with weekly presentations of the state of their research. For instance, if the object were an iPhone 5S, these teams and their responsibilities would include:

• The Raw Materials team would learn all about tantalum, bauxite/aluminum, fluoropolymer-coated glass, ceramics – how they're sourced, how they're extracted, how they're transformed
• The History team would assemble the historical context in which the iPhone exists: mobile telephony, PDAs, the Newton, Tricorders and other fictional precedents that inform the design language.
• The Spectrum team would understand all there is to know about the EMFs with which the phone's radio interacts: the regulations (FCC, EU, etc.), the tower handoffs, the Hertzian surround of 3G, 4G, LTE, the moral panics over cellular radiation
• The Architecture team would put the phone's processor on display: fab line production, FEOL and BEOL, investment, lifespan, memory, and the underlying business arrangements
• Other teams could include: Logistics; Design/Form-and-Fit; Sensors; OS and SDK, etc.

The readings will also change accordingly, though following some common themes expressed in the week subject titles regardless of the object chosen.

Week 5: “I Fight for the User”: The Politics of Hardware Access
Reading Silvanovich, Natalie: “Many Tamagotchis Were Harmed in the Making of this Presentation” and Tamagotchi ROM dump blog excerpts. Torrone, Phillip: “The Owner’s Manifesto.”

Week 6: Infrastructure as Material

Week 7: Understanding Logistics

Week 8: “Maker is Always Plural”: Communities of Hardware

Weeks 9-11: Assembling Things Together
Having delved into a single, specific object we now put it into steadily larger material contexts, using theory and practice as a lens: flows of materials, capital, and energy from the body to the planet.

Week 9: Affordances and Ergonomics: Making the Body
Exercise Prototyping critical prosthetics.

Week 10: Making the City
**Reading** McCollough, Malcolm: *Ambient Commons: Attention in the Age of Embodied Information* (MIT, 2013), excerpts.

**Exercise** Describe material/digital interventions for New York City that engage questions of access, control, public/private space, or the commons.

**Week 11: At Scale: Hyperobjects**


**Exercise** Making terminals for hyperobjects: Arduino development with network input.

**Weeks 12-14: Intensive Final Project Collaborations**

Student teams (or individuals, in some cases) present their in-progress projects in a series of circulating talks and demonstrations, with in-class feedback and production help from ourselves, other students, and guests (from ITP, other MCC faculty, etc.).

**Week 12: Collaborative Session I**

**Week 13: Collaborative Session II**

**Week 14: Final Presentations**