

Instructor: Katerie Gladdys **Email:** kgladdys@ufl.edu **Class Time:** M +W 11:45-2:45 **Classroom:** FAC306 **My Office:** FAC301 **Phone 273-3073** **Office Hours:** M 3-5:30 or app't

Topics

HCI, electronics, serial, parallel, Maker culture, microcontrollers, soldering, programming, Arduino, memory, variables, hex, decimal, binary, virtual, analog, performance and responsive objects, interactivity as dynamic, socially engaged, and collaborative processes, robots, aesthetics of interactive artifacts with respect to discourses in the visual arts, communications and performance, representation, visual language, link, rhizome, multiplicity, network, documentation, storage, performance, schematics, meters, components, input, output, memory, variables, serial communication, motors, analog and digital sensors, sound, data logging, breadboarding, circuit design, adaptation (in no particular order and this list is subject to change)

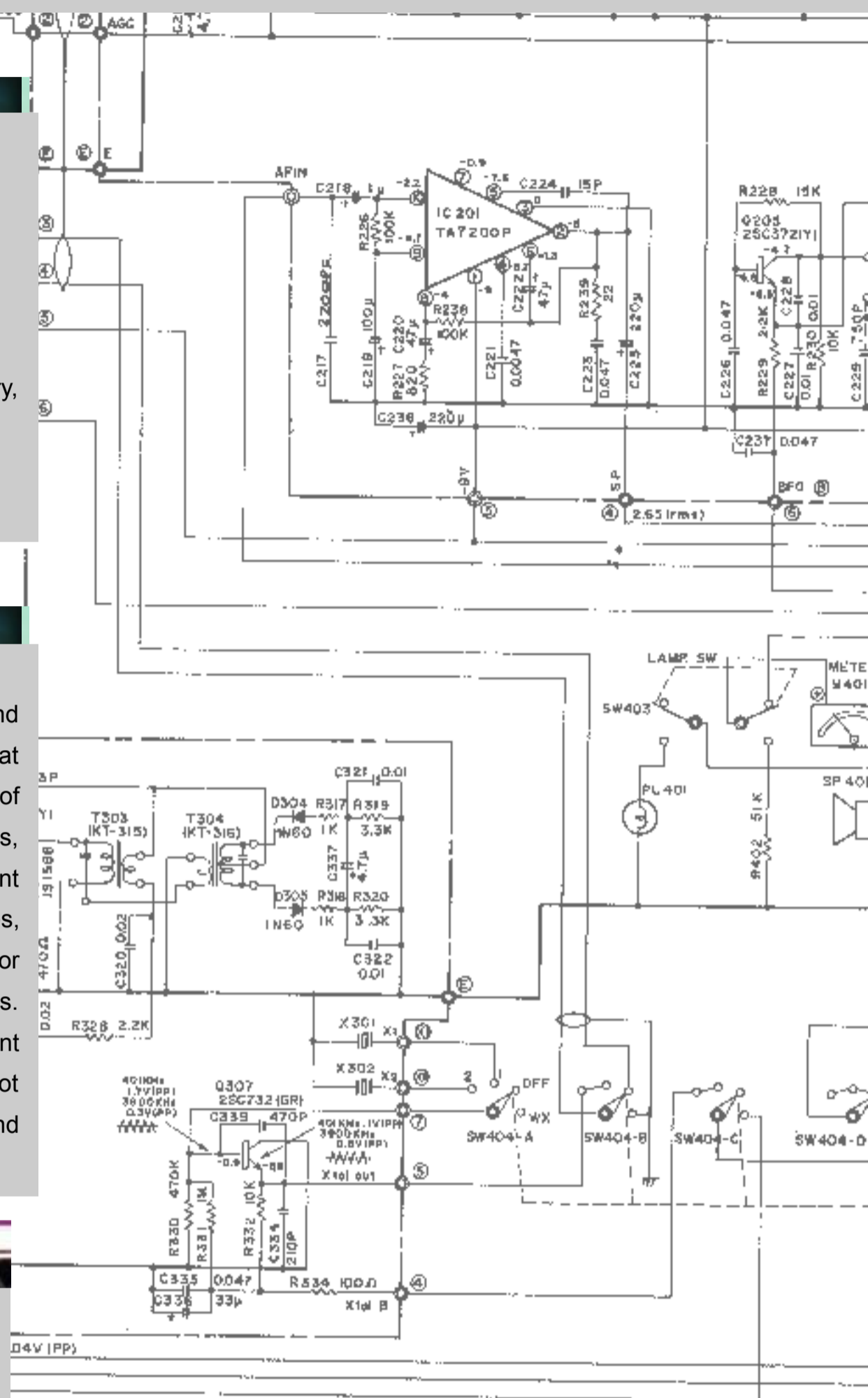
Course Description

Physical computing/HCI (Human Computer Interaction) explores how devices respond to and interact with human physical action. In this 3 credit class, students will create artwork that explores physical interfaces beyond mouse/keyboard/screen interactions through the use of microcontrollers and sensors. This course introduces students to basic electronics, microcontrollers and sensors. We will examine what works in terms of the conceptual content as well as how it works technically. Through readings, discussions, practical exercises, individual and collaborative projects, students will develop an articulate, theoretical basis for conceptualizing and discussing works presented in class as well as their own creative projects. Emphasis will be placed on the ways that the technology and interactivity relate to the content of the work. Physical computing takes a hands-on approach, which means that you spend a lot of time building circuits, soldering, writing programs, building structures to hold sensors and controls, and figuring out how best to make all of these things relate to a person's expression.

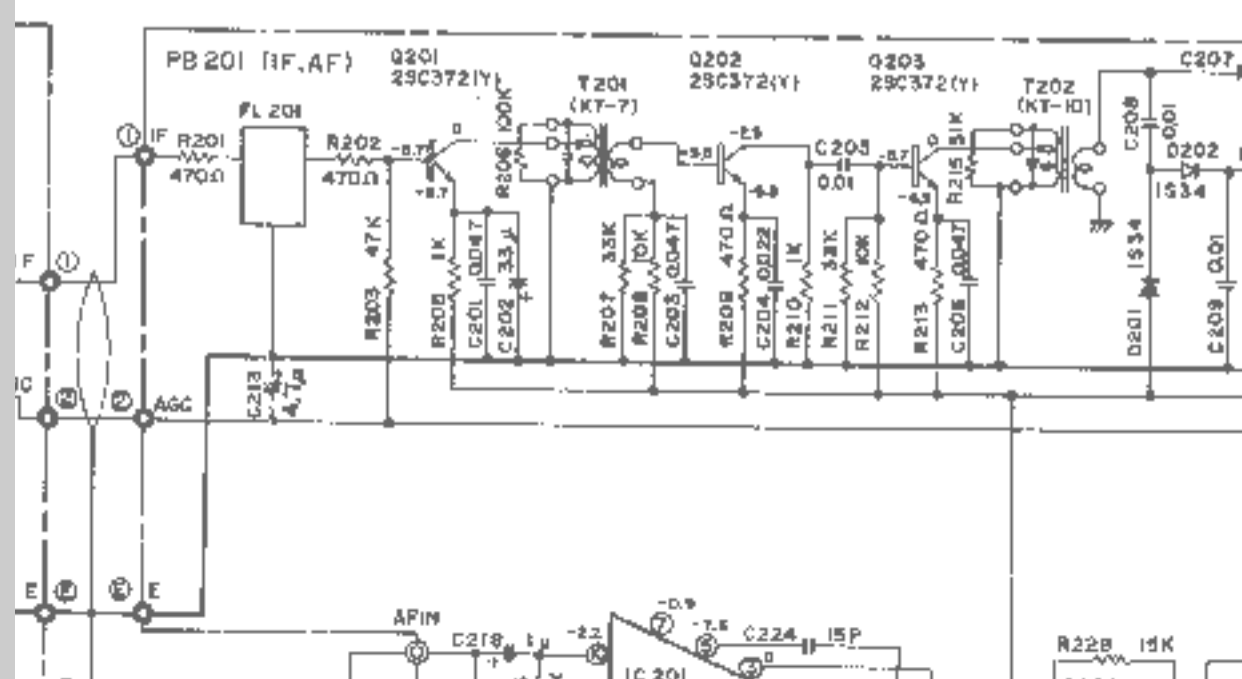
Objectives

Students will demonstrate understanding of the following principles and techniques through studio assignments:

- Explore recent and current trends in maker culture.
- Learn techniques of basic electronics
- Create art work that that explores interactions between humans and processes such as motion, mapping, sound, position, gesture recognition
- Learn to solder and wire
- Demonstrate skills in basic programming with Arduino and Processing to facilitate the interface between humans, objects, and sensors
- Integrate tools and concepts from science & technology into art making
- Articulate theoretical perspectives relevant to cultural experimentation with embodiment, physical computing, motion detection, gesture recognition, activated objects and alternative interfaces. advances



555A Schematic Diagram



Course Structure

- WEEKS 1-4 introduction to electronics, microcontrollers, digital input and output, serial output, memory and variables, analog input, analog output, a little sound
- WEEKS 5-8 digital output, motors, more sound, USB and serial communication, shift registers, coding
- WEEKS 9-12 buses, wireless communication, data logging, connecting to the internet?
- WEEKS 13-16 project development and critique

Materials

required texts

Exploring Arduino: Tools and Techniques for Engineering Wizardry by Jeremy Blum 2013 ISBN-1118549368

Manga Guide To Electricity by Kazuhiro Fujitaki and Matsuda 2012 ISBN-1593271972

recommended texts

Circuit Playground App by AdaFruit Industries

Beginning Arduino by Michael McRoberts 2013 ISBN 978-1430250166 This book is also can be accessed as an e-book from the UF library.

Getting Started in Electronics by Forrest Mims 2003 ISBN-0945053282

Getting Started with Arduino. Massimo Banzi. O'Reilly Media, 2008 ISBN 10: 0-596-15551-4 | ISBN 13: 9780596155513

Making Things Talk: Practical Methods for Connecting Physical Objects. Tom Igoe. Make Books, 2007.

Physical Computing: Sensing and Controlling the Physical World with Computers. Tom Igoe and Dan O'Sullivan. Course Technology PTR, 2004.)

Getting Started in Electronics. Forrest M. Mims III, ©1983, Forrest M. Mims III

The User Illusion: Cutting Consciousness Down to Size, Tor Nørretranders ©1998 Viking Press; ISBN: 0670875791

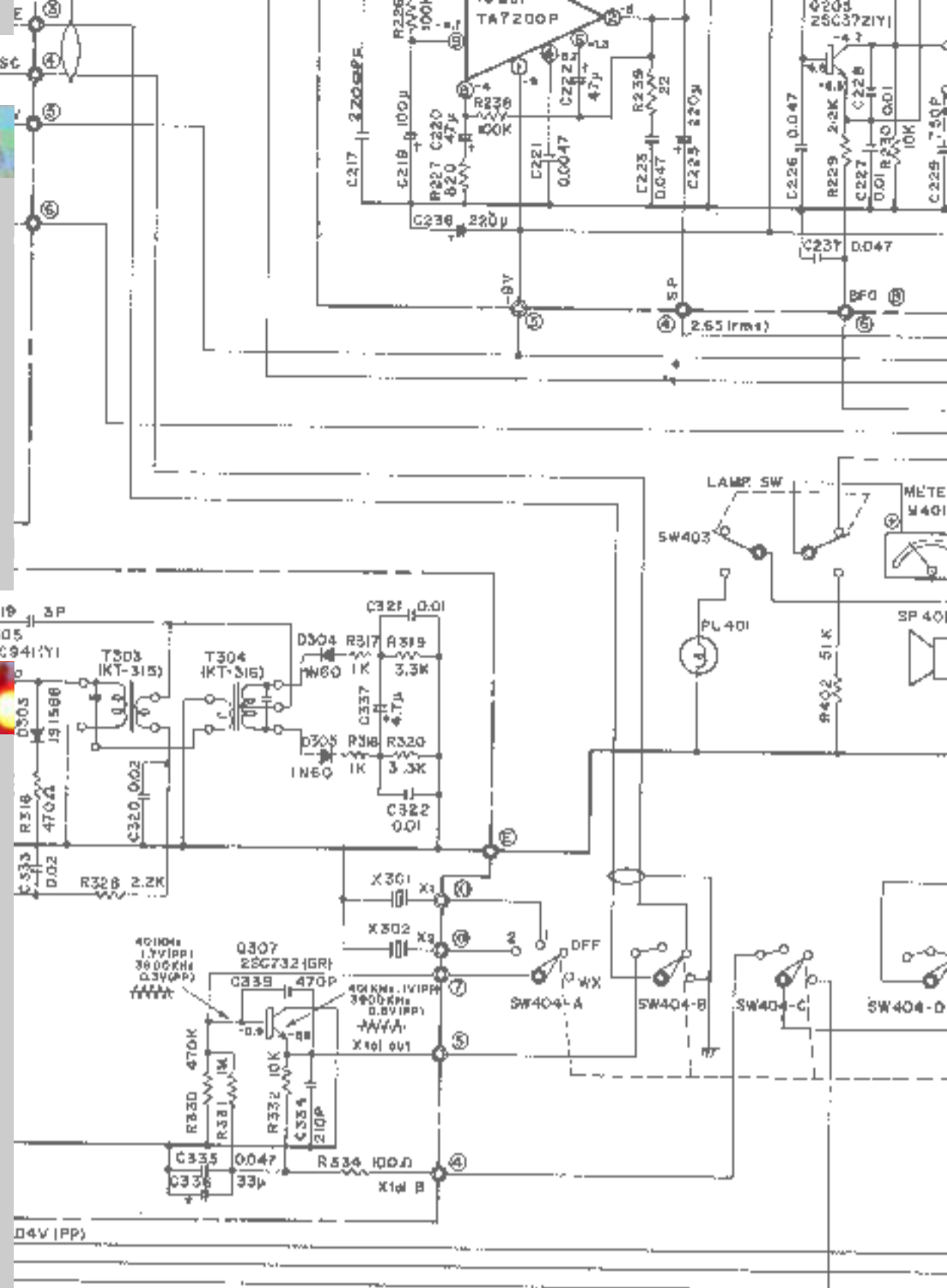
access to software

Arduino, Processing

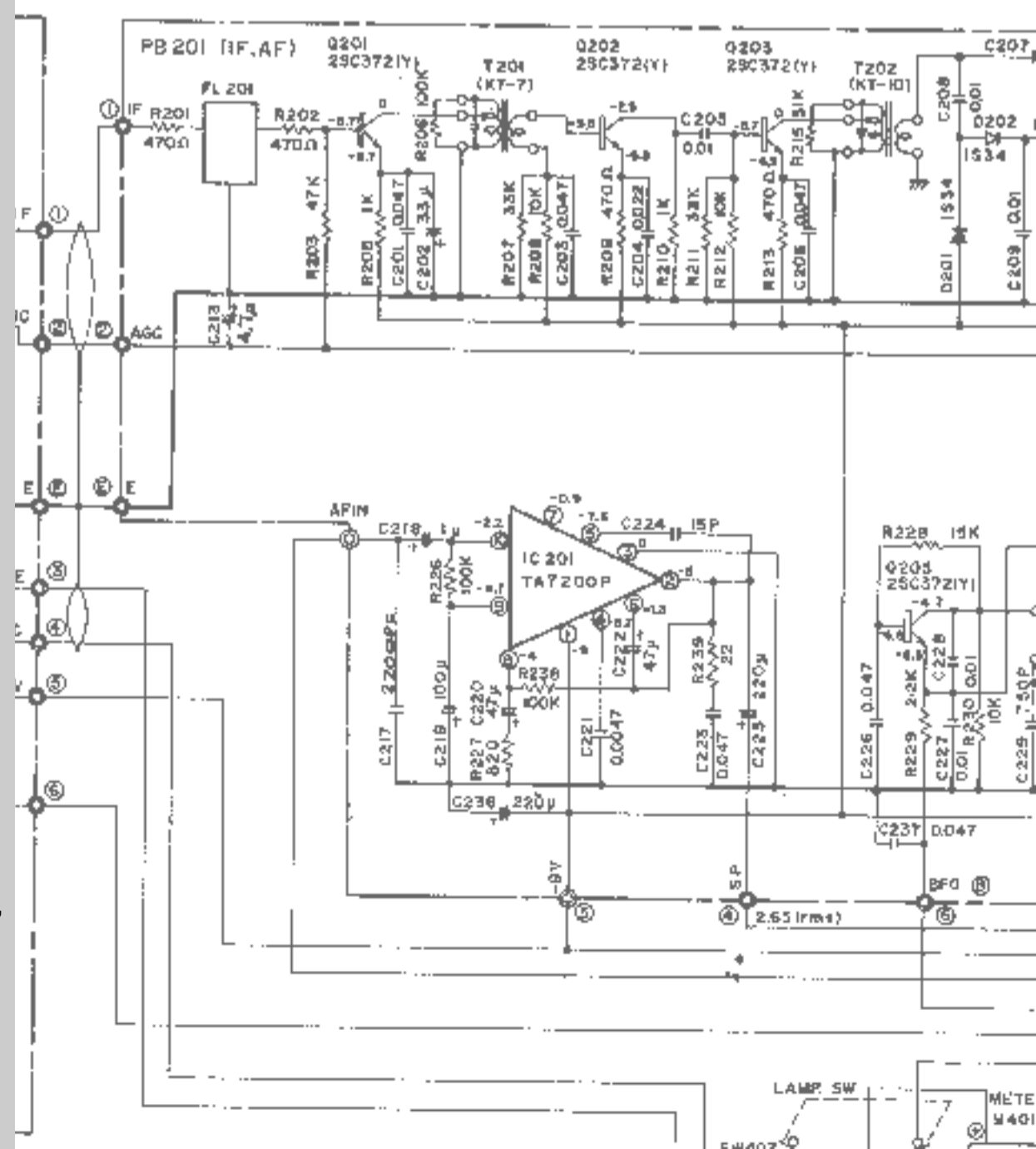
equipment and supplies

Many of these items are supplied to you as part of your lab fees in the form of a "kit". This class has two types of kits. One that has tools which will be inventoried and collected back at the end of the semester and another that includes the following consumables: arduino microprocessor, 5V voltage regulator, 3.3V voltage regulator, LEDs, solderless breadboard, resistors, potentiometer, trimmer potentiometers, momentary switches, toggle switches, ceramic capacitors, electrolytic capacitors, thermistor, photocell, 1N4001 diodes, zenner diodes, transistors, DC power jack, photocell, AA battery holder, 9V battery snap, servo motor, dc motor, gearbox kit, H bridge, reed relay, screw terminals.

You need to purchase a box or a case to haul your components to and from class. You may also want to purchase another plastic box to keep your breadboard and prototype safe.



555 timer 555A Schematic Diagram

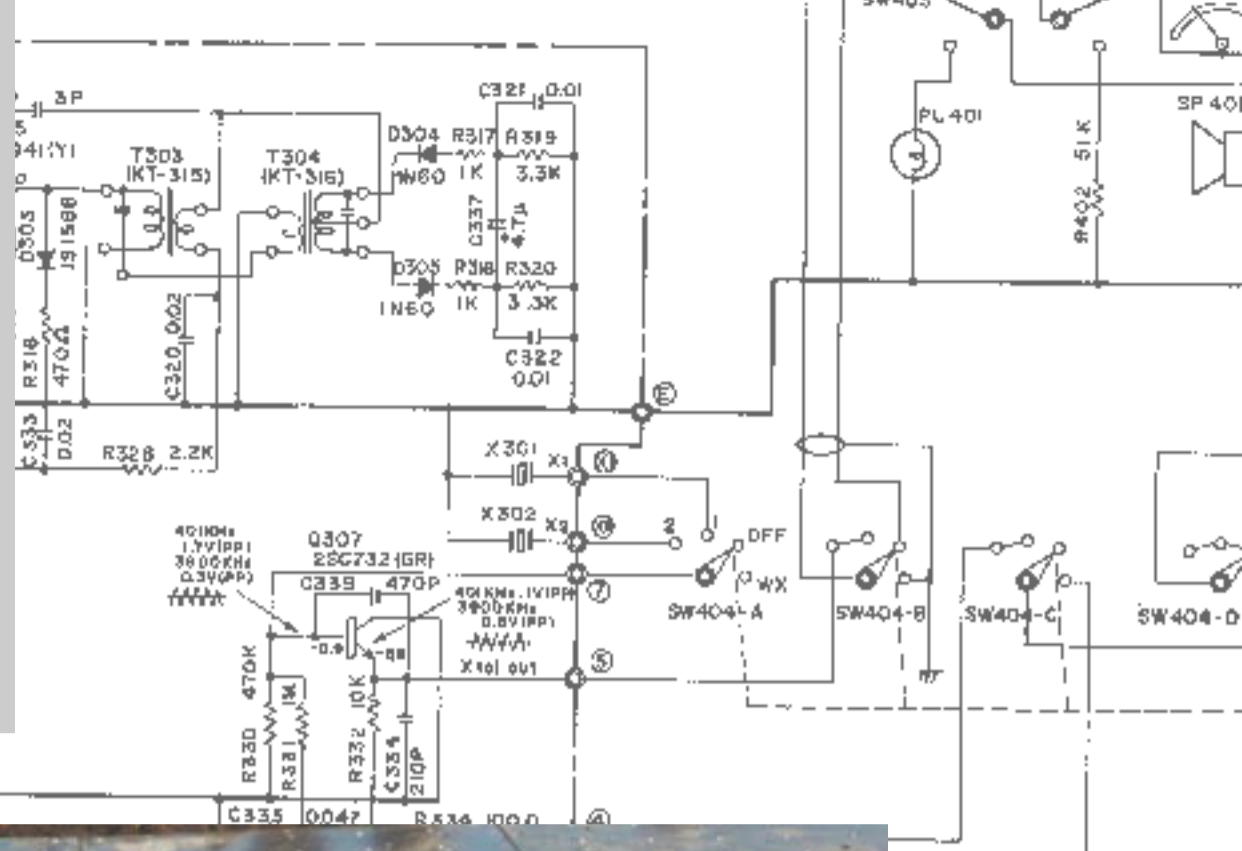


Another item important for this class is the camera attached to your phone. The best way to record that you did a practice assignment is to take a picture of it and post on blog.

There are also components that you are welcome to use are located in the Electronics Studio next to Jack Stenner's office. Depending on what you make, you may need to purchase extra components for your projects or if you let me know soon enough, I can look into purchasing if there are available funds.

If you create a project which uses other types of sensors, you can purchase them from the vendors listed on the [resource](#) page.

Giving Credit--Many of the ideas and resources for this class came from Rob Faludi and Tom Igoe's Physical Computing Class at NYU's ITP program <http://itp.nyu.edu/physcomp/>.



Grades and Evaluation

The purpose of grading is to clearly and accurately pinpoint the strengths and weaknesses of your progress. You will receive grades on all assignments and receive a progress report and meet with me individually at midterm. This report will evaluate progress, note strengths and areas for improvement. Your overall grade will be based on your understanding of the information and ideas discussed, and your formal, technical, and conceptual progress as demonstrated in projects and exercises, and professionalism during the course. Students will be evaluated through exercises, participation, research, presentations, and technical proficiency with the various software applications, their aesthetic application, and problem solving.

Part of this course is learning basic electronics and circuit building. Most every class you will work build a circuit based on a lesson in the book. In order for me to keep track of and troubleshoot, you are required to document your circuit exercise by creating a short video using the phone on your camera or a cheap digital camera and posting the video in a format no larger than 320X240 on the blog. Each video must be documented in the title of the blog post with both the chapter number and the title of the project. For example your first project would be titled - Chapter 1 Betting Up and Blinking. The project MUST also be labeled with the names of the people that worked on it. You may work on these exercises on your own or with a partner in this class. Exercises must be completed and posted to the blog within the week of their assignment or you will not get credit. I need to be able to clearly see that the circuit and the components working or I cant give full credit. Circuit building exercises generally have a point value of 5-15 weighted points depending on their complexity.

Additionally you will have reading assignments and occasionally some math problems practice so that you can competently calculate resistance so you know which component to use. Again the point value of these assignments ranges from 5-15 points.

Distribution of Grades

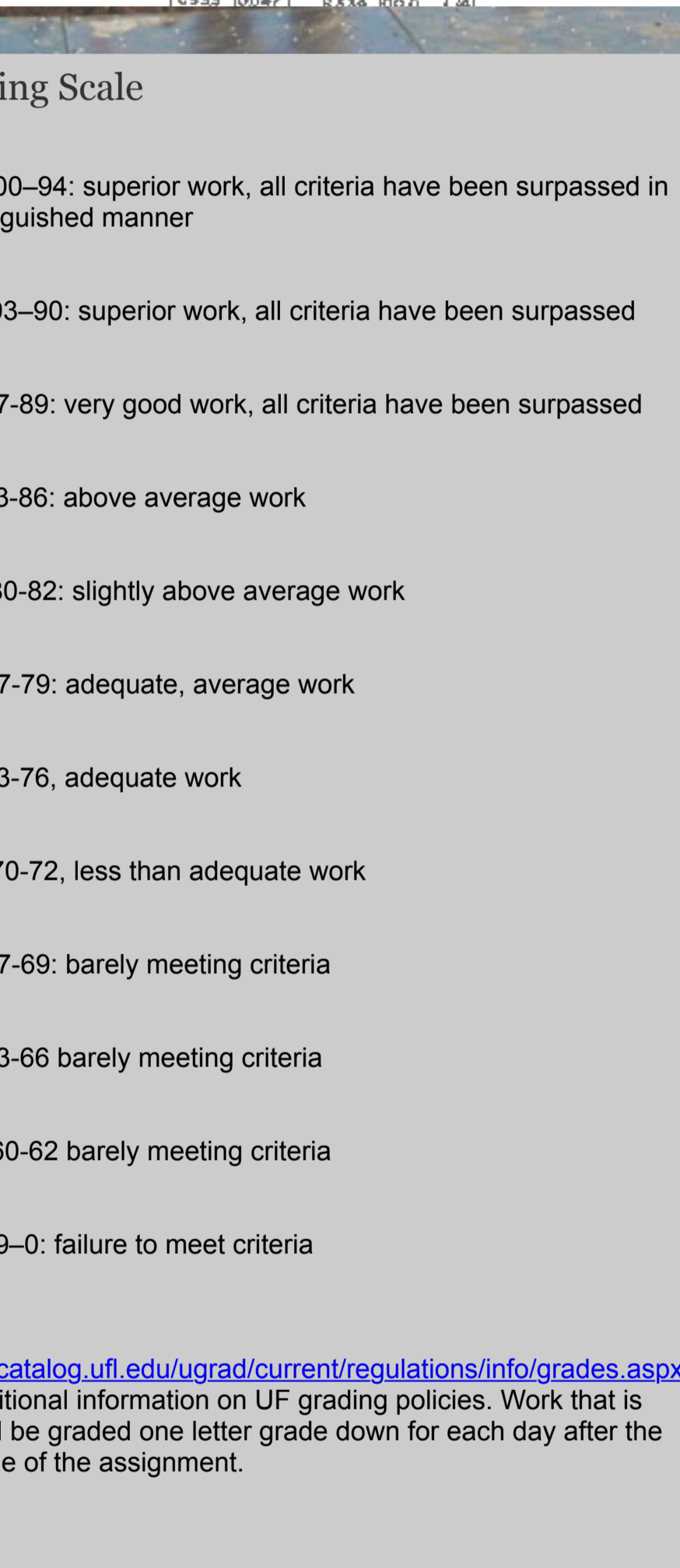
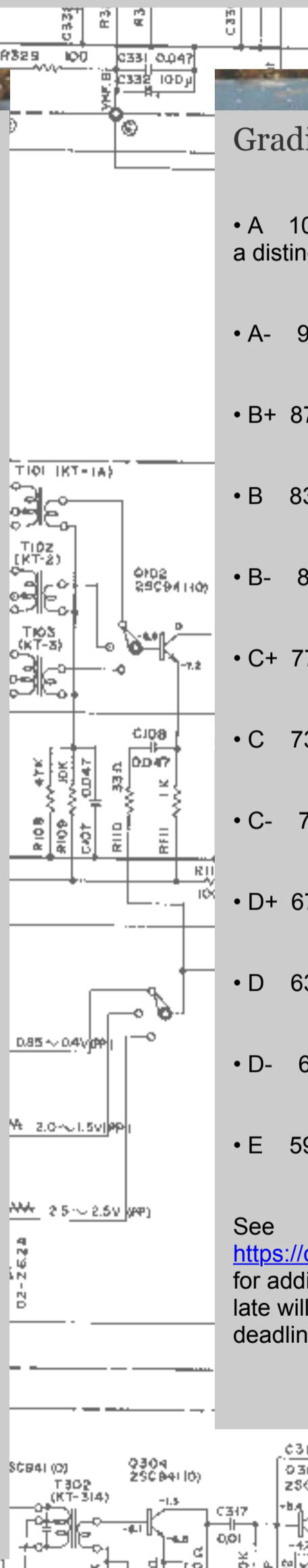
Projects Total 65% = Semester Project 50% + Three Gestures 15%

35% class participation (attendance, participation in class discussions, reading responses,

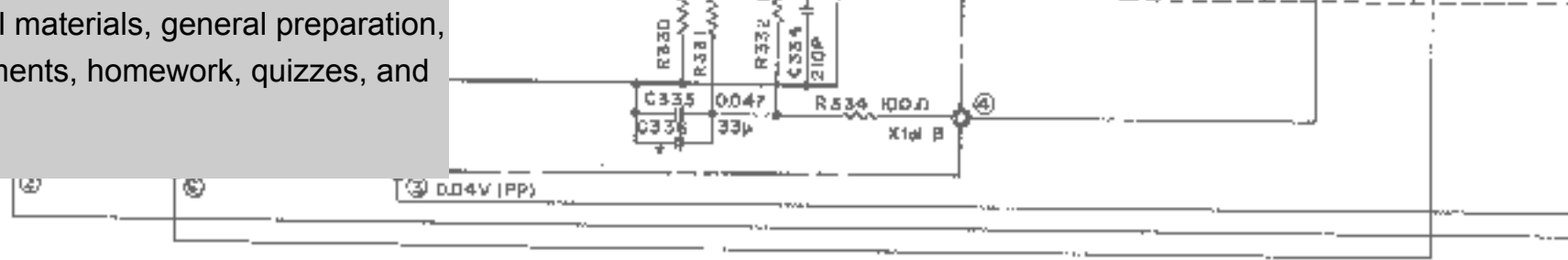
Grading Scale

- A 100-94: superior work, all criteria have been surpassed in a distinguished manner
- A- 93-90: superior work, all criteria have been surpassed
- B+ 87-89: very good work, all criteria have been surpassed
- B 83-86: above average work
- B- 80-82: slightly above average work
- C+ 77-79: adequate, average work
- C 73-76, adequate work
- C- 70-72, less than adequate work
- D+ 67-69: barely meeting criteria
- D 63-66 barely meeting criteria
- D- 60-62 barely meeting criteria
- E 59-0: failure to meet criteria

See <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx> for additional information on UF grading policies. Work that is late will be graded one letter grade down for each day after the deadline of the assignment.



asking/answering questions, teamwork, coming to class with all materials, general preparation, and proper classroom etiquette), in-class experiments, assignments, homework, quizzes, and exercises



Attendance + Participation

This class is very experiential and experimental in nature. We will do a lot of in class activities for which you will get credit. Many of these activities can not be "made up" outside of class. You will miss out on a great deal if you do not come. There is a correlation in studio classes between attendance and final grades. You have a better chance of doing well if you come to class. Only three (3) unexcused absences will be allowed. Every unexcused absence beyond this will lower your grade by a letter grade. Four latenesses equals one absence. A total of seven absences, excused or unexcused, will result in a grade of "E" for the class. Excused absences include religious holidays, a verifiable death in the immediate family or with a doctor's note.

What constitutes participation?

- contribution to class discussions
- thoughtful and thorough posts to the blog
- asking relevant questions
- thoughtful responses
- consideration for classmates
- attendance
- positive attitude and open mind

expectations for class participation

Participation by all members is critical to the success of this class. Excellent participation is a given and includes contributing to ongoing discussions and critiques, suggests alternative ways of approaching projects, along with a thoughtful process and strong work ethic. Participation is evaluated with respect to both quality and quantity.

lateness and leaving early

I will take attendance at the beginning of each class. If you are not present at that time, you will be marked as absent unless you see me at the end of class letting me know that you came so I can correct my attendance sheet. You are expected to stay for the entire class period. I generally check to see who is around after the break. If you leave, your attendance will be recorded as late. Three late marks count as an unexcused absence. If you know that you will be late or absent, please let me know in advance by contacting me at kgladdys@ufl.edu. Both lateness and absence will also have an effect on your participation grade.

late assignments

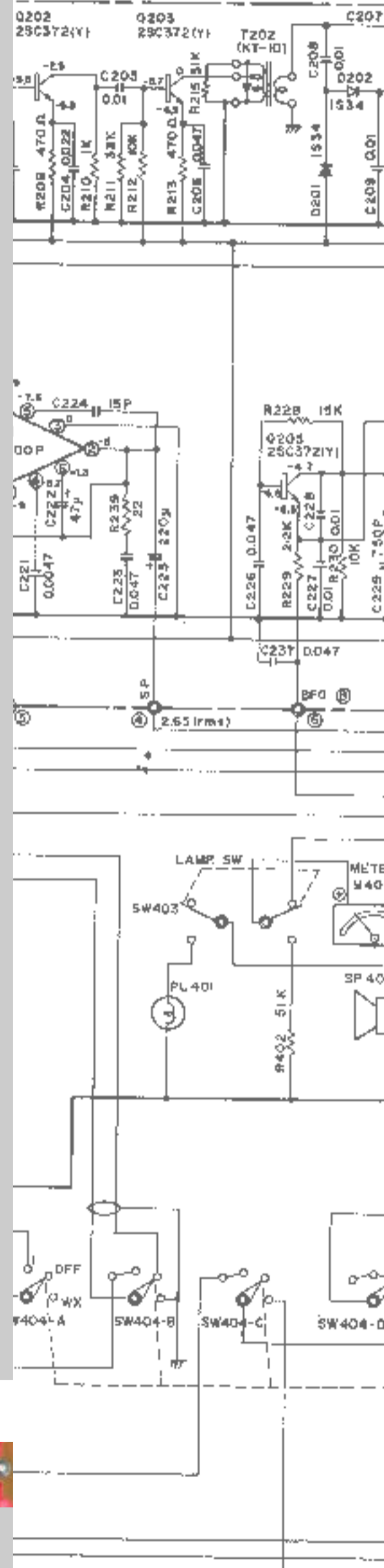
The two major projects for this class need to be completed on time. If you turn a project after the deadline, 10% will be deducted for each day the project is late. Assignments that are 10 points or less may not be made up unless you have an excused absence or have contacted me in advance. If you arrive late and miss the better part of an in class assignment, you are welcome to do the assignment on your own time, but I will not give credit for it. It is not fair to the students who were on time.

keeping and making up

This is an intense class that can stretch students in terms of learning curve of materials and concepts that are unfamiliar. It is IMPERATIVE that you keep up. If you are having difficulties for any reason in understanding the material and completing the work for this class, you NEED to make an appointment to meet and talk with me. Do not wait until the last minute right before an assignment is due) or until you are totally lost to contact me. Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

computer lab information

When this class is held in the lab, there is no food and drink. For lab hours, equipment checkout information, access <http://plaza.ufl.edu/mchristo/>



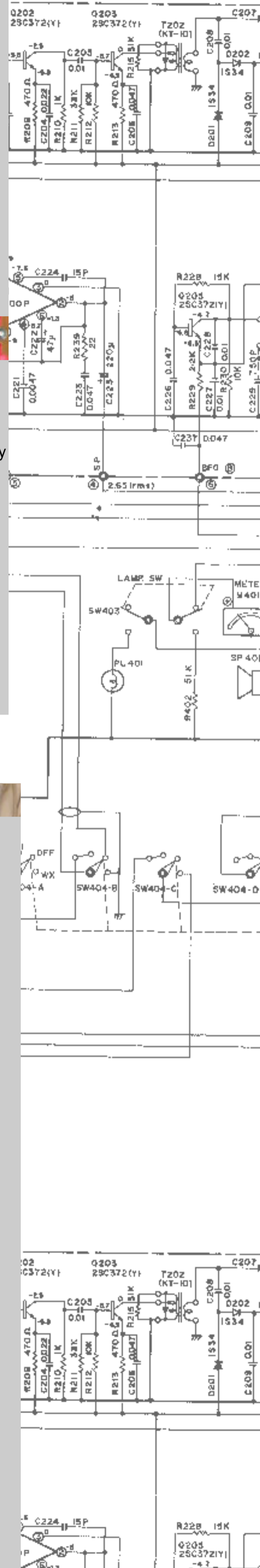
Courtesy and Engagement

I want this class to be fun and meaningful with everybody feeling comfortable to contribute to the dialogue. This is how we learn. Effective learning/teaching is a creative and co-constructed experience with give and take between teacher and student and between student and student. Key to facilitating an environment for learning is respect. Disruptive and disrespectful behavior make for stressful atmosphere which is not conducive to learning. Please observe the following class policies.

- Be professional; be on time. Walking in late or not being prepared is disruptive to others.
- You are expected to stay for the entire class.
- Cell phones need and pagers to be turned to vibrate before class starts.



- In group projects, you are expected to do your share of the work and communicate effectively with others in your group ie. giving correct contact information to the rest of the group, responding to emails and phone calls regarding the group project, attending meetings to work out assignments and schedules.
- Most of my communications outside of class with individuals as well as the class are done via email, please check your UFL account regularly for updates and additional course information.
- Address me and your fellow students respectfully both in person and in e-mail.
- Pay attention during class, no surfing that is not relevant to the topic at hand, AIMing, reading newspapers, doing work for other classes.
- Listening to other students and myself while they are talking and not carrying on conversations or interrupting while others have the floor.
- Students will conduct themselves with personal integrity and honesty. See UF policies below.
- Common courtesy--treat others as you would like to be treated.



Area Specific Information: Art + Technology

1. Hazards of Materials

Batteries, old monitors, lamps from digital projectors if broken may release mercury.
THERE ARE NO KNOWN HEALTH HAZARDS FROM EXPOSURE TO LAMPS THAT ARE INTACT.

2. Best Practices

Though not much is generated, the Digital Media technician is certified for handling Hazardous Waste by the University of Florida. For installations or sculptural elements, please cross-reference with other area specific information as needed.

3. Links

n/a

4. Area Rules

All users of the studio classrooms are expected to follow studio area rules at all times. If you have any questions, ask your instructor.

- Follow all SA+AH Health and Safety handbook guidelines (the handbook should be reviewed by your instructor and can be found at: www.arts.ufl.edu/art/healthandsafety)
- Follow the SA+AH Satellite Waste Management Chart in the classroom and other health & safety guidelines posted for your media.
- In case of emergency, call campus police at 392-1111
- File an incident report (forms may be found in the SAAH H&S handbook, the SAAH faculty handbook and in the main office.) Turn completed forms into the SAAH Director of Operations within 48 hours of the event.
- Alcohol is forbidden in studios
- Familiarize yourself with the closest eyewash unit.
- No eating or drinking in computer the lab.
- Do not use spray adhesive in the studios or in the building. There is a professional and safe paint spray booth in FAC-211A for your use.
- Shoes must be worn at all times.
- Protective equipment must be worn for hazardous work.
- Do not block aisles, halls or doors with stored items or when working. This is a violation of fire codes.
- Do not store anything on the floor. This impedes cleaning and creates a hazard.
- Installations must be removed as soon as possible after critique.
- Clean up spills immediately.
- Take items which do not fit into the trash to the dumpster, follow dumpster guidelines.
- Follow the **SA+AH CONTAINER POLICY** (see policy below)

LABELS

There are 2 types of labels used in the SA+AH-- yellow and white. Both labels are found at the red MSDS box and are supplied by the SA+AH. Each is used for a different purpose.

White:

All new and or used product in containers (hazardous or what might be perceived as hazardous -i.e. watered down gesso, graphite solutions, satellite containers of solvents, powders, spray paints, fixatives, oils, solvents, etc...) must be labeled within the SA+AH to identify their contents. Labels can be found at the MSDS box in each studio and work area. All containers must be marked with your name, contents and date opened. All secondary/satellite containers for hazardous materials must be marked with content, your name and the date opened. All unmarked containers will be disposed of with no notice.

Yellow:

WHEN HAZARDOUS ITEMS ARE DESIGNATED AS WASTE.

All containers must have a yellow label identifying the contents that are designated as trash for weekly EHS pick up.

- Flammable solid containers (red flip top) must have a yellow hazardous waste label on the outside (top).
- 5 gallon jugs must have a yellow hazardous waste label on the outside.
- Fibrous containers must have a yellow hazardous waste label on the outside (top).
- Each item in the blue bin must have a yellow hazardous waste label.

Note: Hazardous Waste labels should include all constituents in the waste mixture as well as an approximate 2 percentage of the total for that item and must add up to 100%.

Labels should also include the Bldg and room number of the shop generating the waste along with the Waste Manager for your area, this is located on the SWMA sign posted at the sink or at the Waste Management Area.

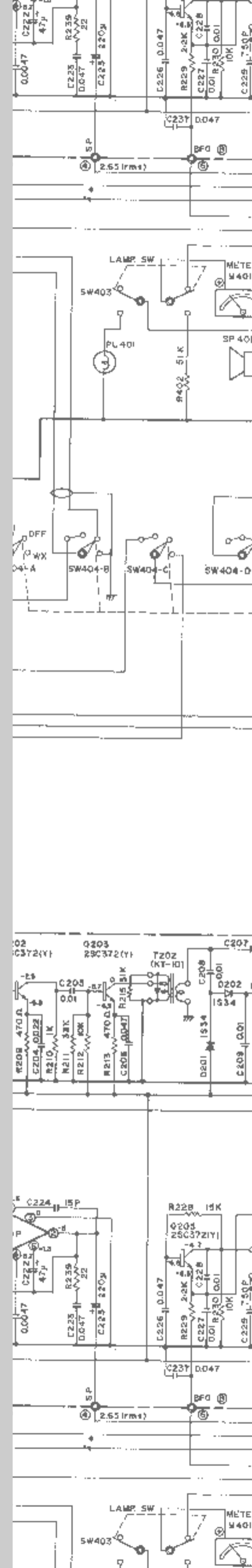
safety and security

University Police Department - <http://police.ufl.edu/>

Dial 911 for emergencies.

Dial 392-1111 otherwise.

reading days



The two days prior to the start of examinations in the fall and spring semesters, generally a Thursday and Friday, are designated reading days. No classes or exams are held on these days. Instead, students are encouraged to use these days for study and review.

twelve-day rule

Students who participate in official athletic or scholastic, extracurricular activities are permitted twelve (12) scholastic day absences per semester without penalty. In any case, it is the student's responsibility to maintain satisfactory academic performance and attendance.

absences for religious holidays

Students, upon prior notification of their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith. Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence. A student who believes that he/she has been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

honesty policy

An academic honesty offense is defined as the act of lying, cheating or stealing academic information so that one gains academic advantage. As a University of Florida student, one is expected to neither commit nor assist another in committing an academic honesty violation. Additionally, it is the student's duty to report observed academic honesty violations. These can include: cheating, plagiarism, bribery, misrepresentation, conspiracy, or fabrication.

<http://www.dso.ufl.edu/judicial/academichonestystudent.html>

computer use and acceptable use policy

All faculty, staff, and students of the University of Florida are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

<http://www.circa.ufl.edu/computers/>

<http://www.cio.ufl.edu/aupolicy.htm>

disruptive behavior

Faculty, students, Administrative and Professional staff members, and other employees [hereinafter referred to as "member(s)" of the University], who intentionally act to impair, interfere with, or obstruct the mission, purposes, order, operations, processes, and functions of the University shall be subject to appropriate disciplinary action by University authorities for misconduct, as set forth in the applicable rules of the Board of Regents and the University and state law governing such actions. A detailed list of disruptive conduct may be found at <http://www.aa.ufl.edu/aa/Rules/1008.ht>

Be advised that you can and will be dismissed from class if you engage in disruptive behavior.

Critical Dates on the University Calendar

<http://www.reg.ufl.edu/dates-critical.html>

It is your responsibility to check the class website in a regular basis. Generally, I announce any changes to the syllabus in class.

