It is very important to take detailed notes to augment this outline. Also be sure to read through your textbook carefully. There is not enough class time to discuss all concepts which are presented in the textbook.

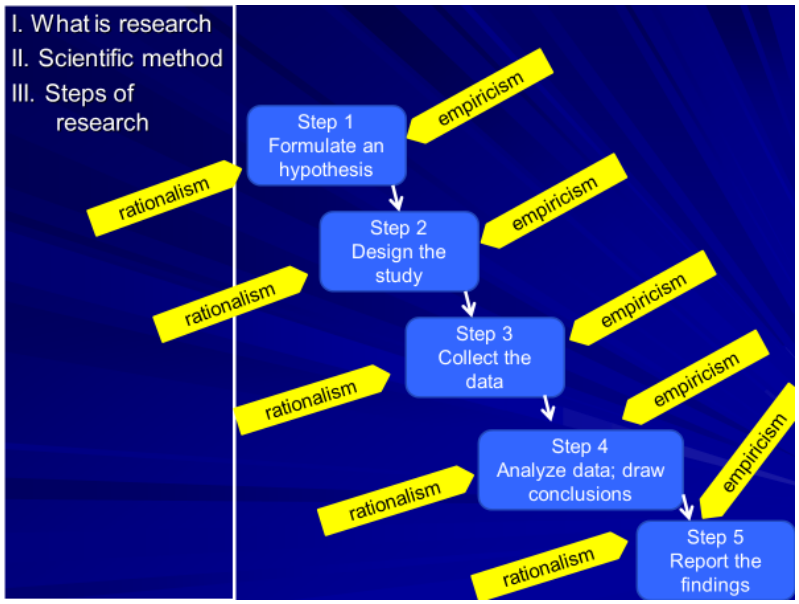
Be prepared to participate in discussion/activities.

I. What is research?

- Process of gaining information in order to come to a conclusion
- Goals:
    - Measurement and description
    - Understanding and prediction
    - Application and control
- Guiding principles:
    - Rationalism
    - Empiricism
- *Q for you: Why is it not enough to use just one of these methods?*

II. Scientific method

- The steps scientists use to arrive at the most likely valid conclusion
    - These steps incorporate the principles of rationalism & empiricism
- Notice how empiricism and rationalism are applied throughout the steps of research. *Could you argue that one or more of the steps involve both principles of coming to a conclusion about the world? Which principles might be at play during Step 5?*



III. Steps of research

- pre-1: Get to know topic
  - observation
  - indirect observation (other's observations)
    - library
    - popular theories (why?)
    - peer-reviewed journal articles
- Step 1: Formulate an hypothesis
  - hypothesis vs. theory
  - operational definition
    - a definition in terms of operations (that is, actions) used to measure something
- Step 2: Design the study
  - Experiments
  - Quasi-experiments
    - Looks like an experiment but the IV has <u>not</u> been manipulated by the experimenter.
  - Non-experiments – descriptive/correlational studies
    - Naturalistic observation
    - Case studies
    - Surveys
  - Consider the pros & cons of each method

	Advantages	Disadvantages
Naturalistic	1. Can observe phenomenon as it	*Reactivity (difficult to be truly unobtrusive)

Observation	naturally occurs 2. Good place to start when investigating something unknown 3. This method can also be used for animals	*Qualitative data can be difficult to analyze *Sometimes, a challenge to observe behaviors (the environment can be chaotic!)
Case study & case study research (where more than one case study is reviewed)	1. Can give more in-depth view of particular phenomenon (e.g. where disorder originates from or how therapy is going) 2. Compelling real-life evidence to support an hypothesis or theory	*lack of objectivity/increased subjectivity *May be unusual case
Survey	1. Can get data on difficult-to-observe behavior 2. Can get data from a LOT of people	*Declining response rates, making sampling bias an issue *Self-reporting issues: Intentional deception, wishful thinking (social desirability bias), yay-sayers and nay-sayers and/or order (of questions) effect, memory lapses, poorly worded questions *Can the participants read?
Experiment	1. Precise control 2. Can make causal conclusions (unlike non-experimental)	*Situations are artificial (sometimes phrased as lack of ecological validity) *Ethical or practical concerns

- Ethics
  - Tuskegee syphilis experiment
    - Check it out here: http://en.wikipedia.org/wiki/Tuskegee_syphilis_experiment
    - It is research studies like this that showed us that we need an ethics committee to approve all studies
  - Study submitted for approval by ethics committee
  - American Psychological Association & Federal agencies determine ethics
  - Examples
    - participants can quit at any time (even if they have signed a consent form)
    - participants should not be exposed to harmful conditions
    - participants have a right to privacy
    - deception is used…
      - only when justified

        - fairly common in social psychology research
        - debriefing must occur as soon as possible
    - when using animals…
        - consideration of how much suffering; importance of the research; likelihood of benefits from the study
        - must live in decent living conditions
- Step 3: Collect the data
    - Examples:
        - direct observation
        - questionnaires/psychological test
        - interviews
        - archival data
        - physiological readings
- Step 4: Analyze data; draw conclusions
    - Descriptive statistics
        - e.g. central tendency (e.g. mean, median, mode), dispersion of scores (e.g. standard deviation, variance, etc.)
        - e.g. correlation
            - represented by "r"
            - strength: "0" to "1"
                - r = .2 = negligible
                - r = .5 = moderate
                - r = .8 = very strong
                - 1 = perfect relationship
            - direction "+" or "-"
            - 3rd variable
            - correlation does NOT mean causation
    - inferential statistics
        - e.g. T-tests, Chi-test, F-test, Multiple regression, etc.
        - mathematical calculation that tells you whether or not it is likely okay to generalize from sample results to the population
        - Why use inferential statistics?
            - Generally, researchers want "universal" truths
            - But it is impossible to actually measure "everyone"
            - So we use samples of the general population
            - But initially, it is unclear if results of the sample are true of the general population that it came from or if it was due to chance
            - Inferential statistics tells you the probability that the results were due to chance
                - If results are due to chance, then you cannot generalize sample results to the greater population.

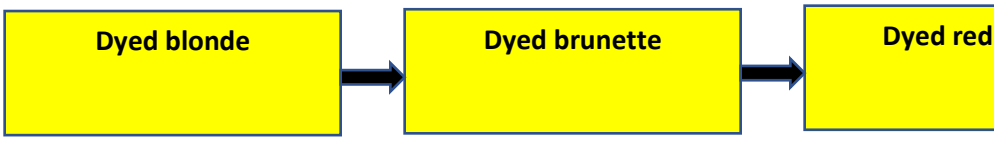
        - If the results were NOT due to chance, then you CAN generalize sample results to the population.
    - Example…
        - Does playing violent video games result in increased aggressiveness in the child?
        - Using a sample of people…
            - lots of violent video games = 3-4 fights per year
            - lots of non-violent video games = 0 fights per year
            - no video games = 0 fights per year
        - But, is it possible that these results are due to chance?
            - Inferential statistics says probability is 10% chance that this is a fluke result → cannot generalize from sample to population
            - Inferential statistics says less than 5% chance that this is a fluke result → CAN generalize from sample to population
- Step 5: Report the findings
    - Write a report
    - In a particular format
        - e.g. when to use italics vs. underlining vs. bold print
        - e.g. what sections of a paper to include (e.g. introduction, methods, etc.)
    - Publication Manual (by American Psychological Association)
    - Submit to a peer-reviewed journal
    - "Publish" or "Perish"

IV. Looking in-depth at experiments

A. Experiments

- Purpose: to determine causality
- Factors to know:
    - manipulation of a variable; hold all other variables steady
        - What's a variable? Anything which can vary (i.e. change)
        - e.g. level of intelligence
    - Independent vs. Dependent variable
        - e.g. do blondes have more fun?
        - The manipulated variable is called the independent variable.
        - Independent variable = hair color.
        - The dependent variable is the variable which may be caused by the independent variable. Dependent variable = how much fun the women have.
    - Levels
        - # of ways the variable is manipulated = levels.

- Experimental group vs. Control group(s)
  - The experimental group is the group "of interest." (in this case, blondes).
  - The other groups are control groups; they are groups we use as comparisons to the group "of interest."
  - Within-subject/repeated measures designs
    - Counter-balance measures?



  - More than one IV and more than one DV are possible
    - Single IV and single DV

Exercise	Weight lost?
No Exercise	Weight lost?

    - Two IVs and single DV

	Females	Ma
Exercise	Weight lost?	We
No Exercise	Weight lost?	We

    - Two IVs and two DVs

	Females	Ma
Exercise	Weight lost?	We
No Exercise	Weight lost?	We

	Females	Ma
Exercise	Mental health?	Me
No Exercise	Mental health?	Me

- Random assignment
  - What if a pretty woman had a greater chance of ending up in the blonde/experimental group than any of the other groups?
  - And what if you found that blondes did have more fun, using these groups? Would you believe in the results?
  - Why not?
  - Random assignment decreases chances that your groups differ from one another before the manipulation/experiment.
- Extraneous vs. Confounding variables
  - Confounding variable = inconclusive study
    - not only influences your results, but does so in a way that makes your results unclear (e.g. only pretty women being in the blond group)
  - Extraneous variable = variables which may influence your results, though you are not interested in its effects (really, same as the confounding variables EXCEPT that the factor has been "controlled for"—that is, the factor doesn't make your study completely unclear like if it were a confounding variable b/c of the fact that it is more or less equitable between groups.
    - if you spread variables which could affect your results across groups equitably, they are not confounding variables; they are extraneous variables
    - random assignment helps to spread extraneous variables equitably across groups
  - e.g. You want to know if a new SAT prep course is effective. You know that IQ will influence how well your subjects perform on the SATs.
    - IQ is an extraneous variable if the average IQ of each group (those who will end up taking the SAT prep vs. those who will not take this new prep course) is similar.
    - IQ is a confounding variable if the average IQ of the group (before the manipulation is done) is significantly different, e.g. if the experimental group (the group that will end up taking the

SAT prep) is 20 points higher than the average IQ of the control group (the group which will not be taking the SAT prep course).

- e.g. You want to know if being rich can make you happy. You conduct an experiment where you give one group of people a million dollars each and see how happy they are a year later.
  - Happiness is an extraneous variable if the average level of happiness is equitable between the experimental (the group which will receive the money) and the control (the group which you won't do anything with) groups before you begin the study.
  - Happiness is a confounding variable if before you give the experimental group the money, you find that the average level of happiness of the experimental group is much, much higher than the average level of happiness in the control group (or vice versa: the point is, you have a difference between groups even before you do the experimental manipulation).

V. Research challenges/potential problems

- Sampling bias
  - Sample size is important
  - Don't rely on anecdotal cases – *Why do we say this?*
- Experimenter expectation/bias
- Participant expectation/bias, including placebo effect
- Single-blind & double-blind studies
- Distortions in self-report data
- Replication
  - Meta-analysis