1. Attributes:
   - Ability to solve complex problems
   - Ability to reason logically
   - Ability to recognize faculty logic
   - Culminates in an action
   - Learned moral and ethical basis

2. How do you measure?
   - Solve and defend a solution to a complex problem
   - Being able to stand up and defend your decision and the process of getting there

1. What does critical thinking look like?
   - Gathering information related
   - Listening and comprehending statements of others
   - Objectively considering the information available to form an opinion, provide a response, make a decision, etc.
   - Considering reliability and accuracy of information sources in weighing their value
   - Ability to formulate questions to gain more information, determine accuracy and pertinence of information, etc.
   - Using experiential learning
   - Solving problems
   - Able to make decisions without all pertinent information
   - Ability to make a reasoned argument

2. What is critical thinking?
   - Separating the Wheat form the Chaff
   - Once separated, what to do with the results and why
   - Assess relative merit (claims, logical, structure)
   - Robustness of process, tools to make it possible
   - Reflection on the ?? assumptions evidence, and logical inferences that lead to opinions and knowledge claims
   - Ability to look openly and pointedly at issues and topics to assess their merit and/or import
   - Term should be dropped “Think outside the box”

Engaged thinking
1. No one-sized
2. Logic
3. Out-of-box, well red – well ???

Ability to evaluate information
   - Veracity
   - Relevance
   - Reliability

Ability to find/seek information that fits those parameters and utilize info ?? to pre-conceived “knowledge”

Ability to shape thought, arguments, offer coherent “application” of info

Part 1 – Define
Consider multiple possibilities perspectives before acting/responding experiences
Thinking reflective not reflexive deeply about a problem/topic – not reflexive response – not just reiteration of known facts – application of knowledge base to problem
Thinking that analyses/assesses/transforms thought
Thinking that is universality & adaptive able to apply logic/reason to problems/topics in diverse fields/different circumstances – adaptive
Should be introduced in several/many forums and evidenced throughout core experience
Thought that goes outside/beyond the “rote” response and entering requires student/person to in thought go outside the comfort zone
Continuity – applying info foundation from previous courses

Part 2 – Attributes
Attributes – open, inclusive (within appropriate consideration)
Being able to take info/knowledge base and design approach/experience to answer next questions especially if design approach to test (disprove) your theory question premise
Goes beyond comfort zone/out of box
Creative – imaginative, prepared
Ability to look at likelihood/experience
Deliberate, reflective
Measure – pose problem/goal without direction and ask to solve/achieve

Brainstorming (individual)
1. Logically think, analyze, reach conclusions based on reasoning
   Students derive at answers to problems and working through steps, analyze situations
   Consider option and outcomes
2. Realize gray areas
   Expanding beyond that is “seen” to imagine that which is not
Ability to evaluate information (veracity, relevance, reliability, etc.)
Ability to find/seek information that fits those parameters and to utilize info contrary to pre-conceived “knowledge”
Ability to shape thoughts, arguments, offer coherent “application” of information
Question ideas and opinions
Understanding he difference between ideas and opinions
Listening and deeply considering many diverse ideas, perceptions, perspectives
It either looks combative (delegate) – ratiocinative or collaborative (convergative) emphatic thinking
It acquires substantive engagement – diverse world views perception and perspectives and opinions
Preparation, investigation, analysis, use
CT involves investigation (looking at various sources, perspectives, opinions) evaluating it, analyzing it, internalizing it and acting on it
How to measure?
   Application
   Applied results
Attributes of CI vary based on the specificity of what is to be considered and how

**BUCCS 9/27/07 Table Notes**

Searching strategies – focus, bigger picture, assess topic/sources
Ethics – assess options – analyze/having awareness
   Use of licensed resources 1st – to assess other source later
PT Health Sciences - Go beyond your belief system and experience
FCS – What is the problem to be solved breaking down
English – Reading/writing – pieces – analysis
Stages of critical thinking Novice – Expert
Attributes and Assessments
Assess – conversation- concepts personal – sources Results
process – reaction product – built to conclusion, to outcome
Habit/buying vs. rational purchase
Definition – redefinition – expanded definition
Evidence based practice/assessment/plan
Paper/evidence – conference – conversations – collaboration - End Results
Pass exams
Problem solvers
Communication

Critical thinking
Analytical thinking - Not always answers
Breakdown
Arguments - Research
Assumptions - Indepth knowledge
Evaluation - Debate
What is it based on - Free of bias
Perspectives - Collection of data
Process of analysis, inquiring, debate, perspective, recognizing assumptions, using evidence to work conclusions
Creative? Creative solutions
Not just: facts, answers
Problem solvers
Communicate ideas
Research
Collaboration
Critical thinking as a renaming of the scientific method for problem solving
    Process of identifying components, analyzing, synthesizing and evaluation
    Logical way/process/methodology

Alternative view: thinking about the thought process
Read – Paul & Elder: “C.T. is the art of analyzing and evaluating thinking with a view to
    improving it.” From their little book
Exposition of what mathematicians view as C.T.

How to assess?
1. If you define critical thinking as problem solving, then assessment is easy: can you solve the
    problem at hand
2. For the more esoteric view of C.T. as thinking about thinking, assessment is: challenging
    students to identify underlying/hidden thought process
Examples: how assessment is done in:
BIO: Generate testable hypothesis; eliminate unwarranted hypoth
PT: Case studies
Math: Prior need: well defined terms
EE: the ability to understand “why” (why did you assume what you assumed) thinking about
    your own thought process

Critical thinking Attributes – problems solving strategies * evaluate validity of outcome –
    outcome measures (FCS)

Objectivity
Considering all points of view
Depth. . . ask questions
Common ground – dialogue, conflict
Define problem
Logic
Methodology
Civil discourse
Steps to a solution
Content and free reasoning
Measure: know it has taken place?
Follow process – define problem, strategy to solve, state outcome, assess outcome
Formulate question/debate
Essays
Using secondary sources
Counter factual thinking
Set of evaluative criteria
Formal logic or reasoning
Definition: Discern, determine whether something is true. Reason whether . . .
Growing engagement and interaction with a subject
Take information and build structure
Thinking analytically Awareness that knowledge can be infinite
Awareness that premise and framework could be faulty
Develop a love for the process (deep) engagement
Defining Critical Thinking: What is it? What does it look like?

Involves multiple possibilities, experiences, perspectives before acting or responding
Analyzes, assesses, transforms thought
Process of separating the shaft from the wheat
Once separated, what do you do with results and why?
Traditional cultures: poetry within critical thinking sophisticated analyses
Willingness to look at yourself and your own thinking
Critical thinking is engaged thinking
Investigation – various sources, perspectives, opinions
Evaluating for real-life impact
Learn something that means something to you
Are we trying to train people to be good thinkers? Do we need the term?
Maybe we really mean educated, informed thinkers and educated includes thought/reflection/understanding what you don’t know
Critical thinking leads to critical action what we’re not pushing is teaching them how to act
Is critical thinking the same thing for all disciplines? Are we looking for a one-size-fits-all definition?
Matters of fact, law, opinion, belief part of critical thinking is understanding differences between terms, learning to differentiate between fact and opinion, use of analytic tools to reach these conclusions
Analytic tools, how do we determine relative merits of an opinion or knowledge claim, different from good thinking or helpful thinking, may not relate to all aspects of life/education, e.g. poetry
Thinking that is deep on a problem or topic, not simply a reflexive response
Universal and adaptive, applied across disciplines
What to do with results and why after separating wheat and chaff
Reflection on assumptions, inferences that had to knowledge claims
Across cultures, throughout time two processes involved: 1) separating 2) finding commonalities
Oral written expressions of thinking in the whole continuum of education from early experiences throughout higher education

Summary #1
Goal: Is there enough common understanding for shared attributes to emerge?
Process of thinking and making a determination about what is being scrutinized. Analytic assessment process to come to a conclusion (goal in mind)
Disagreement: Willingness to take action/ or not take action (Same or different attribute?)
Important to recognize feminist critique questioning the history from Plato in western thought.
Androcentric view is not the only framework in thinking. Important to embrace diversity of world views
Educated person? Good thinking? Goal – not helpful for the process
Critical thinking is a process of becoming a critical actor
Assessing relative logical merit of an argument
Ability to look openly and pointedly at issues and topics to assess impact and import
Vacuous – do not use
Internalizing – expressing what is important to you
Value in curriculum is one’s ability to think as part as a civil society – willing to look at self openly and honestly

**Assessing Critical Thinking: What are its attributes? How do you measure it?**

**Measurement:**
To solve and defend a solution to a complex problem
Defend decision and process of getting there
Well read, well rounded, willing to accept change, but knowing when to reject it
Process changes with each generation, we don’t have to start from scratch any more
But don’t we want to give them the skills that don’t change over time
Regardless of where your starting point is, the process is applicable
If process is dependent on assumption, you have the wrong process
Pose a problem or goal without giving much or any direction, ask person to solve problem or achieve goal
Measured in its application-essay, argument, action or non-action
If everything is discipline-specific, you can measure what your discipline values, may not be able to come up with a cross-disciplinary measurement
Does technology embed a logic that encourages or discourages critical thinking? – question the input from technology
Tools may change, but process doesn’t
Become dependent on a technology when we don’t know how it works
Trying to understand what info you need that you may not have and what info you don’t need
Dealing with uncertainty

**Attributes:**
Ability to solve complex problems
Ability to reason logically
Ability to recognize faculty logic
Culminates inaction
Deciding non-action
Learned, moral ethical bases
Reality
Tools → Have changed
Technology
We don’t understand the ability to think why, how the technology works
Investigate, observe, create
Intellectual curiosity
What info do I/do not need?
Uncertainty: not knowable bits
Set of routines (without thinking) other factors and variables
Open and inclusive with appropriate consideration, ability to take info/knowledge that includes ability to answer next logical question
Way to disprove/question a promise
Creative, imaginative, prepared to think about outcomes
Reflective and deliberate
Based on specificity of what is being considered/quantifiability, etc.
(in the absence of clarity or definition – discipline specific)
Knowing you are in the box, going to the edge of the box, being willing to go to the edge and climbing out of the box
Inductive and deductive process
Defining Critical Thinking: What is it? What does it look like?

Reflection: Is it a skill set? Is it a habit?
Paradigm issues and shifting
Continuum of novice ---------------------expert
Might prove useful
Knowledge based
Science based
Creative
Theory – theoretical foundation
Comprehensive - concepts across disciplines promoted at BU
Research strategies
Ethics of research
  - world beyond Google
  - evaluating sources
  - go beyond own beliefs and experiences
What is the problem to be solved is an issue?
Breaking things to pieces/parts and examine to get to finished product
Similarity critical thinking and scientific research/process
Evidenced-based research health sciences not just fact
Process of debate is critical thinking – even without conclusion being a requirement of deciding what is best solution
Looking across areas to do critical thinking
Can be novice/expert in doing critical thinking
Analytical thinking – analysis
Different perspectives – issues of bias
Depth and breadth of knowledge
Process – analysis inquiry, debate perspectives, recognize assumption – use evidence to reach conclusion
Doesn’t always have answers
Not just facts
Compare/contrast creative-critical thinking

Assessing Critical Thinking: What are its attributes? How do you measure it?

End product – solve problems, conduct research/scholarship, work in group, collaboration, communication
Research strategies (library work)
Process of working toward end product
Assess through conversations
Understanding steps in process
Creative reflection
Need clear definitions*
Overlap with creativity
Can vary across disciplines (multiple intelligence concepts)
Tied in with variety of general education classes
Group 1 –
Processes related to validity of outcomes; means for constructive dialogue
Problem solving
Thinking about the thought process
Settled on broad definition for consensus
Gathering, processing, analyzing info (not sufficient)
Growing engagement/interaction with subject
Awareness knowledge can be infinite
Creativity=critical thinking?
Is engagement in a discipline part of critical thinking? Awareness and responsibility to community fit in (history methodology)
Commentary ↑ example of wide variance in the terminology
Knowledge is infinite (define) awareness that there may not be a solution
C.T. does not have to be part of every course
If define C.T. as problem solving
Can student address and assess underlying process - think about own thought process
Student has to do work measure work or output?
Deliberate: pause to think
Is there developmental process
Reflect too many distractions
Learn time management
Not outcome but process

Group 2 –
Don’t sacrifice whole for brevity, maintain richness of concept
Problem solving strategy
Define problem and strategy to solve
Constructive dialogue agree to objective criteria
Renaming scientific method of problem solving - Define problem and method
Mathematics
Gathering info – process – outcome
Awareness that knowledge can be infinite
Challenging to truth
Critical analysis of art
Engagement of awareness of discipline components and involved in community movement through thinking process
Problem solving process
Methods of organizing thinking process
Engagement in a discipline accepting to challenging methods and conclusions
Knowledge is unbonded, may not be a final answer

Group 3 –
Assessment processes necessarily differ by discipline
How do you understand when assessment of process doesn’t work versus when critical thinking is not shown?
Issue of developmental processes
Issue of support for “campus” about managing time
Don’t sacrifice what the “whole” is for the sake of brevity!
Definition – Engagement of mind to connect with info
Attributes = validate knowledge identify trends
Some aspects don’t know how to assess
Argumentative writing and how inability to define critical thinking can hinder
Not every moment of class will be used in critical thinking
Essay writing can demonstrate; not same across disciplines
Enablement of mind; connect with what is presented
What evidence supports conclusions
Some aspects are not assessable
Don’t know how to assess critical thinking
Follow process indiscipline formulate question and method to reach answer
Teach logic gene d that teaches various logics. Understand fallacious argument