Eberly Center
Teaching Excellence & Educational Innovation

Active Learning Activities

Time	Activity Title	Description	Example
1 min	Minute Paper	Students write on a notecard or sheet of paper the key points from the day's lesson.	*Mechanical Engineering* – "Today we discussed conductive heat transfer. In one minute, list as many of the principal features of this process as you can remember."
1 min	Muddiest Point	Students write on a notecard or sheet of paper the concept or idea they are still struggling with the most	*General* – "On your notecard, write the one concept you are having the most trouble understanding, and which you could use more practice on."
1 min	Application Card	Students are provided with a task that challenges them to apply a concept or skill to a situation they have not encountered before, or challenged to generate examples that illustrate a concept to demonstrate transfer of knowledge.	*Chemical Engineering* – What are three real-world examples of "batch processing"? *Psychology* – Describe two examples that contrast positive versus negative reinforcement?
5 min	Self-Assessment Quiz	Students take a quiz (typically ungraded), or complete a checklist of ideas to determine understanding of a concept. This can be used at the beginning of the semester, or the beginning of a chapter for students to gauge prior knowledge and identify misconceptions.	*Computer Science* - Provide increasingly difficult questions to gauge a student's knowledge of a particular area: 1. Describe the principles of a binary search tree. 2. What is the average big-O search time for a node in a binary search tree? 3. Describe the degenerate tree that accounts for the worst-case search time of O(n). 4. In pseudocode, implement a binary search tree verification function that uses recursion; accept the root of an arbitrary binary tree as input.

5 min	Think-Pair-Share	Have students answer a question individually, then compare their answers with a partner and synthesize a joint solution to share with the class. Can be used with clickers.	*English* – "From the Barthes piece you read for homework, identify the author's main point using two supporting reasons from the text."
5 min	Brainstorming	Introduce a topic or problem and then ask for student input. Give students a minute to write down their ideas, and then record them on the board.	*Civil & Environmental Engineering* – "What are possible safety issues we might encounter with the process unit we just designed?"
5 min	Set It Up	After providing students with a quantitative problem, ask them to solve it using only variables and units, emphasizing the problem-solving process rather than a specific numerical answer. For example, you could ask students to identify which course concepts are relevant to finding a solution, what assumptions need to be made, or what information is missing and how they might calculate it.	*Physics* – "Using the provided circuit diagram, label the different components (resistors, capacitors, battery, etc.) with variable names. Using Kirchoff's circuit laws, set up the equations you would use to calculate the current through the circuit at the points identified in the diagram using only variables."
5-10 min	Practice Expert Problem-Solving Skills	Have students work in pairs or groups. Provide a worksheet that outlines an **ill-defined problem** and a list of questions that an expert would ask him/herself to approach the problem.	*Mathematics* – "What is the longest metal pole one can move into a room without bending or breaking it? ○ Room is 30' x 20' rectangle ○ Room has one entrance at midpoint of 30' wall ○ Hallway & doorway leading to room are 5' wide" *Questions to ask students:* • What is the question asking (what is the deliverable?)? • What are the important pieces of information given? • What pieces of information are extraneous? • What info is missing, but needed to solve this? How will you get it? • What are the assumptions you need to make? Are they reasonable?

			• What course concepts are relevant to this problem? How will you use them to solve the problem? • Activate relevant prior knowledge within the current course or from past courses. How does this relate to [*insert concept here*]? • What is the first step/how would you set up the problem? • Look at your answer. Is it reasonable?
5-10 min	Concept Maps	Direct students to create a concept map in pairs or small groups. Concept maps represent networks of nodes and links. Nodes are labeled boxes representing concepts; nodes are connected by links (lines connecting the nodes that are defined by verbs). Call on pairs/groups to share their concept map using a document projector.	*Biology* – "Create a concept map to connect your understanding of the following terms: natural selection, Hardy-Weinberg equilibrium, Mendelian genetics, allele frequencies, and evolution. Include connecting phrases between map items."
5-10 min	Role-Playing	Students are asked to act out a part. In doing so, they get a better idea of the concepts and theories being discussed. Role-playing exercises can range from simple to complex.	*Modern Languages* – "Role 1: You are a traveler who just missed the train to your next vacation destination. Role 2: You are a travel agent assisting a customer. Both: Playing your assigned role, discuss in [language] the situation and determine a solution to the problem."
10 min	Case Studies	Use real-life stories that describe what happened to a community, family, school, industry, or individual to prompt students to integrate classroom knowledge with real-world situations, actions, and consequences.	*Business* - "Consider the marketing strategies that P&G used to develop its *Pringles* line of potato chips [provide a reading/background information]. Would you consider their marketing strategies successful? Why or why not?"

10 min	Inquiry-Based Learning	Students use an investigative process to discover scientific or engineering concepts for themselves. After the instructor identifies an idea or concept for mastery, a question is posed that asks students to make observations, pose hypotheses, and speculate on conclusions. Then students are asked to tie the activity back to the main idea/concept.	*Chemistry* – Before electroplating zinc onto the surface of a penny, ask students to predict what will happen. After giving students time to reflect and explain their observations, change the scenario – "What will happen when the Zn-plated penny is heated?"
20 min	Peer Review	Students are asked to complete an individual homework assignment, paper, or project. On the day the assignment is due, students submit a copy to one or two classmates. Each student then gives constructive feedback (e.g., corrects mistakes in problem-solving, makes suggestions about improving argumentation, etc.)	*Drama* - After drafting one-act plays, pairs students swap drafts and give each other feedback on their writing.
20 min	Jigsaw	A general topic is divided into smaller, interrelated pieces. Student groups are assigned one of the pieces to review/confirm knowledge. Then the groups "jigsaw" so that there's a representative from each piece in each new group; students then teach each other about their piece.	*Psychology* - Students are assigned to read one of three recent journal articles on neural networks and autism in children. After discussing the study design with their "home groups," students split into new groups and share the results of their paper, and its strengths and weaknesses with each other.