

## A guide/overview of active learning in Mathematics<sup>1</sup>

In general, active learning can be defined as the use of student-centered strategies that engage students in *doing* activities/problems, *thinking* and *writing* about what they are learning, and/or *sharing* their ideas with their peers and instructors (Bonwell and Eison, 1991; Meyers and Jones, 1993; Armbruster et al., 2009; Andrews and Frey, 2015).

Examples of active learning that are used (or could be implemented) in our Mathematics courses include, but are not limited to:

- Clicker concept questions
- Think-pair-share
- Participatory demonstrations and/or games
- Making time for students to discuss concepts and/or work on problems with peers
- Working through problems, scenarios, and/or arguments with students
- Organizing students for group work
- Routinely asking for and welcoming student input and questions
- Fielding questions in a way that encouraged further discussion
- Inquiry-based learning (e.g., students are constructing, analyzing, and critiquing mathematical arguments and/or developing theory and underlying definitions for themselves (Laursen et al., 2014))
- Demonstrating active listening (i.e., fully concentrating on what is being said and using non-verbal (e.g., eye contact, smiling) and verbal (e.g., questioning, clarifying, summarizing) cues that show you are listening; for more information see [Active Listening](#))
- Reciprocal questioning - students create their own questions/problems
- Peer teaching - students instruct skills or explain concepts to their peers
- Minute papers/Muddiest point (Angelo and Cross, 1993) - students write a brief statement on what they thought was the most useful/interesting/important concept and/or the most unclear or confusing concept

### References cited

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