



## Expected Learning Outcomes



Indicator	Upon completion of the course, Student able to	Expected learning outcomes of program
<b>Knowledge</b>		
CELO1	Summarize certain concepts and principles in analytical chemistry; advantages and disadvantages of volumetric methods; instrumental analysis; concentration; sample analysis; errors and basic equipment.	ELO1
CELO2	Apply volumetric method and instrumental analysis to analyze the presence of specific analytes in the field of biotechnology.	ELO1
CELO3	Evaluate the analytical results obtained with current standards in the field of biotechnology.	ELO1
<b>Skills</b>		
CELO4	Apply analytical methods adapted to the sample to be analyzed.	ELO7, ELO 10, ELO11
CELO5	Work in group.	ELO 7
CELO6	Calculate results, discuss results and write reports.	ELO7, ELO 9
<b>Attitude</b>		
CELO7	Be proactive and positive in learning and research.	ELO15

### Brief descriptions

Chapter 1: The basic concepts of analytical chemistry  
 Chapter 2: Gravimetric method of analysis (learn more)  
 Chapter 3: Titrations in analytical chemistry  
 Chapter 4: Instrumental analysis  
 Three practices:  
 Practice 1: Acid-base titration  
 Practice 2: Oxidation - reduction titration  
 Practice 3: Precipitation titration and complexation titration

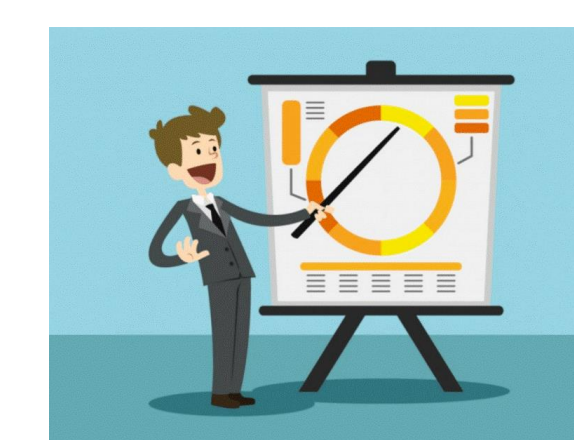
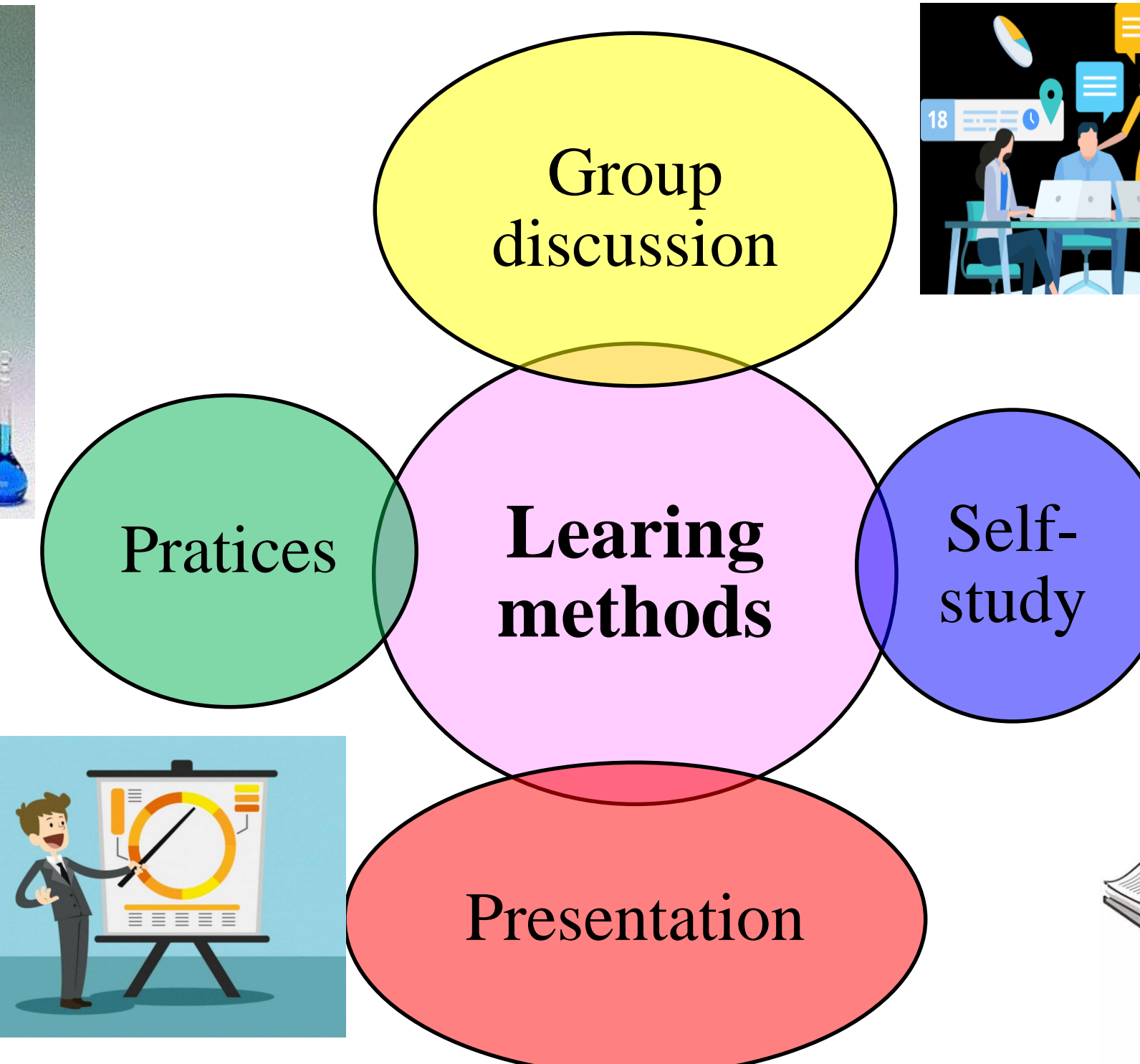
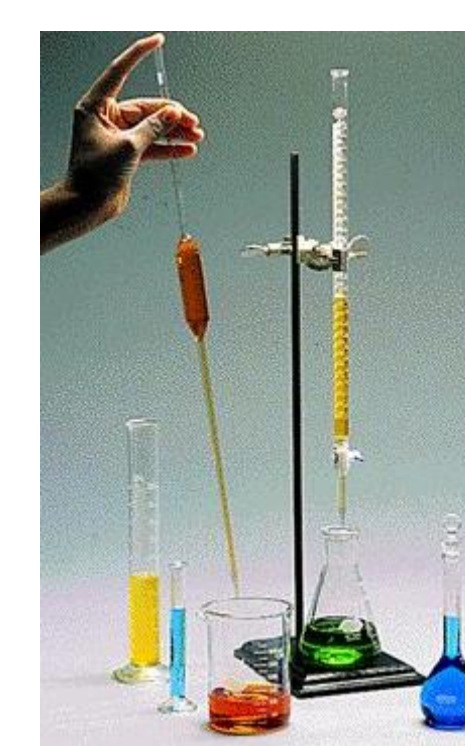


"TODAY EVERYONE HAS TO KNOW 'WHAT'S IN THE FOOD?', 'WHAT'S IN THE WATER?', 'WHAT'S IN THE AIR?' THIS IS TRULY THE 'GOLDEN' AGE OF ANALYTICAL CHEMISTRY."



### Student tasks

- Attendance: Students must attend at least 75% of the class and participate in class activities and 100% practical, discussion sessions.
- Preparing for the lecture: Students must read and carefully the lectures; do homework; presentation; groups discussion.
- Midterm test and final test: Students are required to take midterm test and final exam.



### Assessment methods

- Grading scale: 10
- Evaluation:
  - Attend class and group discussions: 10 %
  - Practice assessments: Students reach practice. These are the conditions for the final exam.
  - Midterm test: 30%
  - Final exam: 60%

### Lecturers

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