

Contents

1	Pedagogy — 1
1.1	Introduction — 1
1.2	Piaget — 2
1.3	Vygotsky — 4
1.4	Other pedagogical theories — 6
1.5	How people learn — 7
1.6	Cognitive theory in educational psychology — 7
1.7	Deep-level versus rote-level learning — 12
1.8	Basic principles for teaching — 12
1.9	Motivation of students — 13
1.10	Design of education — 14
2	Designing a course — 17
2.1	Student study time — 17
2.2	Design — 19
2.2.1	Model used for the design — 19
2.2.2	Science content — 21
2.2.3	Place in the curriculum — 21
2.2.4	Deciding about the science content — 22
2.3	Formulating learning goals — 23
2.4	Planning the course — 24
2.4.1	Learning activities — 24
2.4.2	Time schedule — 25
2.5	Supporting and monitoring the learning process — 27
2.6	Literature used in the course — 28
2.7	Communicating with the students — 28
2.8	Assessing your students — 31
2.9	Improving the course — 31
2.10	Ethics in education — 32
3	Lecturing in a chemistry course — 35
3.1	Introduction — 35
3.2	Lectures — 35
3.2.1	Interactivity — 35
3.2.2	Design of a lecture — 39
3.3	Pre-lecture activities by students — 42
3.3.1	Flipped classroom — 42
3.3.2	Mathematical abilities — 44
3.4	Post-lecture activities — 44

3.4.1	Tutorial — 45
3.4.1.1	Introduction — 45
3.4.1.2	Goal of a tutorial — 45
3.4.1.3	Teaching Assistants — 46
3.4.1.4	Agenda of a tutorial meeting — 46
3.4.1.5	Problems during the tutorial session — 48
3.5	Use of laboratory — 49
3.5.1	Introduction — 49
3.5.2	Goals of practical work — 50
3.5.3	Actual planning of a practical activity — 52
3.5.4	Preparation — 53
3.5.5	Performing the experiment — 54
3.5.6	Reporting — 55
3.5.7	Affective domain — 55
3.5.8	Evaluation — 55
3.6	Mentoring group work — 56
3.6.1	Introduction — 56
3.6.2	Role — 56
3.6.3	Supervision groups — 56
3.6.4	Approaches — 57
3.6.5	Feedback — 57
3.6.6	Feedback on your role as supervisor — 58
3.7	Supervising (un)graduate students — 58
3.7.1	Reports by students — 59
3.7.2	Feedback — 60
4	Assessment in a chemistry course — 61
4.1	Types of assessment — 61
4.2	Criteria for assessment — 61
4.3	Formative assessment — 62
4.3.1	Introduction — 62
4.3.2	Techniques of formative assessment — 63
4.4	Summative assessment — 63
4.4.1	Criteria for summative assessment — 63
4.4.2	Levels of knowledge — 64
4.4.3	Use of knowledge levels in summative assessment — 67
4.4.4	Designing summative tests — 69
4.4.5	Marking the exams — 70
4.4.5.1	Rubrics — 70
4.4.5.2	Written exams — 71
4.4.5.3	Pitfalls in marking exams — 72

5	Evaluation — 75
5.1	Moments of evaluation — 75
5.2	Evaluation form — 75
5.3	Evaluation of the summative assessment — 76
5.4	The improvement plan — 77
6	Professional development — 79
	Literature Cited — 83
	List of figure sources — 89
	Index — 91