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FACULTY OF MATHEMATICS AND NATURAL SCIENCES
CHEMISTRY DEPARTMENT

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SEMESTER LEARNING PLAN (RPS)

KIM 236
ANALYTICAL CHEMISTRY PRACTICUM
2(0-2)

Endorsement		Approval		Compilation of	
Date	DD/MM/YYYY	Date	DD/MM/YYYY	Date	DD/MM/YYYY
Head of Department (.....)		Head of Division (.....)		Course Coordinator (.....)	

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INSTRUCTIONAL ANALYSIS

After attending this course students will

- Can work in the Laboratory properly and correctly in accordance with Lab K3 standards
- Can make solutions required in analyses
- Can calibrate volume and mass measuring instruments
- Can perform titration properly and correctly
- Can perform both gravimetric and titrimetric sample analyses
- Can perform component extraction, either by liquid-solid extraction, liquid-liquid, or distillation

14. Competency Test 2

13. Distillation

12. Liquid-Liquid Extraction

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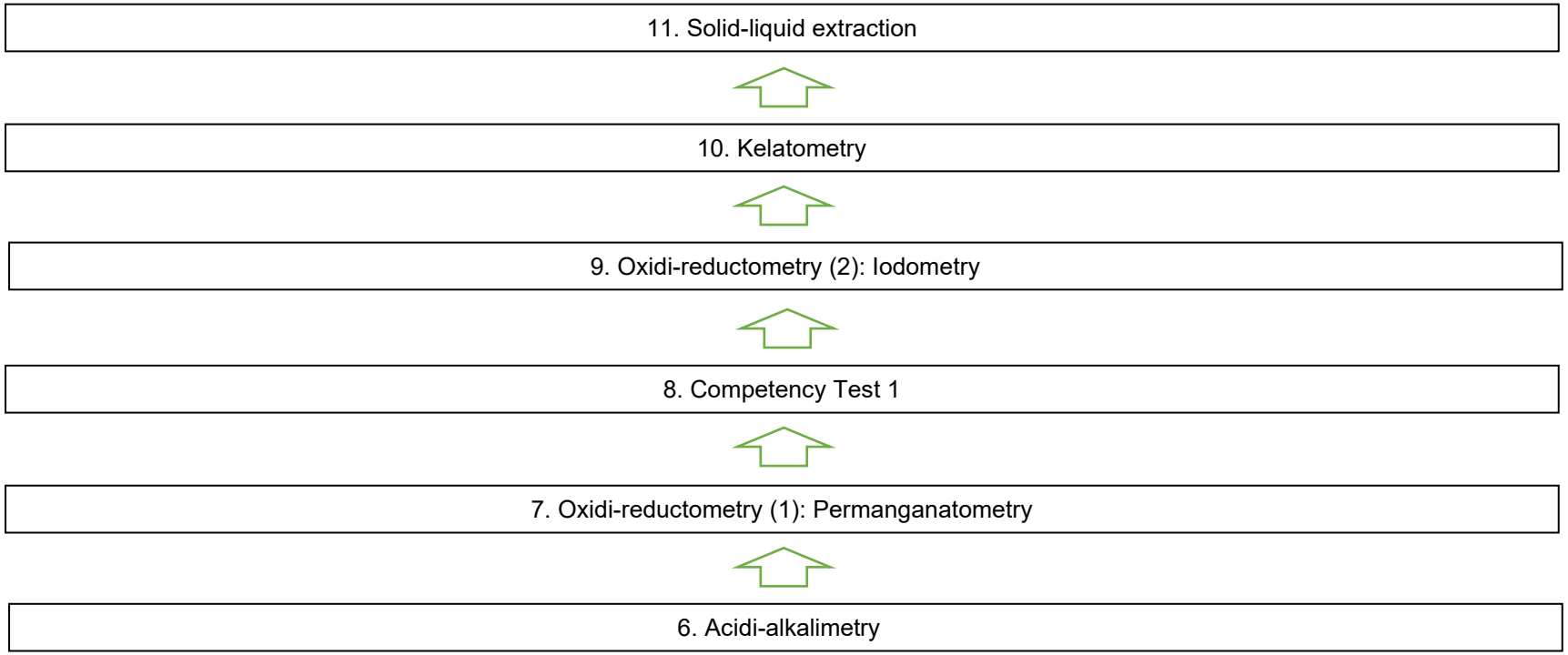

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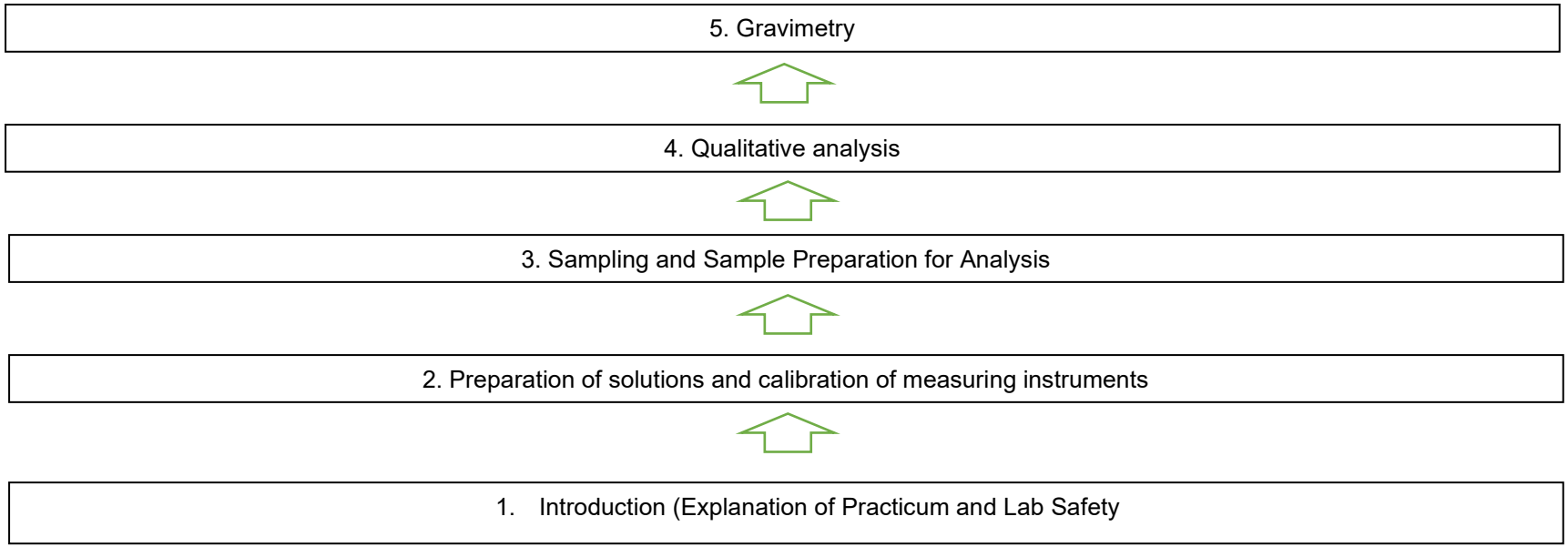

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SEMESTER LEARNING PLAN (RPS)

Course Name	:	Analytical Chemistry Practicum
Code/SKS	:	KIM 236/2(0-2)
Semester	:	3
Course Description	:	The Analytical Chemistry Practicum course provides basic skills for analysing organic and inorganic materials from samples, including reintroduction of K3 Lab, making solutions and calibrating measuring instruments, gravimetry, titration (acidimetry, oxidireductometry, kelatometry, component extraction (solid-liquid, liquid-liquid), distillation, and competency testing.
Prerequisite Courses (if any)	:	Have taken Basic Chemistry (KIM 105)
Course Learning *Outcomes* (CPMK)-Learning *Outcome*	:	After attending this course students will • Can work in the Laboratory properly and correctly in accordance with Lab K3 standards • Can make solutions required in analyses • Can calibrate volume and mass measuring instruments • Can perform titration properly and correctly • Can perform both gravimetric and titrimetric sample analysis • Can perform component extraction, either by liquid-solid extraction, liquid-liquid, or distillation
Study Materials on the *Royal Society of Chemistry (RSC) Chemistry* Curriculum Map[2)]	:	This course is related to Analytical techniques; sampling, data treatment, statistics, quantitative analysis, quality assurance; Classical techniques; titrations, gravimetry; Titration calculations; including those with transition metals; Separation techniques; filtration, crystallisation, simple and fractional distillation.

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References/Sources of Learning	1. Skoog DA, et al. 2013. Fundamentals of Analytical Chemistry. 9th Edition 2.
Division/Science Area	: Analytical Chemistry
Lecturer (Teaching Team)	: Dr Deden Saprudin, S.Si, M.Si (coordinator) Rudi Heryanto, SSi., MSi Zulhan Arif, M.Si

[1)]response/practicum activities are expressed in credits rather than hours.
[2)]view the excel file of Chemistry Curriculum Map from RSC

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I. LEARNING PLAN

MINGGU KE-	EXPECTED FINAL ABILITY-Sub-CLOCK	STUDY MATERIAL (TEACHING MATERIAL)	LEARNING METHODS	ESTIMATION TIME	STUDENT LEARNING EXPERIENCE	ASSESSMENT			LITERATURE REFERENCE
						CRITERIA	INDICATOR	WEIGHT (%)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	***Able to apply K3 Lab during lab work***	• Practicum Assessment Contract • Practicum Work Safety -	Face-to-face in class Material demonstration	2 x 160 minutes	• Students know and understand work safety during lab work • Conduct interaction between students and: (i) lecturer (ii) other students (iii) teaching material • Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem	**Hard Skills:** Completeness and correctness about: • safety during labour practice **Soft Skills:** a. Liveliness b. Cooperation c. responsibility d. discipline e. accuracy and completeness in making questions and statements during interactive discussions	>90% of students correctly answer safety questions during lab work	7	1
2	Able to make solutions and calibrate volume measuring instruments and balance sheets	Preparation of solutions and calibration of measuring instruments	Practicum in Analytical Chemistry laboratory with group work @ 3 students	2 x 160 minutes	• Calibrating volumetric measuring instruments • Perform balance sheet calibration	**Hard Skills:** Ability to calibrate voumetric measuring instruments and	>90% of students are able to make solutions and calibrate volume measuring	7	1,2

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					• How to weigh solids and liquids.
					• Select appropriate tools for solution preparation
					• Dissolves ingredients well
					• Calculate the concentration of solutions with several units of concentration
					• Determining the dilution factor
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem
						balance sheets, and make solutions
						
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during interactive discussions
							instruments and balance sheets		

3	Able to do sampling properly and sample preparation for analysis	Sampling and Sample Preparation for Analysis	Practicum in Analytical Chemistry laboratory with group work @ 3 students	2 x 160 minutes	• Sampling • Sample preparation for analysis • Conduct interaction between students and: • lecturer	**Hard Skills:** Able to perform • Sampling • Sample preparation for analysis **Soft Skills:**	>90% of students are able to do sampling well and prepare samples for analysis well	7	1,2

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					• other students • teaching material • Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem	• Liveliness • Cooperation • responsibility • discipline • accuracy and completeness in making questions and statements during interactive discussions			
4	Able to explain inorganic and organic systematic qualitative analysis	Systematic qualitative analysis of inorganic and qualitative analysis of organic compounds	Practicum in Analytical Chemistry laboratory with group work @ 3 students	2 x 160 minutes	• Perform inorganic and organic systematic qualitative analysis • Conduct interaction between students and: • lecturer • other students • teaching material • Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem	**Hard Skills:** Able to perform • Inorganic systematic qualitative analysis • Qualitative analysis of organics **Soft Skills:** • Liveliness • Cooperation • responsibility • discipline • accuracy and completeness in making questions and statements during interactive discussions	• >90% of students answered correctly the question of qualitative analysis of inorganic systematics • >90% of students answered correctly the question of qualitative analysis of organic compounds	7	1, 2, 3, 4

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5	Able to perform gravimetric analysis	Gravimetric Analysis	Practicum in Analytical Chemistry laboratory with group work @ 3 students	2 x 160 minutes	• Perform gravimetric analysis
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem
						Hard Skills:
						Able to perform gravimetric analysis
						
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during interactive discussions
							>90% of students are able to perform gravimetric analysis	7	1,

6	Able to perform assidi-alkalimetric analysis	Gravimetric Analysis	Practicum in Analytical Chemistry laboratory with group work @ 3 students	2 x 160 minutes	• Perform gravimetric analysis
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem
					•
						Hard Skills:
						Able to perform gravimetric analysis
						
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during interactive discussions
						•
							>90% of students are able to perform gravimetric analysis	7	1, 2, 3, 4

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7	Able to perform permanganatometric analysis	Permanganatometry	Practicum in Analytical Chemistry Laboratory with group work @ 3 students	2 x 160 minutes	• Perform permanganatometric analysis
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem
					•
						Hard Skills:
						Able to perform permanganatometric analysis
						
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during interactive discussions
						•
							• >90% of students are able to perform permanganatometry analysis	7	1,

8	Students are competent in weighing, making solutions, and titration	**Competency tests** in weighing, making solutions, and titration	Competency testing in Analytical Chemistry Laboratory	2 x 160 minutes	• **Competency tests** in qualitative analysis, acidialkalimetric analysis, and permanganatometry
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					Gaining compatibility/understanding of understanding,
						Hard Skills:
						Able to perform permanganatometric analysis
						
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during
							>90% of students are competent in weighing, making solutions, and titration	8	

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					opinions, agreements, and joint decisions on a problem	interactive discussions			

9	Able to perform Iodometric analysis	Iodometry	Practicum in Analytical Chemistry Laboratory with group work @ 3 students	2 x 160 minutes	• Perform Iodometric analysis
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem
						Hard Skills:
						Able to perform Iodometric analysis
						
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during interactive discussions
							>90% of students are able to perform Iodometric analysis	7	1,

10	Able to perform chelometric analysis	complexometry	Practicum in Analytical Chemistry Laboratory with group work @ 3 students	2 x 160 minutes	• Performing chelateometric analysis
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions,
						Hard Skills:
						Able to perform chelometric analysis
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during
							>90% of students are able to perform chelometric analysis	4	1

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					agreements, and joint decisions on a problem	interactive discussions			

11	Able to perform solid-liquid extraction	Solid-liquid extraction	Practicum in Analytical Chemistry Laboratory with group work @ 3 students	2 x 160 minutes	• Perform solid-liquid extraction
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem
					•
						Hard Skills:
						Able to perform solid-liquid extraction
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during interactive discussions
							>90% of students are able to perform solid-liquid extraction	7	1,

12	Able to perform liquid-liquid extraction	Liquid-liquid extraction	Practicum in Analytical Chemistry Laboratory with group work @ 3 students	2 x 160 minutes	• Perform liquid-liquid extraction
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and
						Hard Skills:
						Able to perform liquid-liquid extraction
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during
							>90% of students are able to perform liquid-liquid extraction	7	1,

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					joint decisions on a problem •	interactive discussions			

13	Able to perform distillation techniques	Distillation	Practicum in Analytical Chemistry Laboratory with group work @ 3 students	2 x 160 minutes	• Perform distillation technique
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem
					•
						Hard Skills:
						Able to perform distillation techniques
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements during interactive discussions
							>90% of students are able to perform distillation techniques	7	1,

14	Students are competent in performing extraction and distillation	**Competency test** in extraction and distillation	Competency testing in Analytical Chemistry Laboratory	2 x 160 minutes	• **Competency tests** in qualitative analysis, acidialkalimetric analysis, and permanganatometry
					• Conduct interaction between students and:
					  • lecturer
					  • other students
					  • teaching material
						Hard Skills:
						Able to perform permanganatometric analysis
						
						Soft Skills:
						• Liveliness
						• Cooperation
						• responsibility
						• discipline
						• accuracy and completeness in making questions and statements
							>90% of students are competent in extraction and distillation	8	

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					• Gaining compatibility/understanding of understanding, opinions, agreements, and joint decisions on a problem	during interactive discussions •			

II. ASSESSMENT DESIGN

No.	Learning Outcomes Course Content	Work Plan	Quiz	Work (Activeness in the Lab)	Report	EXAM		
						UK1	UK2	UP
1	***Able to apply K3 Lab during lab work***	-	-	-	√	-	-	√
2	Able to make solutions and calibrate volume measuring instruments and balance sheets	√	√	√	√	-	-	√
3	Able to do sampling properly and sample preparation for analysis	√	√	√	√	-	-	√
4	Able to explain inorganic and organic systematic qualitative analysis	√	√	√	√	-	-	√
5	Able to perform gravimetric analysis	√	√	√	√	-	-	√
6	Able to perform assidi-alkalimetric analysis	√	√	√	√	-	-	√
7	Able to perform permanganatometric analysis	√	√	√	√	-	-	√

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8	Students are competent in weighing, making solutions, and titration	-	-	-	-	√	-	-
9	Able to perform Iodometric analysis	√	√	√	√	-	-	√
10	Able to perform chelometric analysis	√	√	√	√	-	-	√
11	Able to perform solid-liquid extraction	√	√	√	√	-	-	√
12	Able to perform liquid-liquid extraction	√	√	√	√	-	-	√
13	Able to perform distillation techniques	√	√	√	√	-	-	√
14	Students are competent in performing extraction and distillation					-	√	-

[3)]Choose one

III. ASSESSMENT WEIGHT

Assessment Criteria	Value Range	Weight Value (%)	Description
Work Plan	70-100	9	Individual grades
Quiz	0-100	9	Individual grades
Work (Activeness in the Lab)	70-90	18	Individual grades
Report	80-100	24	Individual Grades
Competency Test 1	60-100	8	Individual Grades
Competency Test 2		8	
Practical Exam	0-100	24	Individual Grades

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Analytical Chemistry Practicum Score KIM 234 / credits 2(0-2)	**100**	

IV. WORK PLAN ASSESSMENT RUBRIC

Value Range	Group Resume Assessment Criteria
≥ 90	if students can: - Create an assigned Work Plan with good systematisation, - develop a Work Plan that is effective, efficient, appropriate, and in accordance with the assignment - use good and correct sentences according to PUEBI and are easy to understand, - drawings are clearly self-made - submit the Work Plan on time, - Work Plan book size as requested - have a good, neat, and polite manner of delivery. - Identity is written clearly
80--<90	if students can: - Create an assigned Work Plan with good systematisation, - prepare a Work Plan that is effective, efficient, appropriate, and in accordance with the assignment - use good and correct sentences according to PUEBI and are easy to understand, - drawings are clearly self-made - submit the Work Plan on time, - the size of the Work Plan book is not as requested - have a good, neat, and polite manner of delivery. - Identity is written less clearly

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70--<80	if students can: - Created an assigned Work Plan with a fairly good systematisation, - develop a Work Plan that is effective, efficient, appropriate, and in accordance with the assignment - They use good sentences but some are not PUEBI-compliant and are easy to understand, - drawings are clearly self-made - submit the Work Plan on time, - Work Plan book size as requested - have a good, neat, and polite manner of delivery. - Identity is written less clearly

V. REPORT ASSESSMENT RUBRIC[4)]

Report Components	Assessment			
	None	Less good	Good	Very good
Identity of the report (Name of Practitioner, NIM, etc.)	0	1	2	3
Experiment title	0	1	2	2
Basic principles/theories of experimentation	0	6	8	10
Experiment Objective	0	1	2	3

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Experiment Procedure	**0**	**1**	**2**	**2**
Data Results and Calculations	**0**	**20**	**25**	**30**
Discussion of Results - 40	**0**	**25**	**35**	**40**
Conclusion - 5	**0**	**3**	**4**	**5**
Bibliography	**0**	**3**	**4**	**5**

[4)]The assessment rubric can be customised to the task given

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