Republic of the Philippines
SULTAN KUDARAT STATE UNIVERSITY
Isulan, Sultan Kudarat
College of Industrial Technology
First Semester S.Y. 2025-2026

MST 001
CHEMISTRY FOR INDUSTRIAL TECHNOLOGISTS

1st Semester
School Year 2025 – 2026

Prepared by:

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MST 001– CHEMISTRY FOR INDUSTRIAL TECHNOLOGISTS

UNIVERSITY VISION

A leading University in advancing scholarly innovation, multi-cultural convergence, and responsive public service in a borderless Region.

UNIVERSITY MISSION

The University shall primarily provide advanced instruction and professional training in science and technology, agriculture, fisheries, education and other related fields of study. It shall also undertake research and extension services, and provide progressive leadership in its areas of specialization.

UNIVERSITY STRATEGIC GOALS

a. Deliver quality service to stakeholders to address current and future needs in instruction, research, extension, and production
b. Observe strict implementation of the laws as well as the policies and regulations of the University
c. Acquire with urgency state-of-the-art resources for its service areas
d. Bolster the relationship of the University with its local and international customers and partners
e. Leverage the qualifications and competences in personnel action and staffing
f. Evaluate the efficiency and responsiveness of the University systems and processes

INSTITUTIONAL OUTCOMES (IO)

a. Enhance competency development, commitment, professionalism, unity and true spirit of service for public accountability, transparency and delivery of quality services
b. Provide relevant programs and professional training that will respond to the development needs of the region
c. Strengthen local and international collaborations and partnerships for borderless programs
d. Develop a research culture among faculty and students
e. Develop and promote environmentally-sound and market-driven knowledge and technologies at par with international standards
f. Promote research-based information and technologies for sustainable development
g. Enhance resource generation and mobilization to sustain financial viability of the university

PROGRAM OUTCOMES (PO) COMMON TO ALL PROGRAMS AND ITS RELATIONSHIPS TO INSTITUTIONAL OUTCOMES

	INSTITUTIONAL OUTCOMES (IO)						
A graduate of Sultan Kudarat State University can:	**a**	**b**	**c**	**d**	**e**	**f**	**g**
a. discuss the current developments and advancements in the specific field of practice;	✓	✓				✓	
b. demonstrate independently the 21st century competencies and skills;	✓	✓		✓		✓	
c. work collaboratively in multi-disciplinary and multi-cultural groups;	✓		✓	✓	✓		
d. exhibit professional, social and ethical accountability;	✓	✓	✓	✓	✓		
e. preserve Filipino historical and cultural heritage;	✓	✓	✓	✓	✓		

f. generate new knowledge through data-driven research and development projects; and				✓	✓	✓	✓
g. participate actively in the national, regional and local development plans.	✓	✓	✓	✓	✓	✓	✓

1 **COURSE CODE** MST 001
2 **COURSE TITLE** Chemistry for Industrial Technologists
3 **PREREQUISITE** None
4 **CREDITS** 3 units Lecture; 1 unit Laboratory

5 **COURSE DESCRIPTION**

This course deals with the general concepts of chemistry that are emphasized through classroom and laboratory experience. It discusses chemical bonds, compound formations, chemical reactions, and symbolic representations, the mole concept and its applications, gas laws, solutions and colloids, acids, bases, salts and even chemical equilibrium. Specifically, this course discusses the core concepts of phases of matter such as the intermolecular forces and its properties. Furthermore, the laboratory part includes activities and experiments that aims to strengthen chemical concepts and principles learned by the students as well as develop their skills in the use of common laboratory apparatus, safety in the laboratory, data analysis and interpretation of results.

6 **COURSE LEARNING OUTCOMES (CLO) AND ITS RELATIONSHIPS TO PROGRAM OUTCOMES**

Course Learning Outcomes (CLO)	Program Outcomes						
At the end of the course, a student can:	a	b	c	d	e	f	g
a. discuss the basic concepts of the chemistry of matter and its properties;	✓	✓	✓	✓	✓	✓	✓
b. explain the chemical principles and concepts of structures and bonding of common materials;	✓	✓	✓	✓	✓	✓	✓
c. identify and discuss the chemical processes that take place in all matter around us and how these affects us;	✓	✓	✓	✓	✓	✓	✓
d. identify key chemistry concepts related to Industrial Technology; and	✓	✓	✓	✓	✓	✓	✓
e. conduct experiments and be able to state experimental observations that relate the principles and fundamental concepts of chemistry to Industrial Technology profession.	✓	✓	✓	✓	✓	✓	✓

7 **COURSE CONTENTS**

WEEK	CONTENT	INTENDED LEARNING OUTCOMES (ILOs)	TEACHING AND LEARNING ACTIVITIES (TLA)	OUTCOMES-BASED ASSESSMENT (OBA)	COURSE LEARNING OUTCOMES (CLOs)
1	**Course Orientation** *SKSU VMGO, Classroom Policies, Course Overview, Course Requirements, Grading System*	At the end of the week, the students can: a. discuss the University's VMGO, classroom policies, course overview, requirements and grading system	Discuss the VMGO of the University, the classroom policies, scope of the course, course requirements and grading system		
1	**Matter and its Properties** a. *Chemistry* b. *Physical and Chemical Properties*	At the end of the week, the students can: a. Classify matter according to its properties and characteristics.	a. Concept Recall; b. Interactive lecture and discussion; c. Board work Practice d. Individual/ Peer/ Group Activity	a. Oral recitation b. Written work	c,e,f

	c. Intensive and Extensive Properties d. Physical separation techniques				
2	**Laboratory Safety Orientation** a. Chemical Safety b. Laboratory Rules c. Laboratory Handling and Standard Protocols d. Accidents in the Laboratory d. Orientation on what to do in case of lab accidents, earthquake and fire.	At the end of the week, the students can: a. Identify and explain chemical safety measures and laboratory rules safe lab environment. b. Demonstrate appropriate responses to laboratory accidents and emergency situations.	a. Interactive lecture and discussion b. Concept Mapping c. Laboratory	a. Oral recitation b. Written work/ Seat work d. Laboratory Report	
2	**Standards and Measurements** a. Basic units of Measurements b. Significant Figures c. Scientific Notation d. Dimensional analysis e. Density	At the end of the week, the students can: a. Demonstrate accurate measurement and conversion of physical quantities by applying basic units, standard measurement and dimensional analysis. b. Compute and interpret the density of substances using appropriate formulas, and units. c.	a. Concept Recall b. Interactive lecture and discussion c. Collaborative Problem Solving d. Laboratory Application on Density	a. Oral recitation b. Written work/ Seat work c. Board work Practice d. Laboratory Report	a,c,d,
3	***Atoms, Molecules and Ions*** *a. Atoms and Elements* *b. Compounds and Molecules* *c. Ions* *d. Monatomic Ions* *e. Polyatomic Ions* *f. Writing chemical formulas and nomenclature*	At the end of the week, the students can: a. Describe and differentiate atoms, elements, compounds, molecules, and ions (monatomic and polyatomic) in terms of their structure, composition, and properties. b. Construct and name chemical formulas of compounds accurately by applying the rules of nomenclature.	a. Concept Recall; b. Interactive lecture and discussion; c. Board work Practice d. Collaborative Problem Solving e. Activity worksheet on Nomenclature and formula writing	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,b,c,d

4	**Stoichiometry** a. Balancing Chemical equations b. Types of Chemical Equations c. Mole concept d. Avogadro's number; e. Mass-Mole-Particle Conversion	At the end of the week, the students can: a. Balance chemical equations accurately to represent chemical reactions according to law of conservation of mass. b. Apply the principles of the mole concept, Avogadro's number, and mass–mole–particle conversions analyze chemical substances.	a. Concept Recall; b. Interactive lecture and discussion; c. Board work Practice d. Collaborative Problem Solving e. Activity worksheet on Balancing Chemical Equations	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,b,c,d
5	**Gases** a. Introduction to Kinetic Molecular Theory; b. Ideal vs Real Gases; c. Gas Laws: Boyle's Law, Charles' Law, Avogradro's Law, Gay-Lussacs Law and Combined Gas Law.	At the end of the week, the students can: a. Explain the principles of the Kinetic Molecular Theory, differentiate the behavior of ideal and real gases. b. Solve problems involving Gas Laws by applying mathematical relationships between pressure, volume, temperature, and amount of gas.	a. Concept Recall b. Interactive lecture and discussion c. Board work Practice d. Collaborative Problem Solving	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,c,d,e
6	**Electronic Structure of an Atom** a. Atomic Model b. *Principles and Rules in Electronic Structure* *-Aufbau Building up Principle* *-Hund's Rule* *-Pauli Exclusion Principle* c. *Quantum Numbers* *-Principal QN* *-Azimuthal QN* *-Magnetic QN* *-Spin QN* d. *Electronic Configuration*	At the end of the week, the students can: a. Students can explain significance of atomic models and quantum numbers in the behavior and arrangement of electrons in an atom. b. Students can determine and construct the electronic configuration.	a. Interactive lecture and with visual aid b. Guided problem Solving c. Collaborative Concept Mapping	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,b,c,d

7.	**Electronic Structure of an Atom and Periodicity** a. Periodic Trends b. Atomic Size and Radius c. Electronegativity d. Ionization Energy e. Metallic Character f. Non-metallic Character g. Reactivity	At the end of the week, the students can: a. Explain and analyze periodic trends based on the electronic structure of atoms. b. Predict and compare the properties of elements by their position in the periodic table.	a. Concept Recall b. Interactive Periodic Table Exploration b. Board work Problem Solving	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,b,c,d
8	**Chemical Bonding** a. Valence Electrons b. Lewis Dot Structure b. Chemical Bonding c. Ionic Bonding d. Metallic Bonding e. Covalent Bonding -Lewis Structure -Octet Rule	At the end of the week, the students can: a. Illustrate Lewis dot structures to represent valence electrons. b. Differentiate and explain the types of chemical bonding—ionic, metallic, and covalent—resulting properties of substances	a. Concept Recall and Interactive Discussion b. Interactive Periodic Table Exploration c. Board work Problem Solving	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,b,c,d
9	**MIDTERM EXAM**				
10-11	***Organic Compounds*** *a. Organic Chemistry* *b. Hydrocarbons* *-Alkanes* *-Alkenes* *-Alkynes* *c. Functional Groups* *-Alcohols* *-Aldehydes* *-Ketones* *-Carboxylic Acids* *-Esters*	At the end of the week, the students can: a. Classify, describe the structure, properties, and general formulas of hydrocarbons organic functional groups. b. Apply IUPAC nomenclature rules to name and draw structural formulas of hydrocarbons.	a. Class Discussion b. Reporting c. Brainstorming d. Individual/ Peer/ Group Activity e. Laboratory	a Oral recitation b. Written work/ Seat work c. Board work Practice d. Laboratory Report	a,b,c,d, e

	-Ethers -Thiols -Sulfides				
12	**Intermolecular Forces** a. Intermolecular Forces -Van der Waals -London Dispersion Forces -Hydrogen Bonding -Dipole-Dipole Interaction b. Properties of Liquids c. Crystals	At the end of the week, the students can: a. Explain and differentiate the types of intermolecular forces and their influence on the behavior of substances.	a. Class Discussion; a. Reporting b. Brainstorming c. Individual/ Peer/ Group Activity	a. Discussion and oral recitation b. Written work	a,b,c,d,
13	**Physical Properties of Solutions** a. Types of Solutions -Unsaturated -Saturated -Supersaturated b. Concentration Units -Percentage by mass -Percentage by Volume -Molarity -Molality -Mole Fraction c. Colloids	At the end of the week, the students can: a. Describe and differentiate the types of solutions. b. Analyze and apply concepts of solutions and colloids by performing calculations.	a. Interactive lecture and discussion b. Collaborative Problem Solving c. Board work Practice d. Think, Pair, Share	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,b,c,d,
14	***Chemical Equilibrium*** *a. Chemical Equilibrium* *b. Equilibrium Constant*	At the end of the week, the students can: a. Explain the concept of chemical equilibrium and reversible reactions. b. Calculate and interpret the equilibrium constant for chemical systems. .	a. Interactive lecture and discussion b. Collaborative Problem Solving c. Board work Practice	a. Oral recitation b. Written work/ Seat work c. Board work Practice	a,b,c,d

15-16	**Acid, Base and Salt Equilibria** a. Bronsted-Acids and Bases b. pH c. Strengths of Acids and Bases d. Acid Base Titrations e. Neutralization Reactions	At the end of the week, the students can: a. Explain the Bronsted–Lowry concept of acids and bases and pH scale. b. Perform and interpret pH calculations and neutralization reactions to determine the concentration and strength of acids or bases.	a. Interactive lecture and discussion a. pH measurement Activity b. Acid-Base Titration Laboratory	a. Oral recitation b. Written work/ Seat work c. Laboratory Report	a,b,c,d,e
17	**Fun DIY CheMagic** -Final Requirement	At the end of the week, the students can: a. Apply chemistry concepts learned in class to make and perform safe, engaging DIY experiments using readily available household materials. b. Analyze and explain the chemical principles demonstrated in the experiments, connecting them to real-world applications and prior classroom learning.	a. Brainstorming & Planning Session b. Hands-On Experimentation c. Video Presentation	a. Instructor-Peer Feedback & Reflection	a,b,c,d,e
18	**FINAL EXAMINATION**				

Total No. of Hours : 54

8 COURSE REQUIREMENTS AND COURSE POLICIES

COURSE REQUIREMENTS

Each student is required to:

1. *submit accomplished assignments and laboratory report;*
2. *make a PowerPoint presentation, and a written summary of the assigned report;*
3. *discuss an assigned topic to report and participate in class discussions; and*
4. *pass the major exams (midterm and final).*

COURSE POLICIES

Attendance: *A student will be marked late if he/she enters the class 5 minutes after start of class period. Any student who comes to class 15 minutes after the scheduled time or always three consecutive meetings shall be marked absent.*

Missed work or exam: *Any student who missed to submit a work assignment or to take a test should consult the concerned instructor for immediate compliance*

Cheating and Plagiarism: *Any student who committed any form of academic dishonesty (e.g., copy-paste plagiarism) shall be given disciplinary action provided in the SKSU Student's Ha*

Use of Technology: *Cell phones should be turned off while the session is in progress. Using laptops, notebook PCs, smart phones, and tablets shall be allowed only when needed.*

9 GRADING SYSTEM AND RUBRICS FOR GRADING

GRADING SYSTEM

Midterm Grade

	Weights
Lecture 70%	
Examination	50%
Quizzes/Seatwork	10%
Assignments/Plates	10%
Boardwork/Oral Recitation	15%
Group Work/Presentation	15%
Total	100%

Lecture	**70%**
Laboratory	**30%**
Total	**100%**

	Weights
Laboratory 30%	
Practical Exam	50%
Laboratory Report	25%
Laboratory Performance	25%
Total	100%

Final Term Grade

	Weights
Lecture 70%	
Examination	50%
Quizzes/Seatwork	10%
Assignments/Plates	10%
Boardwork/Oral Recitation	15%
Group Work/Presentation	15%
Total	100%

Lecture	**70%**
Laboratory	**30%**
Total	**100%**

	We
Laboratory 30%	
Practical Exam	
Laboratory Report	
Laboratory Performance	
Total	

$$\text{FINAL GRADE} = \frac{(\text{MIDTERM GRADE} + \text{FINAL TERM GF}}{2}$$

RUBRIC FOR THE INDIVIDUAL/ GROUP SHORT LESSON VIDEO PRESENTATION OF THE TOPIC

CRITERION	UNSATISFACTORY 1	FAIR 2	GOOD 3	EXCELLENT 4
PRESENTATION STRUCTURE	▪ The presentation has no clearly defined structure; or the structure is chaotic	▪ The presentation has a recognizable structure with an introduction and conclusion	▪ The presentation has a clearly defined structure with some clear transitions and a logical introduction and conclusions.	▪ The presentation has a clearl structure with elegant transitions effective introduction and conclusic
CONTENT DELIVERY	▪ Does not speak clearly or demonstrated consistent grammatical errors	▪ Speaks clearly with no grammatical errors	▪ Speaks clearly and effectively	▪ Speaks clearly and effective sophisticated manner.
WRITTEN COMMUNICATION	▪ *Writing is illegible or not adequately used to record information*	▪ Writing is legible and grammatically correct	▪ Writing is legible and well-organized.	▪ Communicates clearly and Legible and grammatically correct.
CONTENT MASTERY	▪ *Shows little to no understanding of the concept*	▪ Limited understanding with gaps	▪ Adequate understanding with some depth	▪ Demonstrates excellent mastery understanding
PRESENTATION QUALITY	▪ *Disorganized and poor visuals*	▪ Somewhat organized but lacks appeal	▪ Organized with acceptable visuals	▪ Clear, visually appealing, and pro quality presentation
PEER-REPORTER INTERACTION	▪ *No interaction; ignores peers*	▪ Minimal interaction; only calls on a few	▪ Interacts with peers but limited engagement	▪ Actively engages peers, e participation, and responds respectfully

Q&A	▪ Unable to answer or shows lack of understanding	▪ Answers with uncertainty or partial accuracy	▪ Answers most questions clearly and correctly	▪ Answers all questions confidently and with depth
Time Organization	▪ Poorly managed; far over/under time	▪ Slightly off from time requirement	▪ Within acceptable time range	▪ Perfect pacing; matches allotted exactly

RUBRIC FOR FINAL REQUIREMENT (FUN DIY CHEMISTRY MAGIC)

CRITERION	UNSATISFACTORY 1	FAIR 2	GOOD 3	EXCELLENT 4
SCIENTIFIC ACCURACY	▪ Major inaccuracies or missing explanation	▪ Some misconceptions present	▪ Mostly correct with minor errors	▪ Concept is fully correct, explain and well-supported by evidence
APPLICATION OF CONCEPTS	▪ No clear link to learned concepts	▪ Limited connection to lessons	▪ Shows clear but basic connection	▪ Demonstrates strong connectior learned
CREATIVITY AND ENGAGMENT	▪ Lacks creativity and engagement	▪ Minimal creativity	▪ Creative but less engaging	▪ Highly creative and engaging
SAFETY PRACTICES	▪ Unsafe or careless execution	▪ Some unsafe practices noted	▪ Most safety rules followed	▪ All safety guidelines followed and
PRESENTATION QUALITY	▪ Disorganized and poor visuals	▪ Somewhat organized but lacks appeal	▪ Organized with acceptable visuals	▪ Clear, visually appealing, and prc quality presentation

10 REFERENCES

Textbooks

1. Brown, T. L, LeMay H.E.S., Bursten, B.E., Murphy, C.J., Woodward P.M. (2012). Chemistry: The Central Science 12th edition. Pearson Prentice Hall.
2. Chang, R. (2010). Chemistry. 10th edition. Mcgraw-Hill Companies, Inc.
3. Silberberg, M., Amateis, P. (2015). Chemistry: The Molecular Nature of Matter and Change. 7th Edition. McGraw-Hill Education
4. Zumdahl S.S., Zumdahl S. A., DeCoste, D. (2018). Chemistry. 10th edition. Cengage Learning.

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