University of the Philippines
Association of Chemistry Majors and Enthusiasts

3/F Institute of Chemistry Teaching Building
University of the Philippines - Diliman

March 28, 2022

Dr. May B. Eclar
Regional Director
Office of the Regional Director
Department of Education - Central Luzon
Maimpis, City of San Fernando, Pampanga

Advisory
No. 048, s. 2022
To: All Schools Division Superintendents
For information.
MAY B. ECLAR, PhD, CESO III
Regional Director

Dear Dr. May B. Eclar:

Greetings!

WHO WE ARE

The **University of the Philippines Association of Chemistry Majors and Enthusiasts (UP ACME)** is a duly recognized, non-partisan, non-religious, non-stock, non-profit, student-oriented organization based in the Institute of Chemistry at the College of Science, UP Diliman. Founded in **1997**, the organization has been geared towards the **promotion of the study of Chemistry in the Philippine setting** through various university-based and community-based projects and events. Throughout the years, UP ACME has been **developing individuals into scientists and enthusiasts** by providing them the opportunities for exceptional leadership skills and further appreciation of the sciences, specifically Chemistry. In line with the goal to **strive for academic excellence alongside holistic development**, the organization has consistently produced honor students, top-notchers, professors, instructors, leaders, and winners of competitions. Now in its **25th year**, UP ACME continues to attain a **legacy of brilliance** by transforming every member into honorable servants of the nation. UP ACME is "***where matter meets purpose***".

OUR EVENT

UP ACME has successfully organized projects that promote better understanding of and appreciation for the sciences. Now that UP ACME is celebrating 25 years of promoting the importance of science, we have put together unique events to highlight the need for better science communication as well as to celebrate ACME's Silver anniversary.

2021-2022
EXECUTIVE COMMITTEE

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PATRICIA EMMANUELLE A. PEREZ
Executive Secretary

UP ACME has been dedicated in promoting better understanding and appreciation of the sciences through different campus-wide and nationwide projects. As we celebrate our 25th founding anniversary, we are determined to continue this mission by conducting various events that showcase scientific literacy and highlight the need for better science communication. With this, we are proud to present one of our biggest events, the **8th HSM: Hanep sa Science at Math.** This year's HHSM will both be a **quiz bee and a scientific writing symposium and competition** open to high school students. The **Quiz Bee category** will be open to **non-science junior high school students**, while the **scientific writing symposium and competition** will be open to **all junior high school and senior high school students**, as well as **out-of-school youth aged 13-19 years old nationwide**. This event has five main objectives:

(1) to **promote the appreciation of natural sciences** and emphasize its importance in today's society through a friendly competition;
(2) to **hone the students' skills and abilities in scientific writing;**
(3) to **give importance to factual checking** and proper information dissemination;
(4) to **advocate for scientific discourse** and practice in the Philippines; and
(5) to **instill the tradition of honor and excellence in the scientific field** thru a healthy collaboration between the participants

The Quiz Bee and Scientific Writing Symposium will take place virtually on **May 14, 2022** and **May 21, 2022**, respectively. The **elimination round** for the Quiz bee will take place at **8:00 AM**, while the **final round** will start at **1:00 PM**. For scientific writing, the **whole day** will be dedicated to the **symposium** while the **contest proper** will begin at **5:00 PM**. The participants are expected to submit their outputs at that same time the following day. The registration links for both events are **bit.ly/8thHSMRegQuizBee** and **bit.ly/8thHSMRegScientificWriting**. Further details of the event, as well as its guidelines and mechanics can be found below after this invitation.

OUR REQUEST

We are humbly requesting your good office to **create an advisory by releasing a DepEd Memorandum for the 8th HSM: Hanep sa Science at Math**. This memorandum will be sent along with our proposal to various high schools so that they may register for our event. For any inquiries or clarifications, please do not hesitate to contact us through:

Myxie Tana Rogado
HSM Steering Committee Co-head
0906 475 3715
upd.acme@gmail.com

Thank you very much and we look forward to hearing from you soon!

Sincerely yours,

Laiya Aneka Miller
Vice Chairperson for External Affairs

Noted by,

Lorenzo Angelo Mapalo
Chairperson

Lyle Ijssel De Guzman
Junior Faculty Adviser

HANEP SA SCIENCE AT MATH

Vision

For the past seven years, HSM has been geared towards nurturing the youth to be more academically competent and science-oriented. In its 8th installment this 2022, UP ACME strives to engage an even wider audience in hopes of further solidifying our purpose as an organization that promotes appreciation for the natural sciences, and emphasis on the importance of effective science communication to the youth.

Date and Location

Quiz Bee
When May 14, 2022 (Saturday)
Where
Zoom & Facebook Live
Time
8:00AM-12:00PM (Eliminations)
1:00PM-5:00PM (Finals)

Writing Symposium and Competition
When May 22, 2022 (Saturday)
Where
Symposium: Zoom & Facebook Live
Competition: Asynchronous (Discord)
Time
Symposium: 1:00-5:00PM
Competition: 5:00 PM of May 22 - 5:00 P.M. of May 23

Target Numbers

Quiz Bee

- 40-50 teams
  - 120-150 participants
    - Non-science Junior High School students (preferably 9th or 10th Grade)

Scientific Writing Competition

- 30-40 teams
  - 90-120 participants
    - Junior High School
    - Senior High School
    - Out-of-School Youth (ages 13-19)

Prizes for Winners

Over Php 10,000 worth of cash prizes to be given away for each category

Champion: Php 6,000
First Runner-Up: Php 4,000
Second Runner-Up: Php 2,000
Giveaways from Sponsors
Laptops, PCs and printers for winners' chosen beneficiary

I. 8th HSM Registration Guidelines

1. The 8th HSM consists of **two major events**: the first is a **quiz bee** to be held on May 14, 2022 and the second is a **scientific writing symposium and competition** to be held on May 21, 2022. Registration for both events starts on **April 4, 2022 (Monday)**.
2. The primary organizing body is the HSM 2022 Steering Committee, composed of members from UP ACME. The **Delegate Relations Officer** is in charge of accepting participants and ensuring that all requirements for registration are complied. The **Delegate Experience Officer** is in charge of the guidelines and mechanics of the events, as well as communicating with the teams.
3. Participation in either event is **FREE** of charge.
4. Participants who wish to compete in either of our events must adhere to the following rules:
   a. For the **quiz bee** participants must be a **bona fide Grade 9 or 10 student of the participating school** and the teacher/coach must be a bona fide teacher of the participating school.
   b. For the **scientific writing symposium and competition**, everyone between **13-19 years of age** who has **not yet graduated from Senior High School** is welcome to participate. Those who are not currently **enrolled, including out-of-school youth, are also welcome to register** provided that they satisfy the other requirements. A teacher/coach is allowed but not required for this event.
5. Contestants wishing to form a team must register in **teams of three (3).** For the **quiz bee**, the contestants must all be from the same school. **For the scientific writing symposium and competition**, the contestants do not need to come from the same school nor the same province.
6. A school may only send one team to one of our events, and a team in one event bars the school from sending another team to the other event. To give a chance to all schools, a school may send a **maximum of one (1) team, totaling four (4) enrolled students** (three principal contestants and their alternate contestant). This will be based on a **first-come, first-serve basis**; after 4 students of the same school have been registered, any other applicants from that school will be politely rejected. **In the scientific writing symposium and competition, no limit exists for teams not participating as representatives of their school.**
7. Any changes made in the teams shall be made known to the **HSM Delegate Relations Officer**. Any violation to this rule shall be grounds for disqualification.

8. For either event, a team may opt to include one (1) alternate participant to substitute for one of the team members in case of technical difficulties or emergencies, and substitutions shall conform to the following rules:
   a. **For the quiz bee**, a team's registered alternate **may substitute a principal contestant only if the Elimination Round has not yet begun**. After the first test in the Elimination Round has been distributed, no requests for substitutions will be allowed. There will be no time extensions granted for last minute substitutions.
   b. **For the writing competition**, an alternate may substitute a principal contestant if and only if all the following conditions are met:
      i. The alternate participant is the official alternate of the team and attended the writing symposium portion of the event.
      ii. The substitution takes place within the first six hours of the competition proper.
      iii. The team has duly notified the HSM Steering Committee of the intended substitution and has their approval.
   c. If the above mentioned conditions are not met, the team will have to proceed with the competition without an alternate.
   d. Substitution will result in the original contestant being barred from further participation in the competition even if the original reason for the substitution has passed.
9. Interested schools and/or individuals can register their team by answering the appropriate **8th HSM Registration Form until April 29, 2022 11:59 PM (Friday).**
   a. **Quiz Bee** registration form: **bit.ly/8thHSMRegQuizBee**. Only the **first 50 teams** who registered and submitted all the requirements found below will be accepted.
   b. **Scientific Writing Symposium and Competition** registration form: **bit.ly/8thHSMRegScientificWriting**. Only the **first 40 teams** who registered and submitted all the requirements found below will be accepted.
10. Each participant of a team and coach/teacher will be required to submit a scanned/digital copy of each of the following documents:
   a. For teams whose participants represent a school (applicable for the quiz bee or the scientific writing symposium and competition):
      - **Valid ID** or **proof of identification**. Any of the following will be accepted:
        - **School ID** for S.Y. 2021 – 2022
        - **Government-issued ID** (Passport, Student's Driving License, etc.)
        - **Birth Certificate**
      - **Endorsement letter** from the School Principal
      - **Signed Parental Consent Form** for participants below 18 years old. Link to Parental Consent Form: **bit.ly/8thHSMParentsConsent**
      - **Official School Logo (optional)**
   b. For teams whose participants come from different schools and/or out-of-school youths (applicable only for the scientific writing symposium and competition):
      - **Valid ID** or **proof of identification**. Any of the following will be accepted:
        - **School ID** for S.Y. 2021 – 2022

- **Government-issued ID** (Passport, Student's Driving License, etc.)
- **Birth Certificate**

- **Signed Parental Consent Form** for participants below 18 years old. Link to Parental Consent Form: **bit.ly/8thHSMParentsConsent**

c. For teachers/coaches accompanying a team to either the quiz bee or scientific writing symposium and competition):

- **Valid ID** or **proof of identification.** Any of the following will be accepted:
  - **School ID** for S.Y. 2021 - 2022
  - **Any government issued ID** of the teacher (Passport, Student's Driving license, Birth Certificate, Postal ID)
  - Professional Regulation Commission (PRC) issued **Teacher's License**

11. **Teams are only given until May 6, 2022 at 11:59 PM (Friday) to submit ALL requirements.** Failure to submit any lacking requirements is grounds for cancellation of the team's slot for the competition.
12. After confirmation of registration and teams have submitted all necessary requirements, the team will receive a **confirmation email** and will also be contacted by the HSM Steering Committee for further instructions.

II. 8th HSM Quiz Bee Competition Guidelines and Mechanics

A. Elimination Round

Guidelines

1. HSM: Hanep sa Science at Math is an annual quiz bee competition organized by the University of the Philippines Association of Chemistry Majors and Enthusiasts (UP ACME).
2. The competition is open to all **public or private non-science high schools** in the Philippines.
3. The quiz bee is a single day synchronous event and it shall be held on **May 14, 2022** through **Zoom**. It is divided into two (2) rounds: Elimination and Finals Round. The elimination round will be done in the morning and the finals will be done in the afternoon.
4. **The elimination round is an individual examination** facilitated through Zoom and Google Forms.
   a. Each participant should have a Zoom account, a working email provided in the registration form (preferably Gmail), and a device to enter the Zoom meeting.
   b. Each participant should have either a device with a webcam or a separate webcam.
   c. The student should have the following on hand:
      i. Clean, white bond papers (max. of 5) for solutions,
      ii. Pen/s,
      iii. Non-programmable scientific calculator.

5. The students will be asked to **reset or initialize their calculators** during the exam. These are steps for the specific calculators:
   a. For Casio ES/EX calculators:
      - Shift + 9 (reset) → 3 (all) → = (yes)
   b. For Casio MS/SVPAM calculators:
      - Shift + mode/clr → 3 (all) → = (yes)
   c. For Canon F calculators:
      - Shift + 9 (reset) → 3 (all) → = (yes)
   d. For Sharp EL calculators:
      - Using pen/pencil, press on the reset button then release.
      - If the calculator used is not on the list, please contact the Delegate Relations Officer upon confirmation of registration.
6. The students shall be divided into separate breakout rooms. Members of the same team are not allowed to be in the same breakout room during the exam proper. There will be one (1) facilitator in each room.
   a. Participants must have their cameras and microphones on at all times. The laptop/desktop cameras should **capture the students half-body shot.**
   b. Should the laptop/desktop camera not suffice. A second device (e.g phone) may be used for the call separate from the device. However, using another device is highly discouraged as it increases the risk of latency issues.
   c. Students must **stay on call** during the whole examination. If the participants are disconnected from the call, they will be given **10 minutes to return to the call** or the current subtest they are taking will **automatically be zero (0).**
   d. If any emergency-related concerns arise during the examination, it should be immediately reported to the facilitator assigned.
7. **Any form of cheating** committed by one student shall be **ground for disqualification** of the whole team. The grounds for disqualification due to cheating include, but are not limited to:
   a. changing tabs/windows during the exam for the purpose of searching the correct answers,
   b. using phones/tablets during the test,
   c. communicating with other participants, coaches or other people,
   d. using "cheat sheets" or secondary sources (e.g books, articles).
8. Not following instructions from the facilitator and any untoward behavior may be grounds for disqualification from the exam.

<u>Mechanics</u>

1. The students of each team will take the examination individually through the platform Google Forms with a proctoring add-on that tracks activities and allows screen-recording.
   a. The examination code will be sent through their emails.
   b. The students will enter the necessary information for easy tracking.

2. The examination is a multiple choice type of test. It will cover **five (5) subjects: Biology, Chemistry, Physics, Earth Science, and Mathematics**. Each subtest will consist of 15 questions each with a total of 75 questions for the whole exam.
   a. The subtests will be given separately with varying time allotments. Durations are as follows:
      i. Chemistry: 30 minutes
      ii. Earth Science: 15 minutes
      iii. Physics: 30 minutes
      iv. Biology: 15 minutes
      v. Mathematics: 40 minutes
   b. The participants will be given a unique link for each subtest in their working emails they provided in the registration form.
   c. They will be given 5 minutes before each subtest to access their examination links.
   d. Students are permitted to use calculators for any subject besides Mathematics. **Usage of calculators during the Mathematics exam will result in zero (0) points** for the subject.
3. The examination is a synchronous activity taken by all the participants at the same time. The test will be done in **three (3) hours** including the pre-examination checks and short intermissions in between subtests for distributing and accessing Google form examination links. During this time, the students are not allowed to contact any of their group mates.
   a. A bathroom break will be allotted before the examination. **Once the test has started, participants are not allowed to leave** their screen.
   b. **Latecomers will be allowed to take the examination**. However, they will not be able to take the subtest they missed. The subtest will automatically equate to zero (0) points.
4. Each **correct answer** will be equivalent to **five (5) points. Incorrect and/or no answers** will be **zero (0) points**.
5. Participants must submit their answers before the time runs out. Failure to do so will automatically declare their answers as **invalid or equivalent to zero (0) points** for the subtest.
6. The scores of each member per team will be calculated **cumulatively** from their individual examinations. The **top 20 teams** will move onto the finals round.

B. Finals Round

Guidelines

1. Only the Top 20 participating teams from the elimination round will proceed to the Finals Round which will be held through Zoom.
   a. Each team should ensure that at least one member of the team has a whiteboard or illustration board with a marker or chalk. The member with the board and writing implement shall be the secretary of the team who shall write the team's final answer on their board.

b Each member of the team should have a Zoom account and device to enter the Zoom meeting.

c Each member of the team is only allowed to have a pen/pencil and blank papers for scratch work.

2. Each team will be allocated a Zoom Breakout Room with a facilitator who will serve as the team's chaperon for the Finals round.
   a. The contestants must have their camera and microphone on at all times, and should show their hands, face, and work space at all times.
   b. The contestants may not use a background.
   c. The contestants' hands must be visible at all times and may not interact with any individual outside of their Zoom breakout room for the duration of the Finals Round.

Mechanics

1. The Finals Round will be held in the main room, and the facilitator will share their video and audio feed of the main room to the breakout room.
2. The team will begin the Finals Round with **starting points equal to the sum of their scores** from the Elimination Round. The scores of the Top 20 teams will be announced before the Final Round begins.
3. There will be 25 questions, 5 questions per category (Chemistry, Biology, Physics, Earth Science, and Math) with varying levels of difficulty.
4. The flow for the finals round will proceed as described below:
   a. The members of the team may only communicate with each other when discussing their answer, and all discussions must be verbal ONLY. Contestants are not allowed to chat with each other through any medium.
   b. The **subject and difficulty of the questions will be in no particular order,** and the subject of the question will be flashed first.
   c. **Each team shall decide on a bid within 30 seconds** and report this to their facilitator who will input it into a database for scorekeeping. The bid shall not be lower than 10 and shall not exceed their starting points. The bid must also be in increments of 10. Failure to provide a bid will result in a default bid of 10 for that question.
   d. Once all bids are in, the difficulty of the question as well as the question itself will be revealed and read by the emcee. The team shall wait until the emcee reads the question twice. After the second reading, the emcee shall say "GO", and only then will the timer start and the team may begin working on their answer. The **time allotted for answering the question will vary** depending on the difficulty of the question.
   e. The final answer of the team will be **written by the team secretary on their board** and raised once time is up. Only answers written on the team secretary's board will be considered.
   f. Teams who **answered correctly** will gain the **amount of points that they bid**. Teams who **answered incorrectly or failed to provide an answer** will incur a **deduction equal to half of their bid.**

g Teams who fail to follow any specific and explicit instructions for each question shall be considered incorrect unless recognized by the Board of Judges.

h In the event that a team has reached a score lower than 10 points, they will not be allowed to go further in the Finals Round.

i After the answer to the question is revealed, points will be allocated accordingly unless there is a concern raised by the team. Guidelines for protests, disconnections, and other concerns that may be raised by the teams will be described in-detail in the following section.

5. Protests regarding the veracity of an answer will only be entertained before the subject of the next question is entertained. Protests for previous questions will not be recognized nor protests from non-participants. **Teams who wish to protest their answer shall inform their facilitator** who will declare a protest in the scorekeeping database. The team shall wait to be recognized by the emcees after which the Judge for that subject area will be transferred to the team's breakout room. They will be given a chance to defend their answer and may use supplemental materials if needed. The decision of the Judge shall be final and irrevocable.

6. If any member of the team experiences an interruption, disconnection, or technical difficulty at any point during the Finals Round, the following actions will be taken:

   a. If a team member experiences an interruption or technical difficulty during the bidding process, then the team must declare this to the **facilitator who will wait at most another 30 seconds after the allotted time for bidding**. If the member does not return within the allotted time, then the team must proceed into the question portion without that member.

   b. If a team member experiences an interruption or technical difficulty while a question is live (i.e., teams are currently answering the question), then **the team must continue answering without that member**. If the team member in question is the secretary, then the remaining members of the team must be prepared to display a final answer on a board/paper in lieu of the secretary.

   c. If a team member experiences an interruption or technical difficulty after the answer is revealed but before the subject of the next question is revealed, **the team shall request a wait period from the facilitator. The facilitator will wait at most another 30 seconds after the request before proceeding to the next question.**

   d. **A team is allowed a cumulative 5 wait periods** inclusive of scenarios 8a and 8c, and across all members of the team. After this limit has been reached, a team may still participate in the Finals round, but no more considerations will be given for interruptions and disconnections.

7. The following rules shall be adopted regarding the use of tools and supplementary materials:

   a. The use of scratch paper for solving or working through answers with team mates shall always be allowed, but only after the "GO" signal has been given. Solving before the "GO" signal shall result in the team incurring a warning. Every time a team accumulates two warnings, the team will be barred from answering the next question. After which, the warning count resets to zero (0).

b. Unless otherwise stated in the question or by the emcee, calculators will not be allowed when answering questions, but a team should have one prepared. Use of a calculator when not permitted will result in a warning which counts towards the warning count in 7a.
c. Unless otherwise stated, a team is only allowed to interact with each other during the duration of the Finals round. The facilitator shall not entertain clarifications regarding the question.
d. Unless used for the purpose of defending an answer to the Board of Judges, physical or digital supplementary materials such as notes, textbooks, or other resources are prohibited.
e. Team members are not allowed to access any online or digital resources or search engines for the duration of the Finals round.
f. Transgressions which fall under provisions 7d-e will result in the team being barred from answering the next 10 questions.
g. For every question that the team is barred from answering, **a deduction of 10 points will be incurred**.

8. The Top 3 teams who will garner the most points after all the questions will be declared the Second and First Runner Up, and the Champion, accordingly.
9. In case of a tie between the Top 3 placements, a clincher round shall take place to determine break the tie. The clincher round shall consist of three (3) questions, and the team who gets the highest score after the three questions shall take the contested spot.
   a If a placement is not decided after the three questions, then a sudden-death round will occur. The first team to provide a correct answer to a question shall take the contested place, and the losing team shall take the next placement.
10. The Top 3 schools that will emerge from the quiz bee shall be named the Second Runner-up, First Runner-up, and Champion. Each will be receiving a Certificate of Recognition and a cash prize. Prizes are as follows:
    a **Second Runner-Up: Php 2,000**
    b. **First Runner-Up: Php 4,000**
    c. **Champion: Php 6,000**
    d. **Giveaways from Sponsors**
    e. **Laptops, PCs and printers for winners' chosen beneficiary**

III. 8th HSM Quiz Bee Competition Coverage

MATTER

A. Atoms, Molecules, and Ions
   1. Give the history of the development of the structure of the atom.
   2. Compare and contrast atomic number, mass number and atomic mass.
   3. Name a compound from the chemical formula.

B. Stoichiometry
   1. Calculate compound's formula/molar mass.

2. Convert mass to moles and vice versa, and moles to number of particles and vice versa.
3. Solve problems involving percent composition and empirical formula.
4. Solve mass-mass or mole-mole stoichiometric problems.
5. Identify limiting reactant and calculate the theoretical yield and percent yield.

C. Chemical Reactions

1. Write balanced chemical equations.
2. Identify different types of reactions.
3. Assign oxidation numbers to species and identify the oxidizing and reducing agents.

D. Electron Configuration and Periodicity

1. Apply the Aufbau principle, Hund's rule and Pauli Exclusion Principle.
2. Represent electron configurations using different notations.
3. Predict whether an element exhibits paramagnetism or diamagnetism.
4. Describe the group trend and period trend for different properties (atomic radius, ionization energies, electron affinity, electronegativity, etc.)

E. Chemical Bonding

1. Distinguish ionic, covalent and metallic bonding.
2. Draw Lewis structures for molecules and polyatomic ions.
3. Calculate formal charges.

F. Molecular Geometry

1. Apply the concept of Valence Shell Electron Pair Repulsion (VSEPR) in predicting and describing the electron group geometry and molecular group geometry of compounds.
2. Describe the polarity of a bond and the overall polarity of the molecule.

G. Gases

1. Solve problems involving gas laws.
2. Solve gas mixture problems involving partial pressures and mole fractions.
3. Work on Graham's law problems.

H. Liquids and Solids

1. Describe, compare, and contrast the types of intermolecular forces.
2. Apply the concept of intermolecular forces to explain solubility.

I. Mixtures and Solutions

1. Describe solutions in terms of various units of concentration.
2. Solve problems related to different colligative properties of solutions (e.g. vapor pressure lowering, boiling point elevation, freezing point depression, osmotic pressure).
3. Differentiate colloids from solution and identify various types of colloids.

J. Acids and Bases

1. Differentiate Arrhenius, Bronstead-Lowry and Lewis definition of acids and bases.
2. Calculate pH and pOH.
3. Describe and explain how buffers work.

K. Organic Compounds and Biomolecules

1. Identify the general classes of organic compounds
2. Draw and name organic chemical structures.
3. Recognize the major categories of biomolecules such as carbohydrates, lipids, proteins, and nucleic acids.

LIVING THINGS AND THEIR ENVIRONMENT

A. Cells

1. Studying Cells: Microscopy
   a. Identify the different types of microscopes.
   b. Identify the basic parts of a light microscope and describe their functions.
2. Cell Structure and Components
   a. Distinguish between prokaryotic and eukaryotic cells
   b. Describe the structure and functions of the various cellular components
   c. Explain how substances are transported across a cell membrane.
3. Cellular Metabolism
   a. Describe the processes involved in cellular respiration and photosynthesis.
   b. Describe the functions of enzymes and coenzymes.
4. Cellular Reproduction
   a. Identify the different phases of the cell cycle and describe the sequence of events that occurs during each phase.
   b. List the phases of mitosis and meiosis and describe the events characteristic to each phase.
   c. Distinguish between asexual and sexual reproduction.

B. Genes & Heredity

1. Use Punnett square to predict genotypic and phenotypic expressions of traits.
2. Identify the relevant law of genetics in a particular situation.
3. Explain the different patterns of non-Mendelian inheritance.
4. Describe how genetic information is organized in genes on chromosomes.
5. Outline the process of how protein is synthesized from the information stored in the DNA.
6. Identify various genetic mutations and their consequences.

C. Evolution

1. Explain the mechanism for evolutionary change proposed by different naturalists.
2. Explain how fossil records, comparative anatomy, and genetic information provide evidence for evolution.

D. Biodiversity

1. Distinguish among the three domains of life (*Eubacteria, Archaea,* and *Eukarya*).
2. Classify organisms using the hierarchical taxonomic system.
3. Describe the characteristics, common features and structures of organisms belonging to each of the five kingdoms (*Monera, Protista, Fungi, Plantae, Animalia*).
4. Describe the structural components of viruses and the mechanism by which they reproduce and infect host cells.

E. Ecology

1. Differentiate biotic and abiotic components of the ecosystem.
2. Describe the different ecological relationships found in an ecosystem.
3. Describe and differentiate the major terrestrial and aquatic biomes (tropical forest, desert, taiga, tundra, lakes, estuaries, etc.)
4. Analyze the process of cycling materials in the ecosystem (e.g. water cycle, nitrogen cycle)

F. Human Anatomy & Physiology

1. Identify and classify four types of tissues found in the body (epithelial, connective, muscle, and nerve).
2. Describe the components and the function of the integumentary system.
3. Identify each bone in the skeletal system.

4. Classify the different types of joints found in the body (synarthroses, amphiarthroses, and diarthroses).
5. Identify the different types of muscle tissue and their components.
6. Describe the contraction of muscle.
7. Name the major subdivisions of the nervous system and the functions of each.
8. Explain how a neuron transmits a nerve impulse.
9. Describe the structure of the spinal cord and the principal regions of the brain.
10. Classify hormones into their major chemical categories, identify the gland that secretes them, and determine their effects in the body.
11. Classify the different types of blood cells and their functions.
12. Describe the parts of the heart and the stages of cardiac cycle.
13. Name the major blood circulatory routes.
14. List the major and accessory organs of the digestive tract and explain how they function.
15. Name the organs of the respiratory system and describe how each is involved in the process of breathing and gas exchange.
16. Define the function of the urinary system and identify its parts.

FORCE, MOTION & ENERGY

A. Classical Mechanics

1. Kinematics
   a. Apply vector notations and operations.
   b. Solve problems regarding motion in one- or two- dimensions.
2. Newton's Laws of Motion
   a. Analyze free-body diagrams and solve problems involving forces such as tension, weight, normal force, friction and applied forces.
   b. Use the concept of Newton's third law to identify force pairs and state the magnitude and direction of each.
3. Work, Energy, Power
   a. Calculate the work done by a constant force on an object that undergoes displacement.
   b. Apply the work-energy theorem and law of conservation of energy to solve problems involving energy transformations.
   c. Calculate the power required to maintain the motion of an object and the work that supplies the constant power.
4. Linear Momentum
   a. Calculate total momentum of a system of objects.
   b. Relate impulse to the change in linear momentum.
   c. Solve problems involving elastic and inelastic collisions between two bodies.
5. Circular Motion and Rotation
   a. Relate the radius of the circle and the rate of revolution to the magnitude of centripetal acceleration.
   b. Apply relations among the angular acceleration, angular velocity, and angular displacement of an object that rotates about a fixed axis.
6. Elasticity
   a. Analyze situations in which a body is deformed by tension, compression, pressure, or shear.
7. Gravitation
   a. Determine the force that one spherically symmetric mass exerts on another.
   b. Apply Kepler's three laws of planetary motion to describe the motion of an object in elliptical orbit under the influence of gravitational forces.

B. Fluid Mechanics

1. Apply the relationship between pressure, force, and area and the relationship between pressure and depth.
2. Apply Archimedes' principle to determine buoyant forces on an object immersed in a fluid

C. Thermodynamics

1. Thermal Expansion
   a. Analyze the changes in the dimensions of an object when heated or cooled.
   b. Differentiate the three modes of heat transfer: conduction, convection and radiation
2. Laws of Thermodynamics
   a. Identify the relevant law of thermodynamics in a given situation.
   b. Determine whether entropy will increase, decrease or remain the same.
   c. Calculate the efficiency of a heat engine.

D. Electricity and Magnetism

1. Electrostatics
   a. Determine the resulting charge of objects undergoing conduction and induction.
   b. Calculate the magnitude and the direction of the force between charges using Coulomb's law.
   c. Describe and calculate the electric field and electric potential at the vicinity of a point charge
2. Electric Circuits
   a. Apply Ohm's law to direct-current circuits to solve for a single unknown current, voltage, or resistance.
   b. Analyze DC circuits with multiple components in series or parallel connection.
3. Magnetism
   a. Calculate the magnitude and direction of the magnetic force in terms of the charge, q, velocity, v, and magnetic field, B.
   b. Apply Lenz's law in conceptual problems related to magnetic induction.

F. Waves and Optics

1. Wave Motion
   a. Distinguish transverse waves and longitudinal waves, and mechanical waves and electromagnetic waves.
   b. Apply the relation among wavelength, amplitude, frequency, and velocity for a periodic wave.
   c. Solve problems related to sound waves.
   d. Identify the different regions of the electromagnetic spectrum.
2. Optics
   a. Apply the laws of reflection and the law of refraction.
   b. Use the mirror and thin lens equation to solve problems involving image formation in mirrors and lenses respectively.
   c. Apply concepts in color addition and subtraction.

EARTH & SPACE

A. Earthquakes and faults

1. Explain how movements along faults generate earthquakes;
2. Differentiate the epicenter of an earthquake from its focus
3. Differentiate the intensity of an earthquake from its magnitude;
4. Explain how earthquake waves provide information about the interior of the Earth.

B. Rocks and the Rock Cycle

1. Describe and distinguish between igneous, sedimentary, and metamorphic rocks
2. Classify rocks according to its properties

3. Identify the events involved in the rock cycle

C. Volcanoes
1. Describe the different types of volcanoes;
2. Differentiate between active and inactive volcanoes;
3. Explain the phenomenon of volcanic eruption

D. Plate tectonics
1. Know the characteristics, processes, and landforms along plate boundaries;
2. Describe the internal structure of the Earth;
3. Describe the possible mechanisms of plate movement; and

E. Meteorology
1. Interactions in the atmosphere
   a. Discuss how energy from the Sun interacts with the layers of the atmosphere;
   b. Explain the occurrence of land and sea breezes, monsoons, and ITCZ.
2. Seasons in the Philippines
   a. Relate the tilt of the Earth to the length of daytime;
   b. Relate the latitude of an area to the amount of energy the area receives; and
   c. Know the different weather patterns and seasons in the Philippines.
3. Typhoons
   a. Explain how typhoons develop;
   b. Explain how landmasses and bodies of water affect typhoons; and
4. Climate
   a. Describe certain climatic phenomena that occur on a global level.

F. Astronomy
1. Solar System
   a. Know the different motions of the Earth (rotation and revolution);
   b. Know the characteristics of planets in the solar system;
   c. Describe the occurrence of eclipses;
   d. Compare and contrast comets, meteors, and asteroids;
2. Constellations
   a. Know the characteristics of stars; and
   b. Know the relationship between the visible constellations in the sky and Earth's position along its orbit.

MATHEMATICS

A. Algebra
1. Solve problems involving algebraic expressions;
2. Solve problems involving linear equations in two variables; and,

B. Quadratic Equation
1. Solve quadratic equations by: (a) extracting square roots; (b) factoring; (c) completing the square; and (d) using the quadratic formula;
2. Solve equations transformable to quadratic equations (including rational algebraic equations);
3. Solve problems involving quadratic equations and rational algebraic equations;
4. Analyze the effects of changing the values of a, h and k in the equation $y = a(x-h)^2 + k$ of a quadratic function on its graph;
5. Determine the equation of a quadratic function given: (a) a table of values; (b) graph; (c) zeros; and,
6. Solve problems involving quadratic functions.

C. Exponents and Radicals
   1. Apply the laws involving integral exponents.
   3. Simplify radical expressions using the laws of radicals;
   4. Perform operations on radical expressions; and,
   5. Solve equations involving radical expressions.

D. Geometry
   1. Identify quadrilaterals that are parallelograms;
   2. Solve problems involving parallelograms, trapezoids and kites by applying theorems in geometry;
   3. Apply the theorems in geometry to show that given triangles are similar; and,
   4. Solve problems that involve triangle similarity and right triangles.

E. Trigonometry
   1. Use trigonometric ratios to solve real-life problems involving right triangles; and,
   2. Solve problems involving oblique triangles by applying the laws of sines and cosines.

F. Sequences
   1. Determine arithmetic means and nth term of an arithmetic sequence;
   2. Find the sum of the terms of a given arithmetic sequence;
   3. Determine geometric means and nth term of a geometric sequence;
   4. Find the sum of the terms of a given finite or infinite geometric sequence;
   5. Solve problems involving special sequences (e.g., harmonic, Fibonacci);

G. Polynomials
   1. Perform division of polynomials using long division and synthetic division;
   2. Factor polynomials;
   3. Solve problems involving polynomial functions and polynomial equations.

H. Circles
   1. Solve problems on circles;
   2. Determine the center and radius of a circle given its equation and vice versa; and,
   3. Solve problems involving geometric figures on the coordinate plane.

I. Statistics and Probability
   1. Calculate the measures of central tendency of ungrouped and grouped data;
   2. Find the probability of a simple event;
   3. Differentiate permutation from combination of objects taken at a time and vice versa;
   4. Calculate a specified measure of position (e.g. 90^{th} percentile) of a set of data; and,
   5. Solve problems involving measures of position.

IV. 8th HSM Scientific Writing Competition Guidelines and Mechanics

<u>Guidelines</u>

1. The 8th HSM: Hanep sa Science at Math 2022 includes a scientific writing symposium and scientific writing competition organized by the UP Association of Chemistry Majors and Enthusiasts (UP ACME)
2. The symposium will include talks on writing academic/scientific write-ups properly and effectively, ensuring fact-checking of information and its proper dissemination, as well as a discussion on the selected science topic for the competition.

3. The symposium will be on May 21, 2022, via Zoom and Facebook Live (FB Live), from 1:00PM - 5:00 PM. The writing competition will begin afterwards at 6:00 PM.
4. Teachers/coaches of students are allowed to accompany their students in the symposium. However, they are not allowed to participate in the writing competition itself.
5. Contestants are **REQUIRED** to join and participate in the symposium. Each individual contestant shall accomplish the **HSM 2022 Attendance Form** to be given at the beginning of the event proper to attest that they attended the writing symposium. Incomplete attendance for a team shall be grounds for cancellation of the team's slot for the competition portion. The alternate should also join the symposium pursuant to Registration Guidelines 8.b.i.
6. Contestants with any emergencies and valid reasons as to why they will be late or unable to attend the symposium shall inform the **HSM Delegate Relations Officer immediately**.
7. Students who are unable to join via Zoom can still watch via the FB Live from the official HSM page. Students who are unable to participate in the symposium and answer the attendance form will not be eligible for the writing competition.
8. At the start of the competition, each team will be provided the HSM 2022 Participants' Kit by the **HSM Delegate Experience Officer**. It contains the following:
    a. Google Form for Submission
    b. Google Doc for the text of the write-up
    c. Competition Instruction Manual (contains mechanics, assigned topic for write-up, additional reminders)
    d. Research Materials
    e. Sample of the expected output
    f. Forms on Intellectual Property Rights and Plagiarism
9. All submitted materials and works shall henceforth be the property of UP ACME.
10. Each participant shall receive a Certificate of Participation from UP ACME.
11. The winning write-up will also be featured on UP ACME's official publication, SPECTRUM.
12. UP ACME and the HSM Steering Committee reserve the right to change the rules from time to time whenever they see fit. The participants shall be notified of these changes.

Mechanics

1. The writing competition portion of the event shall be conducted primarily on Discord, the instant messaging platform.
    a. The 8th HSM Steering Committee shall communicate reminders, instructions, and announcements through a Discord server.
    b. Guidance on the downloading and use of Discord shall be provided for contestants who are not familiar with the platform.
    c. Teams will be allocated their own text channel where they may message each other, and voice channel where they may communicate verbally during the competition proper. Contestants, however, are not limited to the Discord server to communicate with their teammates.

d. Only the principal contestants and the HSM Steering Committee will have access to the team text and voice channels. Coaches/teachers and alternates will not be permitted access to these channels.
e. Coaches/teachers may opt to use the platform as well during the competition, but are not required to do so. Their access to the platform shall be limited to general announcements and communications forums, and will not be allowed to aid their contestants in any way during the competition.

2. Contestants will be given 30 hours to write, edit, and design a **2 to 3 page expository write-up (2-3 A4 size sheets of paper)**. Their 30-hour period shall start at 6 PM of May 21, 2022 once the topic of the expository write-up is given. **All entries submitted later than 11:59 PM of May 22, 2022 will be disqualified automatically**.
3. All entries are to be in the **English language.**
4. Non-adherence to the topic is grounds for disqualification.
5. Font size, typeface, and the length of articles are at the discretion of the contestants. There will be no minimum or maximum word count imposed.
6. The output is expected to contain relevant graphics. The layout and design must be aesthetically pleasing while still looking professional.
7. The HSM organizers will be given research materials on the topic. The writers may base their work entirely on these documents; however, further independent research is allowed and encouraged. **All references are to be properly cited in APA 7th Edition format and in-text citation is required**.
8. Any questions or inquiries that the participants may have should be sent to the appropriate text channel on the Discord server. The appropriate HSM Steering Committee member shall respond to the question.
9. The contestants must submit their final output in PDF form; the text must also be compiled and released in a separate Google Doc found in the HSM 2022 Participants' Kit.
10. Each contestant of the team must also sign the provided forms on plagiarism and intellectual property rights within the writing period.
11. HSM 2022 has a **zero-tolerance policy for plagiarism.** Any confirmed instance of plagiarism will result in **immediate disqualification.**
12. Winners will be chosen based on content, clarity & effectiveness of writing, and the aesthetic appeal of the output. Refer to the Criteria for Judging for more details.
13. In case of a tie, the HSM Steering Committee will submit the outputs in question to the resource speakers for further evaluation to determine the winners.
14. The Top 3 schools that will emerge from the scientific writing competition shall be named the Second Runner-up, First Runner-up, and Champion. Each will be receiving a Certificate of Recognition and a cash prize. Prizes are as follows:
    a. **Second Runner-Up: Php 2,000**
    b. **First Runner-Up: Php 4,000**
    c. **Champion: Php 6,000**
    d. **Giveaways from Sponsors**
    e. **Laptops, PCs and printers for winners' chosen beneficiary**

Criteria for Judging	
Component	**Weight**
Writing	**85%**
Content (completeness, and accuracy of writing)	30%
Clarity and Brevity (clear, logical, and concise written communication)	25%
Creativity & Originality (uniqueness of perspective in writing)	15%
Organization and Correctness (well-transitioned writing and observance of grammar)	15%
Layout & Design	**15%**
Design Fundamentals (mastery of principles of design)	10%
Visual Appeal (aesthetic choice)	5%
Total	**100%**

V. 8th HSM Program

	May 14, 2022 (Day 1 - Quiz Bee)
8:30 - 8:40 AM	Introduction of Participants
8:40 - 8:55 AM	Opening Ceremony
8:55 - 9:05 AM	Overview of Competition Guidelines and Mechanics (Elimination Round)
9:05 - 9:15 AM	Separation into Breakout Rooms and Pre-Examination Checks

9:15 - 11:45 AM	**Elimination Round** Chemistry - 30 minutes Earth Science - 15 minutes Physics - 30 minutes Biology - 15 minutes Mathematics - 40 minutes *(with short intermissions in between subtest for distributing and accessing Google form test links)*
11:45 AM - 1:00 PM	LUNCH BREAK
1:00 - 1:10 PM	Event Recommences
1:10 - 1:20 PM	**Announcement of Top 20 Teams**
1:20 - 1:30 PM	Overview of Competition Guidelines and Mechanics (Final Round)
1:30 - 1:40 PM	Introduction of Judges
1:40 - 1:50 PM	Separation into Breakout Rooms and Pre-Examination Checks
1:50 - 4:20 PM	**Final Round**
4:20 - 4:30 PM	Acknowledgment of Judges
4:30 - 4:40 PM	Intermission
4:40 - 4:45 PM	**Acknowledgement of Winners**
4:45 - 4:50 PM	*Photo Op with Judges and Participants*
4:50 - 5:00 PM	Closing Remarks
5:00 PM	End of Program

May 21, 2022 (Day 2 - Scientific Writing Symposium and Competition)	
1:00 - 1:20 PM	Registration and Run-down of House Rules
1:20 - 1:35 PM	Opening Ceremony
1:35 - 2:25 PM	**Presentation of Speaker 1 (Writing)** Introduction (5 minutes) Presentation Proper (30 minutes) Question and Answer (10 minutes) Awarding (5 minutes)
2:25 PM - 3:15 PM	**Presentation of Speaker 2 (Media)** Introduction (5 minutes) Presentation Proper (30 minutes) Question and Answer (10 minutes) Awarding (5 minutes)
3:15 - 3:25 PM	Intermission
3:25 - 4:15 PM	**Presentation of Speaker 3 (Topic)** Introduction (5 minutes) Presentation Proper (30 minutes) Question and Answer (10 minutes) Awarding (5 minutes)
4:15 - 4:20 PM	Photo Op with Speakers and Participants
4:20 - 4:30 PM	Intermission
4:30 - 4:40 PM	Overview of Scientific Writing Competition Guidelines and Mechanics
4:40 - 4:45 PM	Closing Remarks
4:45 PM	End of Program
4:45 - 5:45 PM	1-Hour Break
5:45 - 6:00 PM	Final Instructions for the Competition
6:00 PM	**Start of 30-Hour Scientific Writing Competition**

May 22, 2022 (Day 3 - Scientific Writing Competition)	
11:45 - 11:59 PM	Final Call for Submission
11:59 PM	**Deadline of Submission**

May 28, 2022 (Day 4 - 8th HSM Awarding Ceremony)	
1:00 - 3:30 PM	Awarding Ceremony