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| Course Title: | General Science |
| Head of Department: | Nadia Iskandarani |
| Teacher(s) + e-mail: | Ms. Rasha: Rasha.f@greenwood.sch.ae Mr. Firas: firas.s@greenwood.sch.ae |
| Cycle/Division: | Middle School |
| Grade Level: | Grade 8 |
| Credit Unit: | 1 |
| Duration: | 2 semesters / 5 periods per week |

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| Department's Vision: | Create Innovators who can link to life, with scientific understanding and learning. |
| Department's Mission: | Provide students with the proper knowledge, skills and scientific principles through hands on activities, research and experimentations, and thus creating young innovators who are ready for real life challenges and problem solving. |

COURSE DESCRIPTION:

This course will deal with scientific reports in the 3 domains life, physical, and earth sciences. It will introduce new topics and reinforce previous ones in addition to the scientific method and lab investigation skills. It is simply the summary of what is taught in 6 and 7 and with an addition to topics of acids and bases and waves.

General Academic Goals: To cover the standards and benchmarks required by Michigan State for grade 8 in Science and to be ready to achieve their targets in the national agenda for TIMSS . To be ready to perform well in International exams assigned by the school.- To be ready academically by the end of 2017-2018 for high school in different fields of Science (Physical, Earth, and Life) involving investigation, experimentation, and research as their tools.

General Skills:

Evaluation skills: making judgment about knowledge by introducing new text to solve and tackle problems using the related knowledge taught.

Comprehension: given scientific text or diagrams to analyze and answer questions about, summarize, compare, relate, or experiment...

Communication and social skills: Making movies, ppt., projects, interviews, and presenting the work either individually or with a peer or as a group.

Investigative skills: lab work, research, journals, experimentation...

Mathematical skills: related to investigations in the lab and application in projects.

Technological skills used in science and computer labs.

Knowledge skills: list, define, show, demonstrate, invent, relate etc... using the taught concepts.

GENERAL COURSE LEARNING OBJECTIVES:

1. compare between animal and plant cell.
2. Describe the parts of the cell.
3. Explain the difference between the eukaryotic and prokaryotic cell.
4. Describe the relationship between the central nervous system and the peripheral nervous system.
5. List one function of each part of the brain
6. Identify the five glands in the endocrine system and describe what their hormones do.
7. Describe the four levels of organization
8. Describe the parts and functions of the digestive system and the urinary system.
9. Compare mechanical digestion with chemical digestion.
10. Explain how the urinary system works.
11. List the eight levels of classification
12. Explain how classification developed as greater numbers of organisms became known.
13. Determine what factors affect the processes of photosynthesis and cellular respiration (i.e., light intensity, availability of reactants, temperature)
14. Understand that chromosomes are structures in the nucleus of a cell that carry genes
15. Understand that genes are smaller units that contain the hereditary code, DNA
16. Explain the relationship between DNA, gene, and proteins
17. -Outline the basic steps in making a protein
18. To be able to recognize the stages of mitosis and identify the amount of time spent in mitosis
19. **Describe how waves transfer energy without transferring matter.**
20. **Distinguish between waves that require a medium and waves that do not.**
21. **Explain the difference between transverse and longitudinal waves.**
22. **Identify and describe four wave properties.**
23. **Explain how frequency and wavelength are related to the speed of a wave.**
24. **Describe reflection, refraction, diffraction, and interference.**
25. **Compare destructive interference with constructive interference.**
26. **Compare the speed of sound in different media.**

27. Explain how frequency and pitch are related.
28. Describe the Doppler effect, and give examples of it.
29. Explain how amplitude and loudness are related.
30. Explain how echoes are made, and describe their use in locating objects.
31. List examples of constructive and destructive interference of sound waves.
32. Identify how electromagnetic waves are different from each other.
33. Describe some uses of microwaves and radio waves.
34. List examples of how infrared waves and visible light are important in our lives.
35. Describe how reflection allows you to see things.
36. Describe absorption and scattering.
37. Explain how radio waves and microwaves are used in four types of communication technology.
38. Describe chemical bonding
39. Identify the number of valence electrons in an atom.
40. Predict whether an atom is likely to form bonds.
41. Explain how ionic bond work.
42. Describe how positive ions form.
43. Explain why ionic compounds are neutral
44. Explain how covalent bonds work.
45. Describe molecules.
46. Explain how metallic bonds form.
47. Describe the properties of metals.
48. Interpret and write simple chemical formulas.
49. Write and balance simple chemical equations.
50. Describe four properties of acids.
51. Identify four uses of acids.
52. Describe four properties of bases.
53. Identify four uses of bases.
54. Explain the difference between strong acids and bases.
55. Explain the difference between weak acids and bases.
56. Identify acids and bases using the PH scale.
57. Describe four types of chemical reactions.
58. Classify a chemical equation as one of four types of chemical reactions.



59. Describe four factors that affect the rate of reaction.

60. Explain why there are many organic compounds.

61. Describe the characteristic of carbohydrate, lipids ,proteins and their function in the body.

STANDARDS/BENCHMARKS:

MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

MS-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS1-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-LS1-7 Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.

MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

MS-PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.*

MS-PS2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.



MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

MS-LS4-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

TIMSS C.B. 1. A. Physical and chemical properties of matter: Distinguish between physical and chemical properties of matter.

TIMSS C.B. 1. B. Physical and chemical properties of matter: Relate uses of materials to their physical properties, such as melting point and boiling point, the ability to dissolve many substances, and thermal conductivity.

TIMSS C.B. 1. C. Physical and chemical properties of matter: Relate uses of materials to their chemical properties, such as rusting and flammability.

TIMSS C.B. 2. A. Physical and chemical properties as a basis for classifying matter:
Classify substances according to physical properties that can be demonstrated or measured, such as density, melting or boiling point, solubility, magnetic properties, and electrical or thermal conductivity.

TIMSS C.B. 2. B. Physical and chemical properties as a basis for classifying matter:
Classify substances according to their chemical properties (metals/nonmetals, and acids/bases).

TIMSS C.B. 3. A. Mixtures and solutions: Explain how physical methods can be used to separate mixtures into their components.

TIMSS C.B. 3. B. Mixtures and solutions: Describe solutions in terms of substance(s) (solid, liquid, or gas solutes) dissolved in a solvent.

TIMSS C.B. 3. C. Mixtures and solutions: Relate the concentration of a solution to the amounts of solute and solvent present.

TIMSS C.B. 3. D. Mixtures and solutions: Explain how temperature, stirring, and surface area affect the rate at which solutes dissolve.

TIMSS C.B.C. 1. A. Properties of acids and bases :Recognize everyday substances as acids or bases based on their properties (acids have a sour taste, react with metals and have pH less than 7; and bases usually have a bitter taste, feel slippery, do not react with metals, and have pH greater than 7).

TIMSS C.B.C. 1. B. Properties of acids and bases : Recognize that both acids and bases react with indicators to produce different color changes.

TIMSS C.B.C. 1. C. Properties of acids and bases : Recognize that acids and bases neutralize each other.

TIMSS C.D .1. A. Characteristics of chemical changes: Differentiate chemical from physical changes in terms of the transformation (reaction) of one or more pure substances (reactants) into different pure substances (products).

TIMSS C.D. 1. B. Characteristics of chemical changes: Provide evidence (temperature changes, gas production, precipitate formation, color change, or light emission) that a chemical change has taken place.

TIMSS C.D .1. C. Characteristics of chemical changes: Recognize that oxygen is needed in common oxidation reactions (combustion, rusting, and tarnishing) and relate these reactions to everyday activities such as burning wood or preserving metal objects.

TIMSS C.D .2. A. Matter and energy in chemical changes: Recognize that matter is conserved during a chemical change and that all of the atoms present at the beginning of the reaction are present at the end of the reaction, but they are rearranged to form new substances.

TIMSS C.D .2. B. Matter and energy in chemical changes: Recognize that some chemical reactions release energy (heat and/or light) while others absorb it and classify familiar chemical reactions (such as burning, neutralization, and cooking) as either releasing heat or absorbing heat.

TIMSS C.E.1. A. Chemical bonds: Recognize that a chemical bond is caused by the forces between atoms in a compound and that the atoms' electrons are involved in this bonding.

RESOURCES:

Holt Science book and online resources

One Stop Planner, Linked Lesson presentations, Extended Visual Labs

You Tube movies

E-games and links

Teacher's Extended Handouts

Lab Handouts

COURSE OUTLINE:

1.INTRODUCTION TO GENERAL SCIENCE

2.Life Sciences

- Cell Parts and Function
- Life Cycles
- Levels of Organization
- Body Systems and their Functions
- Classification
- Food Chains and Food Webs
- Photosynthesis, Respiration and transpiration
- Genetics

- Mitosis and Meiosis
- Human Health

3. Physical Sciences

- Changes of the States of Matter
- Physical and Chemical Changes
- Elements, Mixtures and Compounds
- Electricity Flow Circuits
- Magnets and Electromagnets
- Forces and Motion

4. Earth Sciences

- Earth
- Plate Tectonics and Rock Cycle
- Renewable and Non Renewable Resources
- Atmosphere
- Fossils

Unit L

Chapter 1: Chemical bonding

Section 1: Electrons and Chemical Bonding

Section 2: Ionic Bonds

Section 3: Covalent and Metallic Bonds

} Reinforcement sheet

Chapter 2: Chemical Reactions

Section 2: Chemical Formulas and Equations

Section 3: Types of Chemical Reactions

Section 4: Energy and rates of Chemical Reactions "Lab Handout"

Chapter 3: Chemical Compounds

Section 2: Acids and Bases

Section 3: Solutions of Acids and Bases

Unit O

Chapter 1: Energy of Waves

Section 1: Nature of Waves



Section 2: Properties of Waves

Section 3: Wave Interactions

Chapter 2: Nature of Sound

Section 2: Properties of Sound

Section 3: Interactions of sound Waves

Chapter 3: Nature of Light

Section 2: The electromagnetic Spectrum

Section 3: Interactions of Light Waves

GRADING:

1. Quizzes /tests are given every other week as assigned by school. **Our tests and assessments** consist of multiple-choice, short answer, direct application problems, critical thinking situations, refer to figures, texts, graphs and/or open response items. They are aligned with Michigan benchmarks. A student failing any of his quizzes would have to sit for a **support class and retest** to achieve his 60% which is our passing mark. **A progress report is sent to the parent eventually after sitting for the make up exam.** 40 % is given to students that do not have a medical excuse for missing such an assessment.

2.Skill Based Assignments are done in class where a student has his resources all opened in front of him to answer a set of questions under verbal, nonverbal, quantitative, and spatial domains.

3. Research Sessions are done where students can debate as groups and check the internet for resources and answers to support their ideas. This kind of assessment is under **Research /Project/ Lab Sessions /Journals**. They are evaluated to info, creativity, presentation, discussion and relation to the subject.

4.Daily assessments and drop quizzes take place to check the understanding of students.

5. Laboratory work is checked for research, completeness, accuracy, understanding the experiment, group and individual reports and attendance with the lab coats. Every semester has one term practical assessment.



7. Projects are integrated across and assigned for every term. They are evaluated to accuracy, creativity, info and relation to the subject.

Grade Distribution:

| SCIENCE DEPARTMENT GRADE DISTRIBUTION | |
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| MIDDLE SCHOOL | |
| End of semester assessment | 30% |
| Term Quizzes | 20% |
| Skill based Assessment | 5% |
| Project | 10% |
| Research Journal | 5% |
| Individual Lab Reports | 5% |
| Group Lab reports | 5% |
| Lab Practical Assessment | 10% |
| MAP | 5% |
| Drop Quizzes | 5% |

Cross-Curricular Project(s):

- Once per semester across the disciplines.
- Once as subject activity.