Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Physics I
This course is designed to present topics in mechanics, heat, electricity, magnetism, waves and optics. It will be taught using a concept based approach while simultaneously integrating the student's mathematical background in order to develop a meaningful Physics foundation. The program will be enhanced by experiences with an interactive computer based laboratory environment where students will gain hands on experience with the concepts being studied.

Level: S | Periods per week: 4 | Grade: 9-12
Prerequisite: None | Credit: 1

I. Learning Objectives:

By the completion of this course the successful student will have learned:

a. To conduct laboratory investigations in order to collect and analyze data and observations relating to the motion of matter, the forces acting on matter, and the behavior of electromagnetic and mechanical waves.
b. To design experimental procedures which test a hypothesis.
c. To apply the laws and principles of physics to observable events and processes.
d. To apply the laws and principles of physics to the development of technology.

II. Learning Experiences:

In this course students will:

a. participate constructively in class discussions
b. work cooperatively during laboratory investigations
c. accurately and effectively report the results of laboratory investigations
d. utilize class notes, homework assignments, and reading notes in preparation for exams

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students)

Mechanics	**Thermodynamics**	**Electricity and Magnetism**	**Wave Phenomenon**
Linear Motion	Temperature & Heat	Static Electricity	Sound
Newton's Laws of Motion	Change of Phase	Electric Current	Light and Optics
Circular Motion	Heat Transfer	Magnetism	Reflection
Gravitation		Electromagnetism	and Refraction
Momentum			Diffraction
Energy Conversions			and Interference

IV. Course Materials: The following represents the major text and/or resources used in Physics I. Teachers also use supplementary texts, materials, computer simulations, and documents that they have gathered or prepared themselves to enrich and extend student learning.

1. *Physics: A First Course*, CPO Science, 2008
2. Lab Investigations and Concept Development Workbook of the Conceptual Physics program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Physics I Honor
This course offers the same program as Physics 1 only in a more accelerated manner, and in more depth. It is designed for the student desiring a stronger Physics background and preparing to take subsequent Physics courses in the 12th grade. This course is designed to present topics in mechanics, heat, electricity, magnetism, waves and optics. It will be taught using a concept based approach while simultaneously integrating the student's mathematical background in order to develop a meaningful Physics foundation. The program will be enhanced by experiences with an interactive computer based laboratory environment where students will gain hands on experience with the concepts being studied.

Level: H Periods per week: 4 Grade: 9-12
Prerequisite: None Credit: 1
(It is recommended that Geometry H or Geometry/Algebra II Advanced be taken concurrently)

I. Learning Objectives:

By the completion of this course the successful student will have learned:

a. To conduct laboratory investigations in order to collect and analyze data and observations relating to the motion of matter, the forces acting on matter, and the behavior of electromagnetic and mechanical waves.
b. To design experimental procedures which test a hypothesis.
c. To apply the laws and principles of physics to observable events and processes .
d. To apply the laws and principles of physics to the development of technology.

II. Learning Experiences:

In this course students will:

a. participate constructively in class discussions
b. work cooperatively during laboratory investigations
c. accurately and effectively report the results of laboratory investigations
d. utilize class notes, homework assignments, and reading notes in preparation for exams

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students)

Mechanics	**Thermodynamics**	**Electricity and Magnetism**	**Wave Phenomenon**
Linear Motion	Temperature & Heat	Static Electricity	Sound
Newton's Laws of Motion	Change of Phase	Electric Current	Light and Optics
Circular Motion	Heat Transfer	Magnetism	Reflection
Gravitation		Electromagnetism	and Refraction
Momentum			Diffraction
Energy Conversions			and Interference

IV. Course Materials: The following represents the major text and/or resources used in Physics I. Teachers also use supplementary texts, materials, computer simulations, and documents that they have gathered or prepared themselves to enrich and extend student learning.

1. *Physics: A First Course*, CPO Science, 2008
2. Lab Investigations and Concept Development Workbook of the Conceptual Physics program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Chemistry 1
Chemistry 1 deals with the structure of matter, its properties, and changes in its properties as a result of chemical reactions. Emphasis is placed on the physical world involving atomic theory, energy relationships, and chemical reactions. Laboratory work involves first-hand experiences in the use of chemical equipment and materials and the development of manipulative skills in order to conduct chemical investigations using observation and accumulated data to arrive at conclusions.

Level: S | Periods Per Week: 4 | Grade: 10
Prerequisite: Physics I | Credit: 1

I. Learning Objectives:
By the completion of this course, the successful student will have learned:
a. To describe the structure of matter and its properties, chemical reactions and energy changes
b. The important laboratory skills such as detailed observation, accurate recording, experimental design, manual manipulation, data interpretation and operation of technical equipment
c. An appreciation of how scientific discoveries are made
d. An appreciation of how chemistry applies to everyday life

II. Learning Experiences:
In this course students will:
a. Actively listen to lectures, take notes and participate in class discussions and group activities.
b. Conduct laboratory investigations, and answering questions explaining the findings.
c. Actively participate in the homework review, discussion of investigations and search for related information.
d. Be prompt and complete all in-class and take-home assignments of learning.
e. Be tolerant of others and all ideas presented, work cooperatively, apply strategies and think, act with safety being first in all situations.

III. Course Outline:
1. Gas Laws and Kinetic Molecular Theory.
2. Laws of Chemical Combination and Atomic Theory.
3. Formula Writing and Determination
4. Chemical Change: Balancing simple reactions, Thermodynamics.
5. Atomic structure.
6. Nuclear Chemistry.
7. Periodic Table Development and Interpretation.
8. Modern Bonding Theory.
9. Solution and Colloidal Chemistry.
10. Ionization and Dissociation.
11. Acid-Base Concepts.
12. Electrochemistry.
13. Basic organic chemistry.

IV. Course Materials:
Chemistry, Wilbraham, et. al; Prentice Hall, 2005. Experiments and activities modified for this program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Chemistry I LBC Honor

Chemistry I LBC is a student-centered, year-long chemistry curriculum. This course teaches fundamental chemical concepts around themes such as alchemy, weather and toxins. Chemistry topics covered include periodicity, solutions, chemical equations, stoichiometry, gases, bonding, states of matter and nuclear chemistry. Learning happens primarily through collaborative exploratory-activities and lab work. Students who elect this course for honors credit will be expected to demonstrate strong mathematical ability, self-motivation and academic independence. The curriculum is based on the "Living by Chemistry" modules developed by U.C. Berkeley and supplemented with material from the traditional chemistry curriculum.

Level: H | Periods Per Week: 4 | Grade: 10
Prerequisite: Physics I or I H, and Honors Math | Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To describe the structure of matter and its properties, chemical reactions and energy changes.
b. To perform important laboratory skills (i.e., detailed observation, accurate recording, experimental design, data interpretation and operation of technical equipment).
c. How scientific discoveries are made.
d. How chemistry applies to everyday life.

II. Learning Experiences:

Chemistry I (LBC) uses an innovative, modular curriculum that is designed to engage students through inquiry-based learning activities and thematic units. The course provides an introduction to fundamental concepts in chemistry. The course emphasizes critical thinking, problem-solving, observation and analysis, and collaborative work. Students learn through a combination of exploratory activities, lecture, discussion, labs, supplementary readings, homework and projects.

III. Course Outline:

Unit I: Alchemy
- Classification of matter and its properties and changes
- Introduction to laboratory equipment
- Periodic table organization and periodic trends
- Atomic structure and electronic organization
- Ionic bonding and nomenclature

Unit II: Smells
- Covalent bonding and nomenclature
- Lewis structures
- Polarity
- Intermolecular forces

Unit III: Weather
- Phase diagrams
- Gas Laws and kinetic molecular theory
- Heating curves
- Specific heat and energy changes

Unit IV: Toxins
- Expressions of concentration
- Solubility Rules
- The mole
- Types of chemical reactions
- Stoichiometry
- Acid/Base theories
- pH scale
- Titrations

Unit V: Selected Topics in Chemistry
- Chemical Equilibrium
- Le Chatelier's Principle
- Enthalpy, Entropy, and Free Energy
- Redox reactions and oxidation numbers
- Nuclear Chemistry

IV. Course Materials:

1. Chemistry , Wilbraham, Staley, Matta, Waterman; Prentice Hall, 2005
2. Experiments and activities modified for this program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Chemistry I Honor
Chemistry I Honor is a rigorous, semi-mathematically oriented treatment of the physical world of matter, emphasizing its interactions with energy and the logical evolution of theories concerning both matter and energy. The course stresses the systematic relationship of the major topics. The laboratory work stresses observation, proper and safe techniques, logical data interpretation, and systematic acquisition of laboratory skills. Chemistry I Honor is recommended for students who plan to take the SAT Subject Test in Chemistry.

Level: H Periods Per Week: 4 Grade: 10
Prerequisite: Physics I or I H Credit: 1
(It is recommended that Honor or Advanced Math be taken concurrently)

I. Learning Objectives:
By the completion of this course, the successful student will have learned:

a. To describe the structure of matter and its properties, chemical reactions and energy changes
b. The important laboratory skills such as detailed observation, accurate recording, experimental design, manual manipulation, data interpretation and operation of technical equipment
c. An appreciation of how scientific discoveries are made
d. An appreciation of how chemistry applies to everyday life

II. Learning Experiences:
In this course students will:

a. Actively listen to lectures, take notes and participate in class discussion.
b. Conduct investigations, writing a report or answering questions explaining the findings.
c. Actively participate in the homework review, discussion of investigations and search for related information.
d. Be prompt to class, and complete all in-class and take-home assignments of learning.
e. Be tolerant of others and all ideas presented, work cooperatively, apply strategies and think, act with safety being first in all situations.

III. Course Outline: (A brief outline of the major topics and units which are central to this course).

1. Gas Laws and Kinetic Molecular Theory.
2. Laws of Chemical Combination and Atomic Theory.
3. Formula Writing and Determination
4. Chemical Change: Balancing simple reactions, Thermodynamics.
5. Atomic structure.
6. Nuclear Chemistry.
7. Periodic Table Development and Interpretation.
8. Modern Bonding Theory.
9. Reduction / Oxidation Chemistry
10. Chemical Equilibrium.
11. Solution and Colloidal Chemistry.
12. Ionization and Dissociation.
13. Acid-Base Concepts.
14. Electrochemistry.
15. Basic organic chemistry.

IV. Course Materials:
Chemistry, Wilbraham, et. al; Prentice Hall, 2005. Experiments and activities modified for this program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Biology I
Biology I is the study of the structure of organisms and how they function. It includes their heredity, classification and evolution, along with the interaction between these organisms and their environment. Laboratory activities are an integral part of the curriculum. This is a course for college preparatory students. It will be taught with a traditional academic focus.

Level: S | Periods Per Week: 4 | Grade: 11
Prerequisite: Physics I, Chemistry I (or Permission from Coordinator) | Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To describe the principal concepts which are associated with living organisms.
b. To conduct and report on laboratory investigations which describe these principal concepts or serve as models of those events.
c. To be familiar with the natural world, recognizing both its unity and diversity.
d. To apply scientific knowledge and its methods to living organisms.
e. To appreciate how biological science applies to everyday life.

II. Learning Experiences:

In this course students will:

a. Actively listen to lectures, take notes and participate in class discussion.
b. Outline chapters noting key concepts, words and facts.
c. Conduct investigations, showing results and answering questions explaining the findings.
d. Actively participate in homework review, discussion of investigations and their application to related information.
e. Complete all in-class and take-home assignments of learning.
f. Be tolerant of others and all ideas presented, and work cooperatively.

III. Course Outline:

1)	The Nature of Science and Life	(incorporated throughout the course)
2)	Ecological Interactions	(2-4 weeks)
3)	Biochemistry & Digestion	(5-6 weeks)
4)	Cell Physiology	(5-6 weeks)
5)	Selected Human Body Systems	(1-2 weeks)
6)	Transfer of Energy in Cells	(2-3 weeks)
7)	Molecular Genetics	(4-5 weeks)
8)	Reproduction and Inheritance	(4-5 weeks)
9)	Evolution and Classification	(2-3 weeks)
10)	Anatomy and Physiology of Plants	(incorporated throughout the course)
11)	Systems of the human body	(incorporated throughout the course)

IV. Course Materials: The following represents the major test and/or resources used in Biology I. Teachers also use supplementary texts, articles, materials and curriculum documents which they have gathered or prepared themselves and which they believe enrich and extend student learning.

1. Biology, Miller and Levine - Parrot Edition 2010
2. Experiments and activities modified for this program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Biology I – BSCS Conceptual Biology
BSCS Conceptual Biology is a nationally recognized program developed by the Biological Science Curriculum Study (BSCS). It provides a first year college preparatory lab course that engages students thorough a human perspective. This course organizes content around unifying biological principles, and is taught through hands-on activities, laboratories, and inquiry. Opportunities are provided for students to conduct investigations and make connections between biological concepts and their own life experiences. This course is designed with a strong focus on group work, discussion, reflective writing, and activities.

Level: S or H | Periods Per Week: 4 | Grade: 11
Prerequisite: Physics I, Chemistry I | Credit: 1

I. Learning Objectives (A statement of learning objectives is a statement of changes to take place in students):

By the completion of this course, the successful student should

A. develop an appreciation for the methods of science and the ability to apply these methods to his/her work by practicing critical-thinking skills, making observations, asking questions, collecting data, recording and analyzing data, and using evidence and inference appropriately
B. understand that a community of organisms interacts with the abiotic environment to form ecosystems,
C. analyze how population size is affected by the carrying capacity of the environment for a given species,
D. recognize that communities of organisms depend on the cycling of matter and the flow of energy,
E. recognize that there is diversity of living systems on earth that share common characteristics,
F. explain how evolution provides the scientific explanation for the diversity of living systems,
G. be able to explain that the continuity of a species depends on the transfer of genetic information by showing how this information is transferred and preserved through reproduction and the behavior of genetic material,
H. demonstrate understanding of the role of development, growth, and differentiation,
I. understand that all organisms have an internal and external environment, are affected by interactions between these environments, and must actively maintain a balance in their internal environment, and
J. understand that energy is stored in the organization of matter and that living organisms use matter and energy to build and maintain body structures.

II. Learning Experiences (A learning experience is the interaction between the learner and the external conditions in the environment to which he/she can react):

In this course, the students will

A. participate in a variety of laboratory and group activities and class discussions
B. design and carry out experiments, organize and analyze data, and write lab reports
C. participate in a variety of simulations and authentic assessments
D. use technology to increase the understanding of course material

III. Course Outline (Brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students):

A. Ecology: interaction and interdependence in living systems — 5-6 weeks
   1. Ecology Case Studies
   2. Interdependence among organisms in the biosphere
   3. The cycling of matter and the flow of energy in communities
B. Evolution: patterns and products of change in living systems — 7-9 weeks
   1. The human animal
   2. Evolution: change across time
   3. Products of evolution: unity and diversity

C. Continuity and Development: reproduction, inheritance, growth and differentiation in living systems — 8-10 weeks
   1. Reproduction in humans and other organisms
   2. Processes and patterns of development
   3. Continuity of information through inheritance
   4. Gene Action

D. Homeostasis: maintaining dynamic equilibrium in living systems — 2-3 weeks
   1. The internal environment of organisms
   2. Maintaining balance in organisms

E. Energy, matter, and organization: relationships in living systems — 5-6 weeks
   1. Performance and fitness
   2. The cellular basis of activity

IV. Course Materials:

A. Textbook: Biology: A Human Approach, BSCS, Kendall/Hunt Publishing, Dubuque, Iowa 2006.
B. Other labs and activities developed especially for this program, including computer simulations

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Biology I Honor
This course is the study of the main concepts that are associated with living organisms. Major themes are listed below in the course outline. Laboratory activities are an integral part of the curriculum. This is a rigorous course for college preparatory students, requiring a good deal of abstract thinking. This course prepares students for further studies in AP Biology. It is recommended for students who plan to take the College Board SAT Subject Test in Biology.

Level: H Periods per week: 4 Grade: 11
Prerequisites: Physics I, Chemistry IH or LBC Honor Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To describe the main concepts which are associated with living organisms.
b. To conduct and report on laboratory investigations which describe these main concepts or serve as models of those events.
c. To be familiar with the natural world, recognizing both its unity and diversity.
d. To apply scientific knowledge and its methods to living organisms.
e. To appreciate how biological science applies to everyday life

II. Learning Experiences:

In this course students will:

a. Actively listen to lectures, take notes, and participate in class discussion.
b. Outline chapters noting key concepts, words and facts.
c. Conduct investigations, writing a report or answering questions explaining the findings.
d. Actively participate in homework review, and discussion of investigations and their application to related information.
e. Be tolerant of others and all ideas presented, and work cooperatively.

III. Course Outline:

1)	The Nature of Science and Life	(1 week)
2)	Biochemistry	(5-6 weeks)
3)	Cell Physiology	(5-6 weeks)
4)	Cellular Communications	(2-3 weeks)
5)	Transfer of Energy	(2-3 weeks)
6)	Molecular Genetics, including Biotechnology	(4-5 weeks)
7)	Reproduction and Inheritance	(3-4 weeks)
8)	Evolution and Classification	(3-4 weeks)
9)	Ecological Interactions	(2-3 weeks)
10)	Anatomy and Physiology of Plants	(incorporated throughout the course)
11)	Systems of the Human Body	(incorporated throughout the course)

IV. Course Materials: The major test and/or resources used in Biology I Honor is Biology: Concepts and Connections, 7th Ed., Campbell et.al., Pearson. Teachers also use supplementary texts, articles, materials and curriculum documents which they have gathered or prepared themselves and which they believe enrich and extend student learning.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

ELL Physics I

The ELL Physics course provides an introduction to scientific methods, concepts, and vocabulary for students who are English language learners. Students will study physics topics with an emphasis on hands-on learning, problem solving, and scientific thinking. Students will gain the knowledge and skills that provide a foundation to future science courses.

This course is designed to present topics in mechanics, heat, electricity, magnetism, waves and optics. It will be taught using a concept based approach while simultaneously integrating the student's mathematical background in order to develop a meaningful Physics foundation. The program will be enhanced by experiences with an interactive computer based laboratory environment where students will gain hands on experience with the concepts being studied.

Level: S Periods per week: 4 Grade: 9-12
Prerequisite: Student must be at the ELL 1 or 2 level (or Permission from Coordinator) Credit: 1

I. Learning Objectives (A statement of learning objectives is a statement of changes to take place in students):

By the completion of this course the successful student will have learned:

1. To conduct laboratory investigations in order to collect and analyze data and observations relating to the motion of matter, the forces acting on matter, and the behavior of electromagnetic and mechanical waves.
2. To design experimental procedures which test a hypothesis.
3. To apply the laws and principles of physics to observable events and processes.
4. To apply the laws and principles of physics to the development of technology.

II. Learning Experiences (A learning experience is the interaction between the learner and the external conditions in the environment to which he/she can react):

In this course students will:

A. Actively listen to lectures, take notes and participate in class discussion.
B. Conduct investigations, writing a report or answering questions explaining the findings.
C. Actively participate in the homework review, discussion of investigations and search for related information.
D. Be prompt and complete all in-class and take-home assignments of learning.
E. Be tolerant of others and all ideas presented, work cooperatively, apply strategies and think, act with safety being first in all situations.

In addition, the following Scientific Inquiry Skills will be addressed:

F. Make observations, raise questions, and formulate hypotheses.
G. Design and conduct scientific investigations.
H. Analyze and interpret results of scientific investigations.
I. Communicate and apply the results of scientific investigations.

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students)

Mechanics	**Thermodynamics**	**Electricity and Magnetism**	**Wave Phenomenon**
Linear Motion	Temperature, Heat	Static Electricity	Sound
Newton's Laws of Motion	Expansion	Electric Current	Light and Optics
Circular Motion	Change of Phase	Magnetism	Reflection
Gravitation	Heat Transfer	Electromagnetism	and Refraction
Momentum			Diffraction
Energy Conversions			and Interference

IV. Course Materials: The following represents the major text and/or resources used in Physics I. Teachers also use supplementary texts, materials, computer simulations, and documents that they have gathered or prepared themselves to enrich and extend student learning.

Textbook: Physical Science, by Robert Marshall and Donald Jacobs

Supplementary texts: Matter and Energy and Forms of Energy in the Globe Fearon Science Workshop Series

3. *Physics: A First Course*, CPO Science, 2008
4. Laboratory curriculum developed by the Center for Science & Math Teaching, Tufts University
5. Lab Investigations and Concept Development Workbook of the Conceptual Physics program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

ELL Chemistry 1

The ELL Chemistry course provides an introduction to scientific methods, concepts, and vocabulary for students who are English language learners. Students will study chemistry topics with an emphasis on hands-on learning, problem solving, and scientific thinking. Students will gain the knowledge and skills that provide a foundation to future science courses.

Chemistry 1 deals with the structure of matter, its properties, and changes in its properties as a result of chemical reactions. Emphasis is placed on the physical world involving atomic theory, energy relationships, and chemical reactions. Laboratory work involves first-hand experiences in the use of chemical equipment and materials and the development of manipulative skills in order to conduct chemical investigations using observation and accumulated data to arrive at conclusions.

Level: S | Periods Per Week: 4 | Grade: 9-12
Prerequisite: Student must be at the ELL 1 or 2 level (or Permission from Coordinator) | Credit: 1

I. Learning Objectives (A statement of learning objectives is a statement of changes to take place in students):

By the completion of this course, the successful student will have learned:

1. To describe the structure of matter and its properties, chemical reactions and energy changes
2. The important laboratory skills such as detailed observation, accurate recording, experimental design, manual manipulation, data interpretation and operation of technical equipment
3. An appreciation of how scientific discoveries are made
4. An appreciation of how chemistry applies to everyday life

II. Learning Experiences (A learning experience is the interaction between the learner and the external conditions in the environment to which he/she can react):

In this course students will:

A. Actively listen to lectures, take notes and participate in class discussion.
B. Conduct investigations, writing a report or answering questions explaining the findings.
C. Actively participate in the homework review, discussion of investigations and search for related information.
D. Be tolerant of others and all ideas presented, work cooperatively, apply strategies and think, act with safety being first in all situations.

In addition, the following Scientific Inquiry Skills will be addressed:

E. Make observations, raise questions, and formulate hypotheses.
F. Design and conduct scientific investigations.
G. Analyze and interpret results of scientific investigations.
H. Communicate and apply the results of scientific investigations.

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students)

a. Gas Laws and Kinetic Molecular Theory
b. Laws of Chemical Combination and Atomic Theory
c. Formula Writing and Determination
d. Chemical Change: Balancing simple reactions, Thermodynamics
e. Atomic structure
f. Nuclear Chemistry
g. Periodic Table Development and Interpretation
h. Modern Bonding Theory
i. Redox
j. Chemical Equilibrium
k. Solution and Colloidal Chemistry
l. Ionization and Dissociation
m. Acid-Base Concepts
n. Electrochemistry
o. Basic organic chemistry

IV. Course Materials:

Chemistry, Wilbraham, et. al; Prentice Hall, 2005. Experiments and activities modified for this program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

ELL Biology I

The ELL Biology course provides an introduction to scientific methods, concepts, and vocabulary for students who are English language learners. Students will study biology topics with an emphasis on hands-on learning, problem solving, and scientific thinking. Students will gain the knowledge and skills that provide a foundation to future science courses.

Biology I is the study of the structure of organisms and how they function. It includes their heredity, classification and evolution, along with the interaction between these organisms and their environment. Laboratory activities are an integral part of the curriculum. This is a course for college preparatory students. It will be taught with a traditional academic focus.

Level: S | Periods Per Week: 4 | Grade: 9-12
Prerequisite: Student must be at the ELL 1 or 2 level (or Permission from Coordinator) | Credit: 1

I. Learning Objectives (A statement of learning objectives is a statement of changes to take place in students):

By the completion of this course, the successful student will have learned:

1. To describe the principal concepts which are associated with living organisms.
2. To conduct and report on laboratory investigations which describe these principal concepts or serve as models of those events.
3. To be familiar with the natural world, recognizing both its unity and diversity.
4. To apply scientific knowledge and its methods to living organisms.
5. To appreciate how biological science applies to everyday life.

II. Learning Experiences (A learning experience is the interaction between the learner and the external conditions in the environment to which he/she can react):

In this course students will:

A. Actively listen to lectures, take notes and participate in class discussion.
B. Conduct investigations, writing a report or answering questions explaining the findings.
C. Actively participate in the homework review, discussion of investigations and search for related information.
D. Be prompt and complete all in-class and take-home assignments of learning.
E. Be tolerant of others and all ideas presented, work cooperatively, apply strategies and think, act with safety being first in all situations.

In addition, the following Scientific Inquiry Skills will be addressed:

F. Make observations, raise questions, and formulate hypotheses.
G. Design and conduct scientific investigations.
H. Analyze and interpret results of scientific investigations.
I. Communicate and apply the results of scientific investigations.

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students)

1) The Nature of Science and Life (1-2 weeks)
2) Ecological Interactions and Chemistry (2-4 weeks)
3) Biochemistry (5-6 weeks)
4) Cell Physiology (5-6 weeks)
5) Cell Communication (1-2 weeks)
6) Transfer of Energy (2-3 weeks)
7) Molecular Genetics including Bio Technology (4-5 weeks)
8) Reproduction and Inheritance (4-5 weeks)
9) Evolution and Classification (2-3 weeks)
10) Anatomy and Physiology of Plants (incorporated throughout the course)
11) Systems of the human body (incorporated throughout the course)

Science Department
Ed Wiser, Curriculum Coordinator

IV. Course Materials: The following represents the major test and/or resources used in Biology I Honor. Teachers also use supplementary texts, articles, materials and curriculum documents which they have gathered or prepared themselves and which they believe enrich and extend student learning.

1. Biology, The Study of Life, Schraer & Stoltze, Prentice Hall, 1999
2. Experiments and activities modified for this program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Applied Science 1 – Physical Science

The Applied Science I course provides an introduction to scientific methods, concepts, and vocabulary for students with intellectual impairments. Students will study physical science topics with an emphasis on hands-on learning, problem solving, and scientific thinking.

Level: S | Periods Per Week: 4 | Grade: 9-12
Prerequisite: By permission of the Special Ed. Coordinator | Credit: 1

Learning Objectives:
By the completion of this course, the successful student will have learned:

a. to use the scientific method to solve problems
b. to use various types of lab equipment
c. to use the appropriate vocabulary to explain science concepts orally and in writing
d. to work cooperatively in lab groups
e. to make and analyze graphs
f. to use computers to collect data, conduct research, run science simulations, and make presentations

Learning Experiences:
In this course, students will

a. actively participate in class discussions
b. work cooperatively in lab groups
c. do laboratory experiments, analyze data, and compare class results
d. use computers for a variety of applications
e. make class presentations

Course Outline:

I. The Scientific Method and Measurement
II. The Structure of Matter
III. Motion and Force
IV. Work and Energy
V. Heat
VI. Waves
VII. Electricity and Magnetism

Course materials

Textbook: Physical Science, by Robert Marshall and Donald Jacobs
Supplementary texts: Matter and Energy and Forms of Energy in the Globe Fearon Science Workshop Series

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Applied Science 2 – Life Science

An examination of the principle concepts that are associated with living organisms.

a. This course is for students whose Individual Education Programs specify individualized instruction for students with moderate disabilities. The focus in this course is to build and maintain functional science skills. Reading, language, math, self-advocacy, organizational, behavioral and social objectives written into the IEP are integrated into the curriculum. This course is co-taught with the Special Education Department. Students will gain a familiarity with science, make connections amongst all aspects of learning, and develop the skills they can use within their current and future environments.
b. Life science is the study of the structure of organisms and how they function. It includes their heredity, classification and evolution, along with the interaction between these organisms and their environment. Laboratory activities are an integral part of the curriculum.

Level: S Periods Per Week: 4 Grade: 9-12
Prerequisite: By permission of the Special Ed. Coordinator Credit: 1

I. Learning Objectives: (A statement of learning objectives is a statement of change to take place in students)

By the completion of this course, the successful student will have learned:

a. To describe the principle concepts which are associated with living organisms.
b. To conduct and report on laboratory investigations which describe these principle concepts or serve as models of those events.
c. To be familiar with the natural world, recognizing both its unity and diversity.
d. To apply scientific knowledge and its methods to living organisms.
e. To appreciate how biological science applies to everyday life.
f. The use of relevant technology.

II. Learning Experiences: (A learning experience is the interaction between the learner and the external conditions in the environment to which he/she can react).

In this course students will:

a. Develop their processing, thinking and coping skills.
b. Actively participate in class and problem solving discussions.
c. Work cooperatively during laboratory investigations and activities.
d. Accurately and effectively report the results of experiments and projects.
e. Complete all in-class and take-home assignments of learning.
f. Be tolerant of others and all ideas presented, and work cooperatively.

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students).

1) The Nature of Science and Life and Scientific Method
2) Ecological Interactions in the Context of Chemistry
3) Biochemistry, Nutrition, and Digestion
4) Structure and Function of Cells
5) Molecular Genetics – The Structure and Function of DNA, RNA, and protein
6) Reproduction and Inheritance
7) Evolution and Classification
8) Anatomy and Physiology of Plants (incorporated throughout the course)
9) Systems of the Human Body (incorporated throughout the course)

Science Department
Ed Wiser, Curriculum Coordinator

V. Course Materials: The following represents the major text and/or resources used in Life Science. Teachers also use supplementary texts, articles, materials and curriculum documents which they have gathered or prepared themselves and which they believe enrich and extend student learning.

1. Biology , Charles J. LaRue, AGS Publishing, 2004
2. Experiments and activities modified for this program

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Applied Science 3 – Biology
An examination of the principle concepts that are associated with living organisms.

a. This course is for students whose Individual Education Programs specify individualized instruction for students with moderate disabilities. The focus in this course is to build and maintain functional science skills. Reading, language, math, self-advocacy, organizational, behavioral and social objectives written into the IEP are integrated into the curriculum. This course is co-taught with the Special Education Department. Students will gain a familiarity with science, make connections amongst all aspects of learning, and develop the skills they can use within their current and future environments.
b. Life science is the study of the structure of organisms and how they function. It includes their heredity, classification and evolution, along with the interaction between these organisms and their environment. Laboratory activities are an integral part of the curriculum.

Level: S Periods Per Week: 4 Grade: 9-12
Prerequisite: By permission of the Special Ed. Coordinator Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To describe the principle concepts which are associated with living organisms.
b. To conduct and report on laboratory investigations which describe these principle concepts or serve as models of those events.
c. To be familiar with the natural world, recognizing both its unity and diversity.
d. To apply scientific knowledge and its methods to living organisms.
e. To appreciate how biological science applies to everyday life.
f. The use of relevant technology.

II. Learning Experiences:

In this course students will:

a. Expand on their previous year of Life Science in Applied Science 2.
b. Have every opportunity to pass the MCAS exam in Biology.

III. Course Outline:

1. The Chemistry of Life
2. Ecology
3. Cell Biology
4. Genetics
5. Evolution and Biodiversity
6. Anatomy and Physiology

In addition, the following Scientific Inquiry Skills will be addressed:

2. Make observations, raise questions, and formulate hypotheses.
3. Design and conduct scientific investigations.
4. Analyze and interpret results of scientific investigations.
5. Communicate and apply the results of scientific investigations.

IV. Course Materials: The major text and/or resources used is Miller and Levine, Biology, Prentice Hall, 2002. Teachers also use supplementary texts, articles, materials and curriculum documents which they have gathered or prepared themselves and which they believe enrich and extend student learning.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Physics II Honor
This is a second year course designed for students with a strong interest in physics theory and its application. The first semester is devoted to classical mechanics. The second semester concentrates on classical electricity and magnetism.

Level: H | Periods per week: 4 | Grade: 12
Prerequisite: Physics I, Chemistry I, Biology I. Honor Math strongly recommended. | Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To recognize, understand, and apply the basic concepts and laws of physics to the solution of book problems and real-life problems.
b. To recognize, understand, and apply the basic concepts of geometry and trigonometry within the context of physics.
c. To read, speak, and write critically within the context of physics.
d. To analyze and solve multiple-choice questions, as well as free-response physics questions and problems in clear, concise ways.
e. To look at physical phenomena from different frames of reference.

II. Learning Experiences:

In this course, students will:

a. actively participate in the class discussions, demonstrations, and lectures.
b. work together in lab groups and in problem-solving groups.
c. do laboratory experiments, analyze data and sources of error, and compare class results.
d. develop strong problem solving skills.
e. analyze extreme and/or limiting cases in physical relationships.
f. apply common sense in analyzing the results of calculations.

III. Course Outline:

1. Kinematics, the study of motion in one and two dimensions.
2. Frames of reference - Relative motion
3. Dynamics, the study of forces and Newton's laws of motion, equilibrium.
4. Vector analysis.
5. Universal gravitation and Kepler's laws.
6. Impulse, momentum and conservation of momentum.
7. Work, energy (kinetic, gravitational potential, spring potential) and power.
8. Waves and energy transfer.
9. Conservation of energy: closed systems.
10. Electrostatics: forces, fields, potential.
11. Circuits: voltage, resistivity, resistances in series and in parallel.
12. Magnetism: magnets, fields, electromagnetism, and electromagnetic induction.
13. Geometric optics: reflection, refraction, interference, diffraction.

IV. Course materials: The text book for this course is PHYSICS 3rd edition by Giancoli. Supplementary materials are Interactive Physics software, physics laser disk, and physics video tapes. Physics laser disk, and physics video tapes.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Advanced Placement Physics 1 & 2

Formerly known as AP Physics B; The Physics 1&2 course provides a systematic introduction to the main principles of physics and emphasizes the development of problem-solving ability. The Physics 1&2 course includes a broad range of topics in both classical and modern physics. Knowledge of algebra and trigonometry is required for the course; the basic ideas of calculus may be introduced in connection with physical concepts, such as acceleration and work. This course often provides a foundation in physics for students interested in studying physics as a basis for more advanced work in the life sciences, medicine, geology, and related areas, or as a component in a non-science college program that has science requirements. Credit for the AP Physics 1&2 course provides the student with an opportunity either to have an accelerated college program or to meet a basic science requirement in college. The Physics 1&2 examination cover topics in Newtonian mechanics, electricity and magnetism, thermal physics, fluid mechanics, waves and optics, and atomic and nuclear physics; a single exam grade is reported.

Level: AP Periods per week: 6 Grade: 12
Prerequisites: Physics I H w/strong performance, Chemistry I, and Biology I Credit: 1
(It is recommended that Honor or AP Math be taken concurrently)

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To recognize, understand, and apply the basic concepts and laws of physics to the solving of problems
b. To recognize, understand, and apply the basic concepts of algebra and trigonometry within the context of physics
c. To read, speak, and write critically within the context of physics
d. To analyze and solve multiple-choice physics questions and problems
e. To analyze and solve free-response physics questions and problems in clear, concise ways
f. To successfully take the national A.P. physics examination in May

II. Learning Experiences:

In this course, students will:

a. listen to lectures, take notes, and actively participate in the classroom discussions
b. work together in lab groups and in problem-solving groups
c. build simple devices to illustrate a "point"
d. do laboratory experiments, analyze data and sources of error, and compare class results using data collection probeware and analysis software
e. solve many, many problems
f. analyze the results of calculations for reasonableness by considering extreme or limiting cases

III. Course Outline:

1. Newtonian Mechanics
   - A. Kinematics: vectors, vector algebra, components of vectors, coordinate systems, displacement, velocity, and acceleration.
     - I. Motion in one dimension
     - II. Motion in two dimensions including projectile motion
   - B. Newton's laws of motion
     - I. Static equilibrium
     - II. Dynamics of a single particle
     - III. Systems of two or more bodies
   - C. Work, energy, power
     - I. Work energy theorem
     - II. Conservative forces
     - III. Conservation of energy
     - IV. Power
   - D. Linear momentum
     - I. Impulse and momentum
     - II. Collisions and conservation of momentum
   - E. Circular motion and rotation
     - I. Uniform circular motion
     - II. Torque and rotational statics
   - F. Oscillations and gravitation
     - I. Simple harmonic motion
     - II. Mass on a spring
     - III. Pendulum and other oscillations
     - IV. Newton's law of universal gravitation
     - V. Orbits of planets and satellites
2. Fluid Mechanics and Thermal Physics

A. Fluid Mechanics
   I. Hydrostatic Pressure
   II. Buoyancy
   III. Fluid Flow Continuity
   IV. Bernoulli's equation
B. Temperature and heat
   I. Mechanical Equivalent of heat
   II. Specific and latent heat
   III. Heat transfer and thermal expansion
C. Kinetic theory and thermodynamics
   I. Ideal gases
      a. Kinetic model
      b. Ideal gas law
   II. Law of thermodynamics
      a. First law
      b. Second law

3. Electricity and Magnetism
   A. Electrostatics
      I. Charge, field, and potential
      II. Coulomb's law; field and potential due to a point change
      III. Fields and potentials of other charge distributions
   B. Conductors and capacitors
      I. Electrostatics with conductors
      II. Parallel plate capacitors
   C. Electric circuits
      I. Current, resistance, voltage, power
      II. Steady-state D.C. circuits with batteries and resistors only
      III. Capacitors in circuits
   D. Magnetostatics
      I. Forces on moving charges
      II. Forces on current-carrying wires
      III. Magnetic fields of long current-carrying wires.
   E. Electromagnetic Induction (including Faraday's law and Lenz's law)
4. Waves and Optics
   A. Wave motion
      I. Properties of traveling waves
      II. Properties of standing waves
      III. Doppler effect
      IV. Superposition
   B. Physical Optics
      I. Interferences and diffraction
      II. Dispersion of light and the electromagnetic spectrum
   C. Geometric optics
      I. Reflection and refraction
      II. Mirrors
      III. Lenses
5. Atomic and Nuclear Physics
   A. Atomic physics and quantum effects
      I. Photons and the photoelectric effect
      II. Bohr model and energy levels
      III. Wave-particle duality
   B. Nuclear Physics
      I. Nuclear reactions including conservation of mass number and change
      II. Mass energy equivalence

IV. Course materials: The textbook for this course is Physics 4th edition by Cutnell and Johnson. Supplementary materials are Physics simulations, laboratory and demonstration equipment, and Vernier Probeware.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Advanced Placement Physics C – Mechanics & Electricity and Magnetism
The Physics C course forms the first two semesters of the college sequence that serves as the foundation in physics for students majoring in the physical sciences or engineering. The first half of the year is devoted to classical mechanics. In the second half of the year, the primary emphasis is on classical electricity and magnetism. Methods of calculus are used wherever appropriate in formulating physical principles and in applying them to physical problems. Use of calculus in problem solving and derivations is expected to increase as the course progresses. Students must have already completed a course in calculus or take it concurrently. Most colleges require science and engineering majors to take an introductory physics sequence of which this course covers two semesters. One part of the Physics C examination covers Newtonian mechanics. The other part covers electricity and magnetism. Separate grades are reported for the two subject areas.

Level: AP | Periods per week: 6 | Grade: 12
Prerequisites: Physics I H w/strong performance, Chemistry I, and Biology I | Credit: 1
(Calculus AB or BC must be taken previously or concurrently)

I. Learning Objectives: By the completion of this course, the successful student will have learned:
a. To recognize, understand, and apply the basic concepts and laws of physics to the solving of problems
b. To recognize, understand, and apply the basic concepts of differential and integral calculus within the context of physics
c. To analyze and solve conceptual questions and problems
d. To develop lab procedures, collect data, and analyze results
e. To successfully take the national AP physics exams (Mechanics, Electricity and Magnetism).

II. Learning Experiences: In this course, students will:
a. listen to lectures, take notes, and actively participate in the class discussions
b. work together in lab groups and in problem-solving groups
c. learn how to use a variety of lab equipment
d. do laboratory experiments, analyze data and sources of error, and compare class results
e. solve many, many problems
f. analyze the results of calculations for "reasonableness" by considering extreme or limiting cases.

III. Course Outline:
Semester I. Newtonian Mechanics

I. Kinematics: vectors, vector algebra, components of vectors, coordinate systems, displacement, velocity, and acceleration
  A. Motion in one dimension
  B. Motion in two dimensions
    1. Projectile motion
    2. Circular motion
    3. Relative velocity
II. Newton's laws of motion
  A. Static equilibrium
  B. Dynamics of a single particle
  C. Systems of two or more bodies
III. Work, energy, power
  A. Work energy theorem
  B. Conservative forces
  C. Conservation of energy
  D. Power
IV. Linear momentum
  A. Center of mass
  B. Impulse and momentum
  C. Collisions and conservation of momentum
V. Circular motion and rotation
  A. Uniform circular motion
  B. Angular momentum and its conservation
    1. Point particles
    2. Extended bodies, including rotational inertia
  C. Torque and rotational statics
  D. Rotational kinematics and dynamics
VI. Oscillations and gravitation
  A. Simple harmonic motion
  B. Mass on a spring
  C. Pendulum and other oscillations
  D. Newton's law of universal gravitation

E. Orbits of planets and satellites

Semester II. Electricity and Magnetism

I. Electrostatics
   A. Charge, field, and potential
   B. Coulomb's law; field and potential due to a point change
   C. Fields and potentials of other charge distributions
      1. Planar
      2. Spherical symmetry
      3. Cylindrical symmetry
   D. Gauss' law

II. Conductors, capacitors dielectrics
   A. Electrostatics with conductors
   B. Capacitors
      1. Parallel plate
      2. Spherical and cylindrical
   C. Dielectrics

III. Electric circuits
   A. Current, resistance, voltage, power
   B. Steady-state DC circuits with batteries and resistors only
   C. Capacitors in circuits

IV. Magnetostatics
   A. Permanent magnets
   B. Forces on moving charges
   C. Forces on current-carrying wires
   D. Magnetic fields of long current-carrying wires
   E. Biot-Savart and Ampere's laws

V. Electromagnetism
   A. Induction
   B. Inductance; RL, LC, and RLC circuits
   C. Maxwell's equations

IV Course Materials:

The textbook for this course is University Physics 11th edition by Young and Freeman. Supplementary materials include Physics laboratory experiments with probeware, physics videos, and online computer simulations.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Chemistry II Honor

Chemistry II Honor is a second year chemistry course designed to further prepare students for college chemistry. College chemistry is a required course for pre-medical students, nursing students, and all basic science majors. Chemistry II Honor will provide a substantial lab component, including several open-inquiry lab practicals and an extensive research assignment. In addition to organic and biological chemistry, this course will deal with environmental issues such as nuclear energy, water, 'green chemistry', and air pollution. Application of chemistry to these and other practical problems will be emphasized.

Level: H | Periods per week: 4 | Grade: 12
Prerequisites: Physics I, and Chemistry I w/strong performance, Biology I | Credit: 1

I. Learning Objectives: By the end of the course the successful student will have learned:

1. To comprehend general chemistry including impact of chemistry on society
2. Chemical theory and problem solving in preparation for university-level chemistry
3. Advanced laboratory technique and practice

II. Learning Experiences:

The focus of Chemistry II Honors is to reinforce and greatly improve upon the student's experience in first-year chemistry. Examples of topics to be explored will include chemical equilibrium, organic chemistry, thermodynamics, molecules of life, environmental chemistry, chemistry review and preparation for college.

Some project, outside research, or presentation will be required each quarter. Laboratory work is a large part of the course. As in Chemistry I Honors courses, more exacting quantitative work is involved. Since most students in Chemistry II Honors continue on to take laboratory work at the university level, lab technique as well as results and thoroughness and overall understanding of each experiment will be a significant part of the course grade. Labs will roughly compliment class work and a write-up for each experiment will be required. There are roughly 20 experiments over the year, including two laboratory practicals.

III. Course Outline: The following is a general summary of what can be expected this year.

First Quarter - General Review of Chemistry I: Matter, Atomic Theory, Bonding, Thermodynamics, Stoichiometry, Equations, Equilibrium, Acids/Bases, Electrochemistry and Redox.
Second Quarter - Chemical Resources, Metals and Materials, Complexes and Coordinate Chemistry
Third Quarter - Organic and Biological Chemistry: An intro to Organic Synthesis and types of organic reactions; Biochemistry: Carbohydrates, Lipids, Proteins, Nucleic Acids and their chemistry
Fourth Quarter - Energy - Chemical, Electrochemical, and Nuclear: Thermodynamics and Energy from the Chemical Bond, Electrochemical Energy, and Nuclear Energy (incl. field trip to MIT's Nuclear Reactor)

IV. Course Materials

1. Chemistry: Molecules and Matter, Peter Atkins, Loretta Jones (4th ed., 2000)
2. General, Organic, and Biological Chemistry, Steven Stoker (2004).

Additionally, there will be a number of articles from current sources, i.e. newspapers, scientific publications, student presentations on selected topics, videos from the "Annenberg" and "Chem Study" series, clips from the ACS series 'Chemical Demonstrations', and several guest lecturers.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Advanced Placement Chemistry
Advanced Placement Chemistry is equivalent to two semesters of college level inorganic chemistry. The course stresses quantitative reasoning, a comprehensive laboratory program and covers the basic chemical topics leading to the AP exam in May. A strong background in Chemistry 1 at the honor level is required and students are expected to have a strong, self-motivated approach to their studies. The workload is commensurate with college level chemistry. Most students spend one to two hours on homework per night. All students are expected to take the AP examination.

Level: AP Periods Per Week: 6 Grade: 11 -12
Prerequisite: Physics 1H, Chemistry 1 H or Chemistry 1 LBC H. Credit: 1
(It is recommended that Honor Math or AP Math be taken concurrently)

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To describe the principal concepts which are associated with physical and inorganic chemistry as described in Advanced Placement Course Description Chemistry written by the College Board
b. The important laboratory skills such as detailed observation, accurate recording, experiment design, manual manipulation, data interpretation, statistical analysis, and operation of technical equipment
c. An appreciation of how scientific discoveries are made
d. An appreciation of how chemistry applies to everyday life

II. Learning Experiences:

In this course students will:

a. Actively participate in class discussion.
b. Conduct investigations and keep a lab notebook.
c. Actively participate in the homework, discussion of investigations and search for related information.
d. Share various approaches to problem solving.

III. Course Outline:

1. Introductory Topics: Measurement, chemical nomenclature, stoichiometry
2. Chemical reactions in aqueous systems, Net ionic equations, titrations, and redox reactions
3. Gases
4. Equilibrium: Phase, Solubility product, Acid/Base
5. Thermodynamics
6. Quantum theory and Periodicity
7. Bonding and Intermolecular Attractions
8. Colligative Properties
9. Electrochemistry
10. Rate kinetics

IV. Course Materials:

1. Chemistry; Steven S. Zumdahl; Houghton Mifflin Co. 1997; Boston, MA
2. General Chemistry, An Integrated Approach, Hill, Petrucci; Prentice Hall, 2002; NJ
3. Chemical Reaction Book

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Biology II Honor

This course is designed so that the student may pursue study of several areas of biology that are currently under much investigation. Students will go into more depth than in a first year biology course and will read in many sources besides the textbook. The course is primarily laboratory oriented and labs are designed so that students receive much instruction at the beginning of the course with increasing open-endedness as the year progresses. By the end of the course each student will be designing and carrying out his/her own independent experiment. Labs are generally long term and will require extensive and accurate data taking so that the student will be able to write his/her experiment in the form of a scientific paper. (Instead of having 8-10 lab reports due during a marking period, students will have 1 or 2 papers that will analyze the experimental data). Assignments will be given on a long-term basis giving students an opportunity to plan their time accordingly.

Level: H | Periods per week: 4 | Grade: 12
Prerequisites: Physics I, Chemistry I, Biology I | Credit: 1

I. Learning Objectives (A statement of learning objectives is a statement of changes to take place in the students)
By the completion of this course, the successful student should be able to:

1. participate in a long-term research study through Harvard Forest by collecting data over the year
2. explain how scientists study phenology to understand climate change
3. explain some of the complexities of animal behavior in invertebrates and vertebrates
4. demonstrate techniques in the study of animal behavior
5. discuss controversial ideas in biology using evidence to support both sides of a scientific argument
6. explain bioethics (e.g. of vaccinations)
7. explain how infectious disease has affected humans historically and in current times
8. explain the differences among various infectious agents (e.g. viruses and bacteria)
9. demonstrate how infectious agents are identified
10. explain the difference between innate and adaptive immunity and how they work together to respond to pathogens
11. explain the "central dogma" of Biology
12. explain how molecular genetics has impacted Biology
13. demonstrate Mendelian genetics through crosses
14. demonstrate several laboratory techniques used in modern research laboratories
15. explain the underlying biology of many DNA technologies such as DNA fingerprinting, PCR and microarrays
16. demonstrate techniques in working with microorganisms
17. explain how bacterial transformation takes place and how this demonstrates the way in which DNA controls cell processes
18. write a scientific paper in acceptable form using original data, analyzing these data for patterns and using outside references with proper citation to help support this analysis
19. design, carry out, and submit a formal analysis of an original research experiment

II. Learning Experiences (A learning experience is the interaction between the learner and the external conditions in the environment to which he/she can react):
In this course, the students will:

1. participate in a variety of long term laboratory activities
2. work in teams to complete these labs and share and discuss data with the members of the lab group and the class
3. participate in large and small group discussion of the various reading assignments
4. view videos, movies, and participate in field trips to gain a better understanding of the biological world.
5. design and carry out an original experiment

III. Course Outline (Brief outline of the major topics and units that are central to this course, the sequence of topics and units may be altered by the teacher based on the needs of the students)

1. Ecology & Climate Change

   A. Phenology – Harvard Forest Project: leaf senescence, bud burst and leaf development
   B. Climate Change – causes, global and local effects
2. Animal Behavior (includes brain and nervous system)
   A. Approaches to the study of behavior—ethology, psychology and the study of animal behavior, genetic aspects of learning, physiology of behavior, behavioral rhythms
   B. Animal Communication—courtship, communication in social groups, human language
   C. Ecology and Behavior—orientation and migration, foraging behavior, territoriality, reproductive strategies
   D. The Evolution of Animal Societies—sociobiology, group living, altruism, insect societies, vertebrate societies, human sociobiology
   E. Evolutionary Viewpoint
3. Infectious Disease
   A. Historical significance and importance of understanding infectious disease
   B. Infectious disease – characteristics of agent, symptoms
   C. Microbes vs. pathogens
   D. Pathogens – progression of disease
   E. Immune system – how you prevent and fight against disease
4. Molecular Genetics
   A. Mendelian genetics - Corn and Soybean Lab
   B. Biochemical Interaction of Different Strains of *Serratia marcescens*
   C. Genetic Transformation of Bacteria Using *P-glo* Gene
   D. DNA Technology
   E. Introduction to Computer-based DNA and Protein Databases
5. Independent Research Project

IV. Course Materials:
Textbook: Raven, Peter H. and George B. Johnson. 1995. Understanding Biology, 3rd edition. McGraw-Hill
Supplementary Materials:
Wilson, Edward O. 1992. The Diversity of Life. W.W. Norton and Company, New York
Selected readings from Konrad Lorenz, Nikko Tinbergen, Jane Goodall: In the Shadow of Man, Diane Fossey: Gorillas in the Mist, Scientific American reprints and other supplementary handouts

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Advanced Placement Biology
An examination of the major biological concepts at a level comparable to that taught in a college introductory biology course taken by biology majors. This course is equivalent to a two-semester college introductory biology course usually taken by biology majors during their first year of college. All of the major concepts of biology are covered in depth, with a significant portion of time devoted to a wide variety of laboratory exercises. It is necessary for students to have a strong first-year biology background, along with a self-motivated and rigorous approach to their studies. The work-load is commensurate with college level biology. Most students spend one to two hours on homework per night. All students are expected to take the AP Examination.

Level: AP Periods per week: 6 Grade: 12
Prerequisites: Physics I, Chemistry IH, Biology IH w/strong performance. Credit: 1
(Physics I - 11/12 may be taken concurrently)

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To describe the principal concepts which are associated with living organisms.
b. The important laboratory skills such as detailed observation, accurate recording, experimental design, manual manipulation, data interpretation, statistical analysis, and operation of technical equipment.
c. An appreciation of how scientific discoveries are made
d. An appreciation of how biological science applies to everyday life

II. Learning Experiences:

In this course students will:

a. Actively listen to lectures, and participate in class discussion.
b. Outline chapters noting key concepts, words and facts.
c. Conduct investigations, writing a report or answering questions explaining the findings.

III. Course Outline:

I.	MOLECULES AND CELLS	
	A. Basic biological chemistry	4 - 5 weeks
	B. Cells	2 - 3 weeks
	C. Energy transformations	2 - 3 weeks
II.	GENETICS AND EVOLUTION	
	A. Heredity	2 - 3 weeks
	B. Molecular genetics	2 - 4 weeks
III.	ORGANISMS AND POPULATIONS	
	A. Body Systems	5 - 8 weeks
	B. Plants	3 weeks
	C. Ecology	2 - 4 weeks

IV. Course Materials:

Biology, 9th Ed Campbell & Reece, Pearson, 2011.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Advanced Placement Environmental Science

Advanced Placement Environmental Science is designed to be the equivalent of an introductory college course in environmental science. The goal of the AP Environmental Science course is to provide students with scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them, leading to the AP examination in May.

Level: AP Periods per week: 6 Grade: 12
Prerequisite: Physics I, Chemistry IH w/strong performance, Biology IH w/strong performance. Credit: 1

I. Learning Objectives:

By the end of this course the successful student will have learned:

a. Science is a process.
b. Energy processes underlie all ecological processes.
c. The earth itself is one interconnected system of abiotic and biotic components
d. Humans alter natural systems
e. Environmental problems have a cultural and social context
f. Human survival depends on developing practices that will achieve sustainable systems

II. Learning Experiences:

In this course students will:

a. Regularly read and summarize assigned material.
b. Participate in classroom discussion of assigned material.
c. Perform and write up associated laboratory exercises.
d. Perform data collections and analyze statistical and graphical trends

III. Course Outline:

I. Scientific Analysis (ongoing)
   A. Observing the natural world and developing hypotheses
   B. Collecting data
   C. Modeling
   D. Critical interpretation of data
II. Interdependence of Earth's Systems (9-10weeks)
   A. The Flow of Energy
   B. The Cycling of Matter
   C. The Solid Earth
   D. The Atmosphere
   E. The Biosphere
III. Human Population Dynamics (2-3 weeks)
   A. History and Global Distribution
   B. Carrying Capacity-Local, Regional, Global
   C. Cultural and Economic influences
IV. Renewable and Non-renewable Resources (7-8 weeks)
   A. Water
   B. Minerals
   C. Soils
   D. Biological
   E. Energy
   F. Land
V. Environmental Quality (7-8 weeks)
   A. Air /Water/Soil
VI. Global Changes and Their Consequences (5-6 weeks)

A. First-order Effects
B. Higher -order Interactions

VII. Environment & Society (2-3 weeks)

A. Economic Forces
B. Cultural and Aesthetic Considerations
C. Environmental Ethics
D. Environmental Laws and Regulations
E. Sustainability

IV. Course Materials: The following represents the major text and/or resources used in Advanced Placement Environmental Science. Teachers also use supplementary texts, articles, materials, and curriculum documents that they have gathered or prepared in order to enrich and extend student learning.

1. Living in the Environment: Principles, Connections, and Solutions; Miller G. Tyler, Jr.; 15th ed., Thomson, 2007
2. The World Wide Web

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Anatomy and Physiology
This second year biology program is a survey course that concentrates on mammalian anatomy and physiology. All vertebrate systems are covered on both a gross anatomy level and a microscopic anatomy level. The laboratory curriculum involves histology and organ dissections along with assorted laboratory experiences in physiology. Guest lecturers from the medical field will supplement the curriculum. Students electing to take this course for honor credit will complete supplementary projects and papers.

Level: N or H | Periods per week: 4 | Grade: 12
Prerequisites: Physics I, Chemistry I, and Biology I | Credit: 1

I. Learning Objectives: (A statement of learning objectives is a statement of change to take place in students)

By the completion of this course, the successful student will have learned:

A. basic anatomical and physiological terminology.
B. the human body: its structure and function in health and disease.
C. an appreciation of both the simplicity and the complexity of major body systems.
D. an appreciation of the practical usefulness of anatomical and physiological knowledge in everyday life.

II. Learning Experiences: (A learning experience is the interaction between the learner and the external conditions in the environment to which he/she can react).

In this course students will:

a. Actively listen to lectures, and participate in class discussion.
b. Outline chapters noting key concepts, words and facts.
c. Conduct investigations, writing a report or answering questions explaining the findings.
d. Be tolerant of others and all ideas presented, work cooperatively, apply strategies and think, act with safety being first in all situations.

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the teacher based on the needs of the students).

A.	Organization of the Human Body	1 week
B.	Introduction to Basic Chemistry of Humans	1 week
C.	Cells and Tissues	1 week
D.	Integumentary System	2 - 4 weeks
E.	Skeletal System	3 - 4 weeks
F.	Muscular System	3 - 4 weeks
G.	Nervous system	4 - 6 weeks
H.	Cardiovascular System	2 - 3 weeks
I.	Lymphatic System and Immunity	2 - 3 weeks
J.	Respiratory System	2 - 3 weeks
K.	Digestive System	2 - 3 weeks
L.	Reproductive System	2 - 3 weeks
M.	Excretory System	2 - 3 weeks
N.	Endocrine System	2 - 4 weeks

IV. Course Materials:
Martini & Nath, Fundamentals of Anatomy and Physiology, 8th Ed., Pearson, 2009
Teachers also use supplementary texts, articles, materials and curriculum documents which they have gathered or prepared themselves and which they believe enrich and extend student learning.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Astronomy
Astronomy is a full year laboratory science course that examines the natural events that occur in the Universe, Galaxies, and our Solar System. Constellations, the motion of the moon, planets and stars, and recent discoveries will be studied. The course will review pertinent science topics from prior science courses, and serve as a capstone for Physics, Chemistry, and even some of Biology. Students will conduct several research projects and do outside reading.

Level: N or H | Periods per week: 4 | Grade: 12
Prerequisites: Successful completion of three years of science (Physics, Chemistry, Biology) | Credit: 1

I. Learning Objectives: By the completion of this course successful students will:
a. Describe events and processes that occur in our solar system, stars, galaxies, and the universe.
b. Use their previous three years of science to make this course a capstone for their high school science experience.

II. Learning Experiences:
a. Astronomy is a highly visual academic discipline; therefore pictures, movies, and views through the school telescope will be presented.
b. Lectures will be presented in Powerpoint form. Discussions will be driven by readings, questions, and pictures presented on screen.
c. Use of home computers and laptops from the Science department, will be routine.
d. Data collection for astronomy takes years and decades, but Starry Night Software offers an infinite number of views of the universe over a span of 100,000 years. We will use the software to observe the "night sky" and collect historical (and future) data.

III. Course Outline:
Part One - Astronomy and the Universe
- Charting the Heavens
- Copernican Revolution: Birth of Modern Science
- Radiation, Spectroscopy, and Telescopes

Part Two - Our Planetary System
- The Solar System, its Formation and Beyond

Part Three - Stars and Stellar Evolution
- The Sun: Our Parent Star
- Red Giants and White Dwarfs
- The Interstellar Medium
- Stellar Formation, Evolution and Explosions: Novae, Supernovae, and Formation of Elements
- Neutron Stars and Black Holes: Strange States of Matter

Part Four - Galaxies and Cosmology
- Normal and Active Galaxies
- The Big Bang and the Fate of the Universe
- The Early Universe
- Life in the Universe: Are We Alone?

IV. Course Materials:
- Astronomy Today; 5/e Chaisson and McMillan
- Multimedia materials
- Starry Night Software
- Orion XT 10 Intellisocope – Dobsonian Telescope with computerized locator

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Engineering by Design - Honors
Engineering By Design is a year-long, project-based course that will expose students to the fundamentals of engineering and the design and fabrication process. Projects will be interdisciplinary in nature and will draw from the fields of Chemical, Civil, Environmental, Mechanical, and Materials Science Engineering. Students who take this course will be prepared to make an informed career decision regarding engineering. Furthermore, students will discover that engineering is a different and intellectually rewarding.

Level: H | Periods per week: 6 | Grade: 12
Prerequisite: Successful completion of three years of science (Physics, Chemistry, Biology) | Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

- How the field of engineering relates to science, technology, and society.
- The fundamental skills that all professional engineers must develop.
- To solve problems from a wide variety of engineering disciplines.
- To apply the engineering design process while considering design tradeoffs and constraints.
- To collaborate with other students and integrate smaller projects into a larger system.
- To communicate and document design work.

II. Learning Experiences

In this course students will:

- Design, model, and construct solutions to challenging problems.
- Evaluate and modify designs in response to feedback.
- Research and present technical information.
- Coordinate both software and hardware components of a design.
- Utilize a variety of building materials and construction techniques.

III. Course Outline

A. Introduction to Engineering and Design Process
   1. Lego Robotics
   2. Graphical Programming

B. Materials Science
   1. Atomic structure and material properties
   2. Stress, strain, sheer, compression, tension, etc.

C. Architectural & Civil Engineering
   1. Engineering, Ethics, and Society
   2. Hydrology, bridges, trusses, and towers

D. Chemical & Environmental Engineering
   1. Energy conversion and storage
   2. Water quality and purification

IV. Course Materials

Although there is no textbook, teachers will use articles, computer simulations, and curriculum documents that they have gathered or prepared themselves and which, they believe, enrich and extend student learning.

1. Engineering challenges prepared by the Tufts University Center for Engineering Education Outreach.
2. Engineering challenges from “Physics By Design”, Barbara Bratzel, 2005.
3. Lego Mindstorm kits with Robolab software.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Body/Mind Honor
This course explores the relationship between mind and body through the findings of current scientific research and through practical experience. The first semester is primarily academic, focusing on the nervous system, the brain, and the field of psychoneuroimmunology. The second semester is primarily experiential and focuses on such body/mind methods as yoga, Qigong, meditation, and guided imagery. Among the wide variety of body/mind topics are the connection between stress and disease, Eastern Medicine, and theories relating socioeconomics, community and health. The most common course outcomes reported by students are greater confidence, a healthier life style, an open mind, a sense of community in class, increased body awareness, and the ability to use that awareness to improve physical and mental well-being.

Level: H | Periods per Week: 4 | Grade: 12
Prerequisite: Biology I H | Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. The major structures and organization of the nervous system and the immune system.
b. The major structures and organization of the brain.
c. The basic concepts and research underlying the science of psychoneuroimmunology
d. The fundamentals of the science of healing – the power (and limits) of faith and hope; the relationship between mind and immunity; the programming of the body/mind through conditioning; and the dangers of helplessness and how to overcome it.
e. How to control stress through developing an attitude of "stress as opportunity," and the learning process and practice of meditation.
f. How to break the anxiety cycle through breathing techniques, stretching, and progressive muscle relaxation.
g. The concept and art of mindfulness and a model for understanding the mind.
h. To recognize the cognitive mind traps which perpetuate our problems and to replace these with self-understanding.
i. The art of reframing through such means as humor, affirmation, and creative imagination.
j. To recognize emotional mind traps and to learn healthy attitudes toward emotions.
k. To be more aware of his/her body.
l. To be more aware of the relationship between body and mind (experientially as well as cognitively).
m. To use mind/body awareness to develop healthier attitudes and life styles
n. To function as a member of a class community – valuing differences, contributing ideas, sharing experiences, and supporting others.

II. Learning Experiences:

By the completion of this course, students will have:

a. Attended lectures, taken notes, and actively participated in class discussions.
b. Completed homework assignments, daily reflections, papers and projects.
c. Completed all quizzes and exams.
d. Completed journal assignments.
e. Attended and fully participated in workshops and classes based on mind/body practices.

III. Course Outline: (A brief outline of the major topics and units which are central to this course; the sequence of topics and units may be altered by the instructor based on the needs of students)

First Semester

1. Immune system
2. Nervous System
3. Brain
4. Psychoneuroimmunology
5. The fundamentals of emotional intelligence

6. The science of healing
7. Controlling stress
8. Mindfulness and a model of the mind
9. Cognitive mind traps and levels of understanding
10. Emotional mind traps and the art of reframing

Second semester

Interspersed throughout the first semester and primary in the second semester are experiential activities which apply the concepts students are learning or have learned. These are designed to enhance body awareness, awareness of the relationship between the body and mind, health and a healthy life-style, and a sense of community. The emphasis and sequence will vary with the needs and responses of the students.

1. Meditation
2. Guided imagery
3. Movement classes (based on Hatha yoga, Qigong, etc.)
4. Touch activities (based on shiatsu, acupressure, Feldenkrais Technique, etc.)
5. Trust/community building activities

IV. Course materials: The following list represents the major texts and/or resources used in Body/mind Research.

1. Books:
   - Groopman, Jerome, Anatomy of Hope, New York: Random House, 2003.
   - Borysenko. Joan, Minding the Body, Mending the Mind, New York: Bantam Books, 1988.
   - Goleman, Daniel, Emotional Intelligence, New York: Bantam Books, 1997.
   - Sacks, Oliver, The Man Who Mistook His Wife for a Hat. New York: Harper Perennial, 1990. (selected chapters).
   - Sacks, Oliver, An Anthropologist on Mars. New York: Alfred A. Knopf, 1995 (selected chapters).
2. Articles are used from a wide range of sources including Advances: The Journal of Mind/Body Health.
3. Videos:
   - "The Brain: Our Universe Within" from Discovery Communications, 1994
   - "Healing and the Mind with Bill Moyers" first shown on PBS in 1993.
4. Community Resources: Guests are a regular part of the curriculum, but they vary from year to year. Examples of guests who have shared their past expertise through talks and/or demonstrations are brain researchers, psychologists, chiropractors, osteopaths, and medical doctors specializing in sports medicine, homeopathy, immunology, and respiratory diseases. Parents are our greatest resource. Parents of the current class are encouraged to share their expertise with the Body & Mind class (with the approval of their son or daughter!). Ms. Angione can be reached by email at mary_angione@brookline.k12.ma.us or by phone at (617) 933-8097.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Marine Biology
In this introductory course on the marine environment, we will survey the fundamentals of physical and chemical oceanography before diving into the rich biological and ecological diversity of the oceans. Major topics will include plant and animal life and types of communities such as coral reefs, seamounts, and estuaries. Evaluation will be based on lab reports, quizzes and tests, individual and group projects, and participation. The course will culminate in a field trip to the New England Aquarium, or to Plum Island (weather permitting).

Level: N or H | Periods per week: 4 | Grade: 12
Prerequisites: Physics I (may be taken concurrently), Chemistry I, and Biology I | Credit: 1

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

A. To describe the physical and chemical environment of the world's oceans;
B. To describe the abiotic factors which limit the distributions of marine life and to which marine organisms must adapt;
C. To identify major taxonomic groups living in the ocean;
D. To describe the major ecosystems of the ocean in terms of physical and biological characteristics;
E. To explain how marine communities function;
F. To analyze and identify marine plants and animals;
G. To demonstrate an understanding of the impacts of human activities on marine environments.

II. Learning Experiences:

In this course students will:

a. Actively listen to lectures, and participate in class discussion.
b. Outline chapters noting key concepts, words and facts.
c. Conduct investigations, writing a report or answering questions explaining the findings.
d. Be tolerant of others and all ideas presented, work cooperatively, apply strategies and think, act with safety being first in all situations.

III. Course Outline:

Unit 1: Basics of Physical and Chemical Oceanography (including plate tectonics, tides and oceanic currents, and the chemistry of seawater)
Unit 2: Microscopic and Photosynthetic Life (bacteria, protests, and macroalgae)
Unit 3: Invertebrate Diversity (a survey of all the invertebrate phyla)
Unit 4: Vertebrate Diversity (fishes, reptiles, mammals, seabirds)
Unit 5: Ecological Communities (tidal, estuarine, continental shelves, coral reefs, deep sea)
Unit 6: Humans in the Marine World (biotic and abiotic resource exploitation, recreation, and climate change)

IV. Course Materials:

Marine Biology, 8th Edition Castro, Mcgraw-Hill
Teachers also use supplementary texts, articles, materials and curriculum documents which they have gathered or prepared themselves and which they believe enrich and extend student learning.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Forensic Science
Forensic Science is a student-centered, semester-long course. Basic forensic analyses will be covered using case studies and labs. Topics covered include the study of fibers, DNA profiling, blood and blood spatter analysis, soil analysis, and fingerprinting. Learning happens primarily through collaborative exploratory-activities and lab work. Students who elect this course for honors credit will be expected to demonstrate strong academic independence through completion of extra projects.

Level: N or H | Periods Per Week: 4 | Grade: 12
Prerequisite: Completion of Physics, Chemistry, and Biology | Credit: 0.5

I. Learning Objectives:

By the completion of this course, the successful student will be able to:
1) Use mathematics to determine the validity of a piece of evidence.
2) Problem solve using deductive reasoning and evidence
3) Correctly identify the legal implications and consequential processes of violations
4) Use biochemical assays and chemical reactions to identify drugs, poisons, blood, and DNA
5) Use and analyze data from technological methods such as PCR, spectrophotometry, and chromatography
6) Use physics calculations to determine the projection and pattern of blood spatters
7) Properly use microscopes to identify various hair types, fibers, and blood cells.
8) Explain the science behind identification methods used for various forms of evidence

II. Learning Experiences:

The course provides an introduction to fundamental concepts in forensics science. The course emphasizes critical thinking, problem solving, observation and analysis, and collaborative work. Students learn through a combination of exploratory activities, lecture, case studies, discussion, labs, supplementary readings, homework and projects.

III. Course Outline:

Unit I: Introduction	Observational Skills Crime Scene Evidence Examination	1 week
Unit II: Hair	Structure of hair Types of hair Microscopic features of hair	2 weeks
Unit III: Fibers and textiles	Sampling fibers Fiber analysis Fiber classification (animal, plant, synthetic)	2 weeks
Unit IV: Fingerprinting	History of fingerprinting Classification of fingerprints Detecting and preserving fingerprints	2 weeks
Unit V: DNA Profiling	Structure & function of DNA DNA fingerprinting (VNTR, STR) Analysis of DNA profiles Application of DNA profiling	4 weeks
Unit VI: Blood and Blood Spatter	Composition of blood Blood typing Blood spatter analysis	3 weeks

IV. Course Materials:

1. Textbook: Forensic Science: Fundamentals and Investigations by Anthony Bertino and Patricia Nolan Bertino. South-Western. 2009.
2. Supplementary materials: case studies and articles

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Genetics
Genetics is a student-centered, semester-long course. Molecular and classical genetics will be covered using lectures, activities, and labs. Topics covered include the DNA structure. Fruit fly genetics, human genetics, and genomics. Students will also learn how the definition of a gene has changed over time. Learning happens primarily through collaborative exploratory-activities and lab work. Students who elect this course for honors credit will be expected to demonstrate strong academic independence through completion of extra projects.

Level: N or H | Periods Per Week: 4 | Grade: 12
Prerequisite: Completion of Physics, Chemistry, and Biology | Credit: 0.5

I. Learning Objectives:

By the completion of this course, the successful student will have learned:

a. To describe the structure of DNA.
b. To determine the outcome of genetic crosses including autosomal inheritance and sex-linked inheritance.
c. Describe the structure of bacterial and eukaryotic genes.
d. Describe non-Mendelian forms of inheritance.

II. Learning Experiences:

The course provides an introduction to fundamental concepts in genetics. The course emphasizes critical thinking, problem solving, observation and analysis, and collaborative work. Students learn through a combination of exploratory activities, lecture, case studies, discussion, labs, supplementary readings, homework and projects.

III. Course Outline:

Unit I: Introduction to Genetics (review)	Classical genetics (yeast mutant isolation) History of the discovery of the structure of DNA DNA structure Transcription/Translation Mitosis/Meiosis	3 weeks
Unit II: Fruit Fly Genetics/ Plant Genetics	Life cycle of the fruit fly Life cycle of fast plants Semester long genetic crosses	Throughout the semester
Unit III: Molecular Model of the Gene and Gene Regulation	Prokaryotic Genes *(lac* operon/*trp* operon) Organization of eukaryotic genes Regulation of eukaryotic genes	5 weeks
Unit IV: Non-Mendelian Inheritance	Cytoplasmic inheritance (fast plant crosses) Epigenetics	4 weeks
Unit V: Biotechnology/Genomics	Cloning (molecular and organismal) DNA sequencing Bioinformatics Proteomics	4 weeks

IV. Course Materials:

Original research articles of classical experiments will be read and supplemented with recent publications. Also, Lab handouts and case studies are a strong part of the curriculum.

Science Department
Ed Wiser, Curriculum Coordinator

Course Syllabus

Meteorology
This course is designed to study the atmosphere and the effects it has on local weather pheonomena. The center point of the course will be the observation and prediction of meteorological events based on variables that exist in the Earth's atmosphere. This course will draw on material previously learned in Physics, Chemistry, and Biology and will show how they are all interrelated. Important enviromental aspects will be discussed; such as air pollution, ozone depletion, and global warming.

Level: N or H | Periods per week: 4 | Grade: 12
Prerequisites: Physics I (may be taken concurrently), Chemistry I, and Biology I | Credit: 0.5

I. Learning Objectives:

By the completion of this course the successful student will have learned:

a. To conduct extensive observations relating to meteorolgical events and analyze them in order to make accurate scientifically based predictions.
b. How the atmoshpere interacts with Earth's surface in creating local weather.
c. To further apply the laws and principles of physics, chemistry, and biology to observable events and processes.

II. Learning Experiences:

In this course students will:

a. work cooperatively during outdoor observations
b. participate constructively in class discussions
c. utilize class notes, homework assignments, and reading notes in preparation for exams

III. Course Outline:

Sun-Earth Relationship
Temperature, Heat Transfer
Water Cycle Through Atmosphere
Precipitation
Air Pressure and Winds
Weather Patterns
Storms
Envirnomental Impacts on the Atmosphere

IV. Course Materials: *The Atmosphere: An Introduction to Meteorology* Prentice Hall 2009. Teachers may also use supplementary texts, materials, computer simulations, and documents that they have gathered or prepared themselves to enrich and extend student learning.