Standard Science Courses

BITES

Biology in the Earth System

CITES

Chemistry in the Earth System

PITU

Physics in the Universe

State Test - WCAS

- **W**ashington **C**omprehensive **A**ssessment of **S**cience
- All students take Spring of their Junior year
- Covers 3 strands of science content
  - Life Science
  - Physical Science
  - Earth & Space Science
- BITES, CITES, & PITU teach the standards assessed on the WCAS

LWHS Recommended Science Pathway

9th Grade

- Biology in the Earth's Systems

10th Grade

- Chemistry in the Earth's Systems
- AND OR
- Physics in the Universe OR *AP Physics 1
- WITH
- Science Electives

11th Grade

- Physics in the Universe OR *AP Physics 1
- AND OR
- Chemistry in the Earth's Systems
- WITH
- Science Electives

12th Grade

- Science Electives

Science Electives

Year-Long Electives:

- AP Biology
- AP Chemistry
- AP Environmental Science
- AP Physics 1*
- AP Physics 2
- UW Astronomy 101 – Stars*

Single Semester Electives:

- UW Astronomy 150 - Planets
- Anatomy & Physiology 1
- Anatomy & Physiology 2
- Marine Science – Climate Change
- Marine Science – Human Impact
- Meteorology – Weather and Climate
- Zoology

*Washington State has adopted the Next Generation Science Standards, which cover topics including the universe and stars.

To access all standards in the NGSS, students enrolled in AP Physics 1 are recommended to also take Astronomy 101 prior to graduation.

Science Courses Beyond Core

Core Science Pathway

BITES

CITES

PITU or AP Physics 1

PITU or AP Physics 1

CITES

Electives Available at Any Time

- Meteorology
- Anatomy & Physiology
- Zoology
- Marine Science

Courses Available After Biology in the Earth Systems

- AP Environmental Science*
- UW Astronomy 101*
- UW Astronomy 150

*= courses that recommend completion of, or concurrent enrollment in CITES

Courses Available After Chemistry in the Earth Systems

- AP Biology
- AP Chemistry

Courses With Algebra 2 Prerequisite

- AP Chemistry
- AP Physics 1
- AP Physics 2

Science - High School and Beyond

Lake Washington School District Science Graduation Requirements

3.0 science credits

- 2.0 need to be lab-based
- This can be a combination of year-long courses and semester electives.
- All science department courses are considered lab-bases
- *One credit can be non-lab based (from the CTE department)*

What are Competitive Colleges & Four-Year Universities Looking For?

≥ 3.0 science credits

- ≥ 2.0 lab-based
- ≥ 2.0 algebra-based science
  - Chemistry in the Earth System
  - Physics in the Universe
  - AP Biology
  - AP Chemistry
  - AP Physics 1 and/or 2
  - AP Environmental Science
  - UW Astronomy

CHEMISTRY IN THE EARTH SYSTEM (CITES)

- Year-Long Course
- 1.0 Credits Earned
- Counts for Lab Science Credit
- Integrated Honors Class
- Must have passed Algebra 1

- Learn About the Chemistry of…
  - Earthquakes in Washington
  - Aurora Borealis
  - Crystals & Gemstones
  - Wildfires
  - Ocean Acidification









AP CHEMISTRY

"The universe is full of magical things, patiently waiting for our wits to grow sharper." – Edin Philipotts

- Overview:
  - Year Long Course
  - 1.0 lab Science Credits Earned
  - Equivalent to 1-year STEM-majors General Chemistry in college; opportunity to earn up to 15 college credits by passing the AP Exam

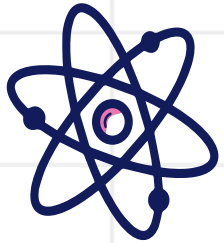
- What You'll Learn:
  Bonding, Intermolecular Forces, Reactions, Kinetics Thermochemistry, Acid-Base Neutralizations, and Electrochemistry.

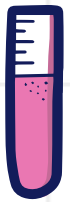
- Expectations
  - Successful completion of Algebra 2 Required
    (Systems of equations, graph composition and analysis, solving logarithms, rearranging equations to solve for exponents)
  - Labs! You will do LOTS of labs, averaging one lab per week!
  - Homework averages 30-45 minutes per day of class
  - Teacher-led review sessions before tests during morning tutorial time
  - Lots of practice test opportunities prior to the AP Exam in May!

College Board recommends this as a second-year chemistry class. Prior completion of CITES is recommended.











Math Expectations in CITES and AP Chemistry

CITES (Intro to Chemistry)

- Algebra 1 successfully completed
- Algebra-based equations
- Multi-step calculations
- Rearranging formulas
- Ability to read and draw graphs
- Scientific Notation
- Unit analysis

AP Chemistry (College Chemistry)

- Algebra 2 successfully completed
- CITES completion recommended
- Equivalent to 1 year of STEM major's chemistry in college!
- Multi-Step Calculations
- Systems of Equations
- Logarithms
- Solving for Exponents
- Graphical Analysis of Functions
- Unit Analysis

Example Equations in CITES

$$q = m \times C \times \Delta T$$

$$1.2\ grams\ H_2O \times \frac{1\ mol}{18.016\ g} \times \frac{6.02 \times 10^{23} molecules}{1\ mol} = ?$$

Example Equations in AP Chemistry

$$m_1 \times C_1 \times (T_f - T_{i-1}) = m_2 \times C_2 \times (T_f - T_{i-2})$$

$$Rate = k[C]^m[D]^n$$

$$\ln [A]_t - \ln [A]_0 = -kt$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{pH} = pK_a + \log \frac{[A^-]}{[HA]}$$

$$E_{cell} = E^o{}_{cell} - \frac{RT}{nF} \ln Q$$

PHYSICS IN THE UNIVERSE (PITU)

- Use wind-up toys to explore the physics around **motion**
- Build rollercoasters to understand **work and energy**
- Make egg protectors to see how **impulse** can protect or destroy an egg
- Create **electrical circuits** to understand **current**
- Construct 3D models of solar systems to explore **Kepler's Laws**



Concurrent Enrollment in Algebra 2 **STRONGLY** RECOMMENDED







Understand ideas using real life experiences

Supports careers in STEM fields

Lots of fun hands-on labs and projects!

Makes you attractive on university applications

Math Expectations in Physics and AP Physics 1

PITU (Intro to Physics)

- Algebra 2 **strongly** recommended
- Primarily 1-D motion
- Algebra-based equations
- Multi-step calculations
- Squared terms (v^2, t^2)
- Ability to read and draw graphs
- Unit analysis
- Algebraic manipulation/ Rearranging formulas

(Example equations below)

AP Physics 1 (Honors PITU)

- The honors version of PITU, no physics knowledge needed
- Everything from PITU, plus:
- 2-D motion (x & y)
- Vector components
- Trigonometry (sin, cos)
- Separate x/y equations
- Systems of equations
- Mathematical modeling

Example Equations In both classes

- $KE = \frac{1}{2}\, m * v^2$
- $F_g = \frac{G*m_1*m_2}{r^2}$
- $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
- $v_f^2 = v_i^2 + 2a * \Delta x$

AP version below

- $(v sin\theta)^2 = (v_o sin\theta)^2 + 2a * \Delta y$

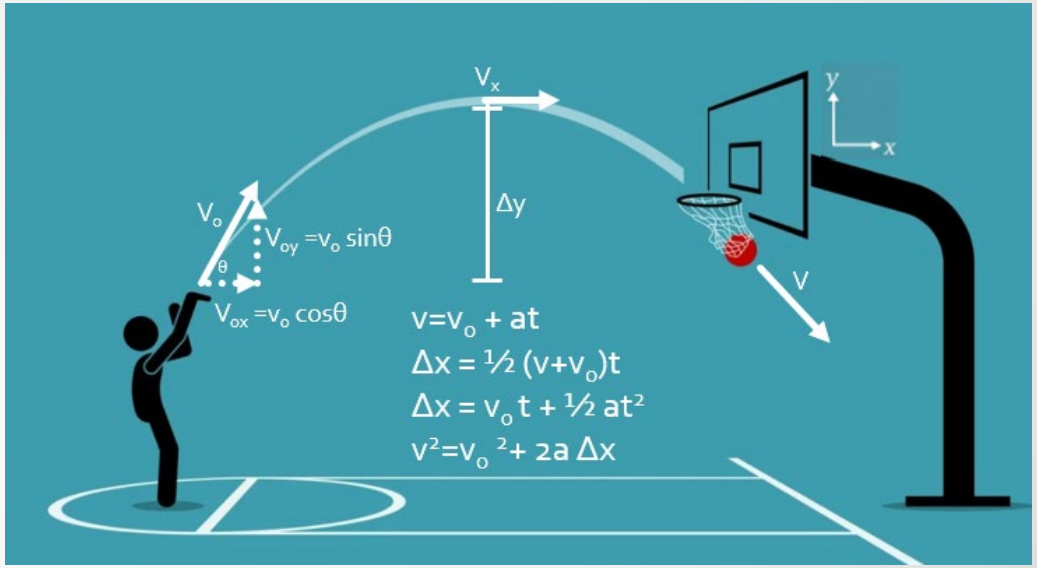
AP Physics 1 (The Honors Pathway for Physics)

What You'll Learn

Kinematics, Forces, Work, Energy, Momentum, Rotational motion, Oscillations, and Fluids

Purpose

To learn mechanics-based physics through labs and the application of equations to real life experiences. Earn college credit through passing an AP test.



Math & Expectations

- **Algebra 2 required**
- A strong understanding of trigonometry and manipulation of equations
- Homework averages ~45 minutes per day
- Hands-on lab work
- Astronomy 101 recommended to meet state standards

Detailed outline of the class. With example problems!

AP Physics II

Comes after PITU or AP Physics I



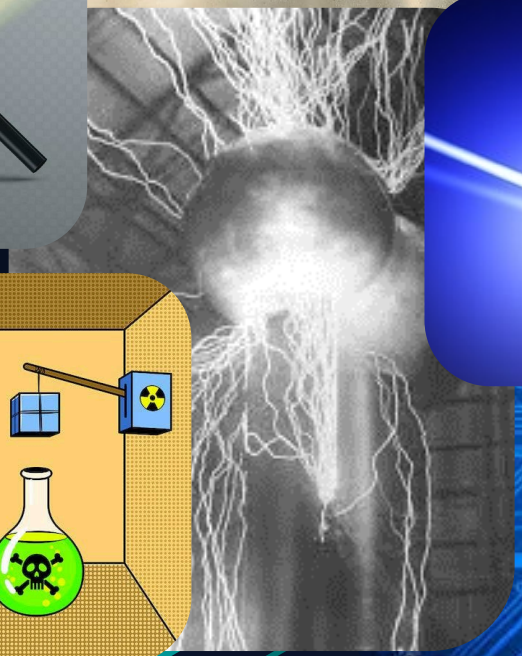
Topics

Thermodynamics, electricity, circuits, and magnetism, optics, light, and atomic and nuclear physics

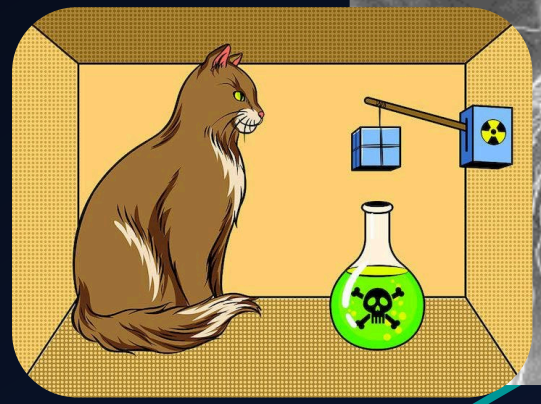
Classwork

- Lab work is strongly emphasized
- Group learning and full class discussions
- End of Year Project!











Expectations

Completion of Algebra 2 is necessary for success in the course
Willingness to work collaboratively
Homework averages 2 hours a week

Meteorology: Weather and Climate

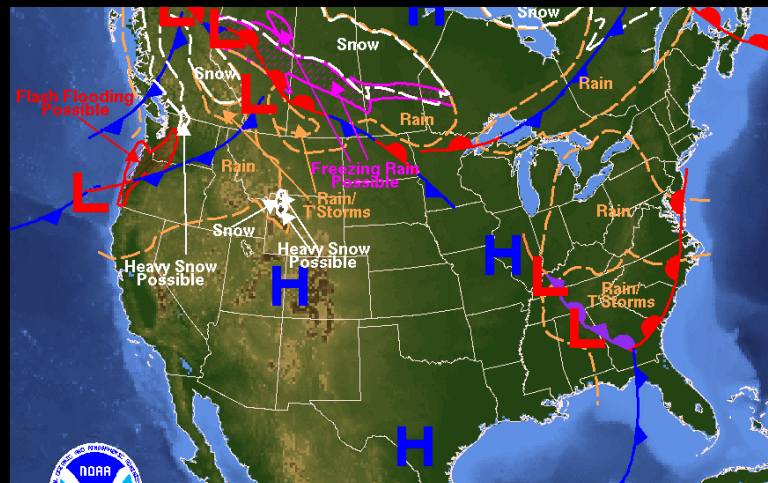


1 Semester

- Climate Change
- Tornadoes
- Hurricanes
- Puget Sound Weather
- Wacky Weather







UW Astronomy 150: The Planets

1 Semester

1 full High School credit
5 FREE College Credits Available
Planets, Asteroids, & Comets
Star Parties
Includes field trip!

Astronomy courses can be taken in any order

UW Astronomy 101: Stars

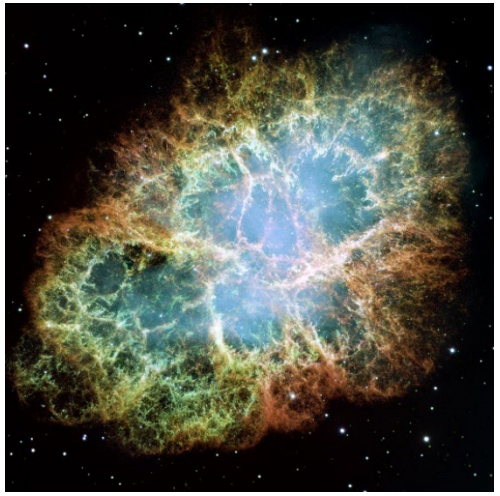
Year-Long

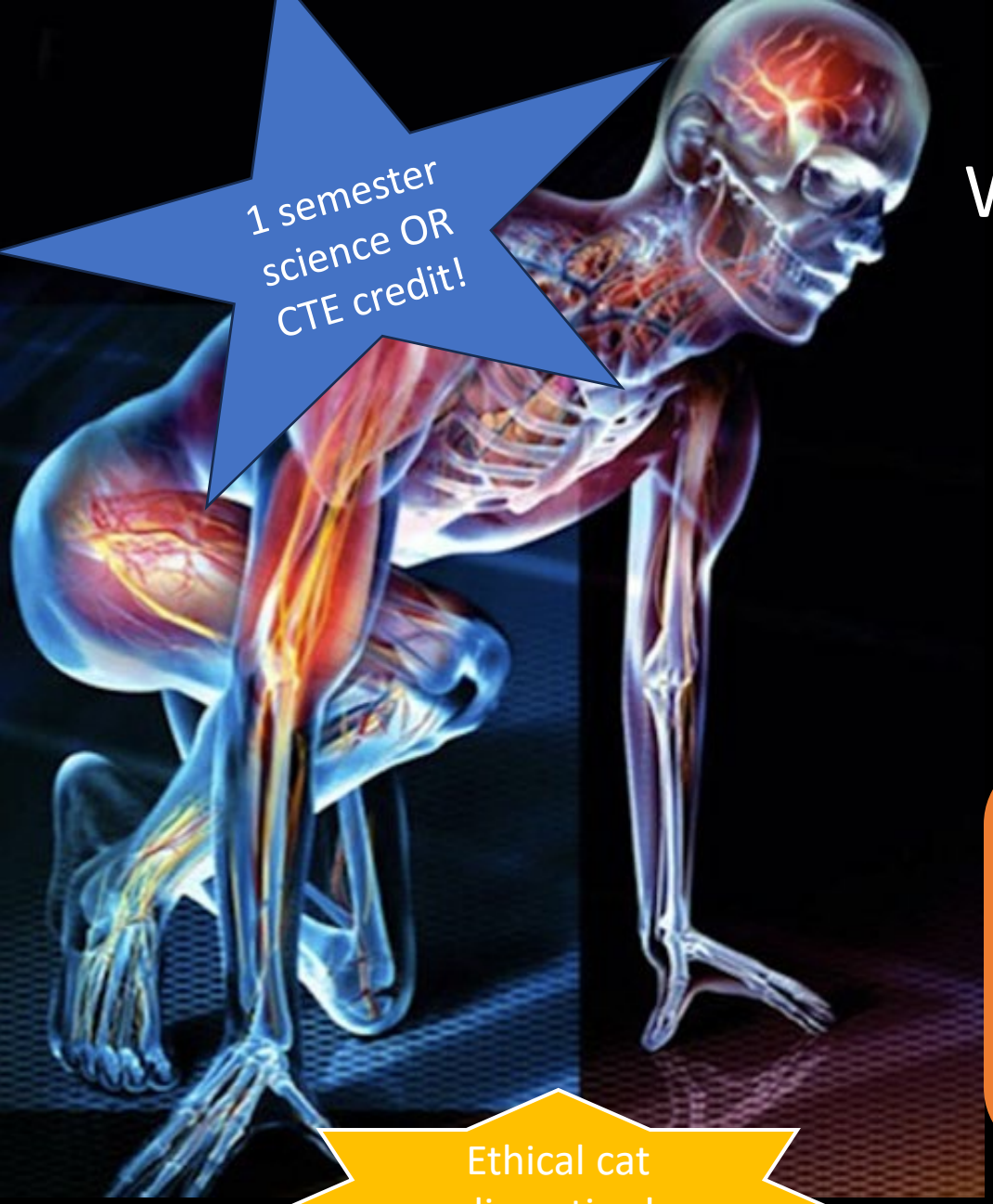
5 College Credits Available

- Galaxies
- Supernovae
- Black Holes
- Big Bang
- Star Parties
- Overnight Field Trip



Astronomy courses can be taken in any order





1 semester science OR CTE credit!

Ethical cat dissection!

Interested in how the body works?
Want to learn about health and medicine?
Curious about diseases and disorders?

ANATOMY & PHYSIOLOGY: Movement and Transport!

Human body systems include:

- Skeletal
- Muscular
- Cardiovascular
- Immune

Connections to nursing, PT, orthopedics, kinesiology



Interested in how the brain works?
Want to learn about how your body uses nutrients?
Curious about diseases and disorders?

ANATOMY & PHYSIOLOGY: Nerves and Nutrients!

Human body systems include:

- Nervous
- Endocrine
- Digestive
- Respiratory

Connections to neuroscience, nutrition, health care

Interested in learning about marine ecosystems?

Curious about how humans are impacting the oceans?



MARINE SCIENCE HUMAN IMPACT





Ecosystems Studied:

The Deep Sea, Rocky Intertidal Zones, & Kelp Forests

Includes a field trip and at least one dissection!

1 semester
Science OR CTE credit!

Interested in learning about marine ecosystems?

Curious about how climate is impacting the oceans?



MARINE SCIENCE CLIMATE CHANGE!





Ecosystems Studied:

Polar Oceans, Coral Reefs, & the Salish Sea

Includes a field trip and at least one dissection!

1 semester
Science OR CTE credit!

Zoology

Biology of animals: form, function, and behavior





1 Semester

Class includes Observational Labs, Dissections, Anatomy, Species Studies

Skills: Presentation, Research, Reading, Dissection, Diagraming/drawing

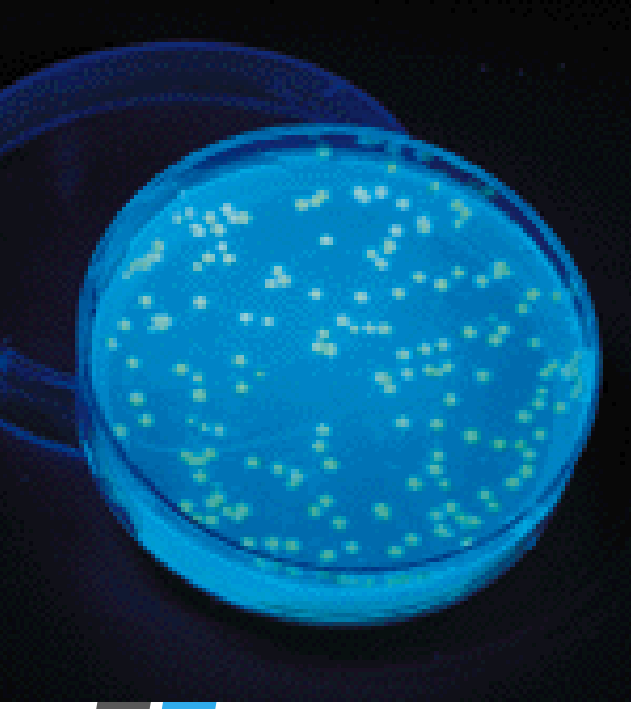
AP ENVIROMENTNAL SCIENCE

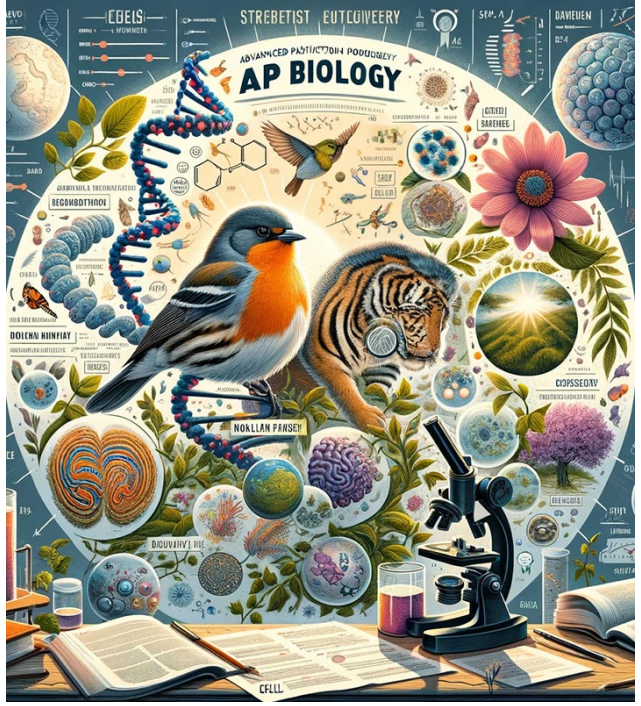
- Learn all about....
  - Ecosystem biology
  - The science of climate change AND pollution!
  - Sustainability
- Fun projects and field trips!
  - Woodland Park Zoo
  - Bubble parenting
  - Design your own city
  - Cemetery Lab
- Course requirements:
  - Biology is a prerequisite!
  - Chemistry taken at the same time or previously!





EARN UP TO 5 COLLEGE CREDITS!









- In-depth dive into how **living things work**!
- **Topics Include:** Evolution, Cell Energy, Cell Communication, Genetics, DNA and Biotechnology, Ecology
- Learn **advanced lab skills**
- Opportunity to earn **college credit** with the AP Exam
- Help **prepare for success** in college science courses
- Completion of **CITES** beforehand ***STRONGLY*** recommended!

OTHER SCIENCE ELECTIVES

- *MAY COUNT AS A SCIENCE ELECTIVE FOR GRADUATION, **BUT** COLLEGE/UNIVERSITY CREDIT MAY VARY*
  - PLEASE NOTE: THESE COURSES WILL NOT COVER THE CONTENT NECESSARY FOR THE STATE REQUIRED SCIENCE EXAM JUNIOR YEAR





SCIENCE ELECTIVE QUESTIONS?

AP Bio



Ms. Zydel
N262

AP Chem



Ms. Koury
N261

AP Physics 1



Mr. Lamy
348

AP Physics 2



Mr. Elliot
347

Marine Science



Ms. Popescu
362

A&P



Mx. Yen
248

Zoology



Ms. Moore
262

APES



Ms. Thody
N161



Ms. Wilson
261



Ms. Tanis
164

UW Astronomy



Mr. Palmer
N162

WE TEACH SCIENCE TOO!



I teach BITES!

Ms. Bangerter
361



I teach BITES & PITU!

Ms. Barker
247



I teach CITES!

Ms. Danziger
261