

Gray Matter Fall 2018 - Course Catalog

Science

Advanced Biotechnology Year 1 and Biotech Research II

Teacher: Courtney Edmonson

Grades: 9, 10, 11, 12

Class Schedule: Tuesday/Thursday

Class Time: 3:30 – 5:30 pm

Duration: 4 hours per week, 32 weeks

Fee(s):

Full Tuition

Supply Fee

\$1,080.00

\$0- included

Description:

We spend two hours covering concepts and two hours in hands-on labs each week.

Biotechnology is one of the fastest growing industries in the nation, with a high demand for entry-level workers and two-year and four-year college graduates. In the last 25 years, the US biotechnology industry has created more than 198,000 high-quality jobs, at over 1,400 pharmaceutical, agricultural, industrial, and instrumentation biotechnology companies, plus more at academic and government agencies. In North Texas alone, over 16,000 people are employed in this industry (2004). After taking this course, your student is well prepared for college lab work, or can apply to work as an intern in the DFW biosciences industry.

During the 32 weeks your student learns:

- basic biology and chemistry necessary for our lab work
- DNA isolation and analysis
- protein isolation and analysis
- assay development
- how to use the spectrophotometer for protein assays
- how to splice genes and genetically transform bacteria
- recombinant protein production
- protein purification and analysis

Students learn cutting-edge lab techniques currently used in the biotech industry:

- use micro-pipettes
- make lab solutions (a gateway skill to internships!)
- run vertical and horizontal gel electrophoresis equipment
- perform PCR
- use a spectrophotometer
- separate proteins using a variety of techniques, including column chromatography
- and many other lab skills directly pertinent to working in the industry (or preparing for college!)

Students gain hands-on experience with advanced lab equipment that includes:

- Spectrophotometer for protein assays—quantitative measurement of the reflection or transmission properties of a material as a function of wavelength
- PCR (Polymerase Chain Reaction) machine—biochemical technology in molecular biology used to amplify a single or a few copies of a piece of DNA
- Horizontal and vertical gel electrophoresis equipment—separation and analysis of macromolecules (DNA, RNA and proteins) and their fragments
- Column chromatography—purify individual chemical compounds from mixtures
- Electron microscope—uses accelerated electrons as a source of illumination to reveal the structure of smaller objects

Join this class to step into the 21st Century! (It really is the coolest class, ever!)

Prerequisites:

Biology

Homework:

Students are expected to prepare their laboratory notebook, including pre-lab questions, before class and may need to complete additional research and conclusions outside of class. (approximately 1-2 hours per week)

Class Materials: Textbook and Lab Manual: *Biotechnology: A Laboratory Skills Course, Student Edition* Brown, et al. ©2011 ISBN-13: **978-0-983-23960-4**. New and Used versions are available at textbooks.com

Payment Options:

1. Full tuition of \$1080.00 due at time of registration.
2. Semester tuition of \$540 due at time of registration and second semester payment of \$540 due by January 15th
3. Monthly payments of \$120. First month is due at time of registration. Subsequent monthly payments of \$120 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.

Biology [Honors]

Teacher: Courtney Edmonson

Grades: 9, 10, 11, 12

Class Schedule: Tuesday/Thursday

Class Time: 9:00 – 10:45 am

Duration: 3.5 hours per week, 32 wks

Fee(s):

Full Tuition

Supply Fee

\$900.00

\$0- included

Description:

This is pre-AP/Honors Biology class for high school students or advanced middle school students using high school curriculum and counted as a high school science class on your transcript. (AP-level classes can be setup, providing the minimum of 4 enroll; contact instructor for additional information).

This is a lab-based class which includes inquiry-based labs. As usual, we spend about half our time covering concepts and the other half in hands-on labs each week.

Topics include cell chemistry, cell structure and function, heredity and genetics, classification, the six kingdoms (including large amounts of dissection the second semester), human anatomy, ecology, and evolution. (Your child can skip the dissections without penalty, if necessary.)

Prerequisites:

None

Homework:

Students can expect to spend 1-3 hours per week studying and note taking. There are 2 exams - midterm and final, regular quizzes, and occasional homework.

Class Materials:

Miller and Levine-authors, Pearson-publisher

Textbook: *Biology (New Edition)* ©2010 ISBN-13: **978-0-13-366951-0**, Hardcover

Lab Manual: *Biology Lab Manual A* ©2009 ISBN-13: **978-0-13-368712-5**, Unknown binding

Standard notebook paper (spiral or loose leaf, student's preference), binder, and pens

Payment Options:

1. Full tuition of \$900.00 due at time of registration.
2. Semester tuition of \$450 due at time of registration and second semester payment of \$450 due by January 15th
3. Monthly payments of \$100. First month is due at time of registration. Subsequent monthly payments of \$100 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.

Chemistry [Honors]

Teacher: Courtney Edmonson

Grades: 9, 10, 11, 12

Class Schedule: Tuesday/Thursday

Class Time: 1:00 – 3:00 pm

Duration: 4 hours per week, 32 weeks

Fee(s):

Full Tuition

Supply Fee

\$990.00 \$0- included

Description: This is a pre-AP/Honors Chemistry class designed to prepare your student for college-level coursework.

This is a lab-based class with inquiry-based labs. About half our time covering concepts and the other half in hands-on labs each week. Topics include titrating acids, purifying water, testing to identify the anions and cations in fertilizers, testing the percentages of protein, vitamin C, iron, fats, carbohydrates, and water in foods, preparing and testing a carbonate buffer, testing the activity of enzymes at different pH levels, testing air samples for CO₂, building a cloud chamber and observing the vapor trails from a radioactive particle as well as the effect of a magnetic field on the particle, making esters and so much more!

Prerequisites: Biology preferred

Homework: Students can expect to spend 1-3 hours per week studying and note taking. There are 2 exams - midterm and final, regular quizzes, and occasional homework.

Class Materials: Textbook: *Glencoe Chemistry: Matter And Change*; Student Edition [1st edition]; by Nicholas Hainen, Cheryl Wistrom, Laurel Dingrando, and Kathleen V. Gregg; ©2001; ISBN-13: **978-0-028-28378-4**; Hardback, Published by Glencoe/McGraw-Hill; 976 pages.

Lab manual provided as copies. Cost of copies included in tuition.

Standard notebook paper (spiral or loose leaf, student's preference), binder, pens, and scientific calculator

Payment Options:

1. Full tuition of \$990.00 due at time of registration.
2. Semester tuition of \$495 due at time of registration and second semester payment of \$495 due by January 15th
3. Monthly payments of \$110. First month is due at time of registration. Subsequent monthly payments of \$110 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.

Earth Science

Teacher: Ian Seamans

Grades: 6, 7

Class Schedule: Wednesday Only

Class Time: 10:45 – 12:15 pm

Duration: 1.5 hours per week, 32 wks

Fee(s):

Full Tuition

Supply Fee

\$630.00

\$0- included

Description: This year we cover Geology, Meteorology, Oceanography, and Astronomy. Earth Science integrates biology, chemistry, and physics in a very real and tangible way. An understanding of the Earth and the forces that act upon it also provide a foundation of understanding for high school science classes. If you don't take Earth Science here, make sure you cover these fascinating topics at home. (It's one of my favorite science subjects!)

As usual, at least 50% of this class is labs. The labs that come with the textbook are interesting and engaging, and we also use labs from other excellent resources.

Prerequisites: None

Homework: Students can expect to spend 2-3 hours weekly reading the textbook and taking notes, as well as completing weekly homework assignments and preparing for exams (2) and quizzes.

Class Materials: Textbook: *Holt Science and Technology: Earth Science*, Pupil Edition, by Rinehart and Winston Holt. ©2002 ISBN-13: 978-0-030-51953-6 Publisher: Holt, Rinehart and Winston, Hardback 808 pages

Standard notebook paper (spiral or loose leaf, student's preference), binder, and pens

Payment Options:

1. Full tuition of \$630.00 due at time of registration.

- Semester tuition of \$315 due at time of registration and second semester payment of \$315 due by January 15th
- Monthly payments of \$70. First month is due at time of registration. Subsequent monthly payments of \$70 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.

Engineering

Teacher: Laura Woolley

Grades: 6, 7, 8

Class Schedule: Monday/Wednesday

Class Time: 10:45 - 12:15 pm

Duration: 1.5 hours per week, 32 wks

Fee(s):

Full Tuition

Supply Fee

\$990.00

\$0 – supplies are included in tuition

Description:

Students review simple machines to see how they are used for energy transference in more complex machinery. Students use the Engineering Design Process on their many designs throughout the class. They will work together to create simple and complex Rube Goldberg machines. When learning about various forces, they will apply their knowledge of bridge design and construction to determine which bridge design is the most robust.

Your students learn about:

- Energy transference and simple machines
- Perspective, orthographic, isometric and CAD drawings
- Tension, compression, torque and shear, how these forces interact with structures, and design basics used when dealing with these forces.
- Various materials and fasteners available, the strengths and weaknesses of each, and how to choose the best material and fasteners for your design.
- Various tools, including basic and power tools, necessary safety instructions, and how/when to use them.
- The Engineering Design Process

Toward the end of the year, students apply the knowledge gained in class and the Engineering Design Process to build something lasting for the school. The class is very interactive and student-driven, with a lot of activities built into the curriculum.

The class focuses on the design and build process.

Prerequisites:

None

Homework:

Students can expect to spend 1-3 hours per week.

Class Materials:

No textbook for this class
All handouts are provided by teacher. The materials fee of \$50 is included in the tuition.

Standard notebook paper (spiral or loose leaf, student's preference), binder, and pens

We are using the eGFI (engineering Go For It) website resources: <http://www.egfi-k12.org/about/>

Payment Options:

- Full tuition of \$990.00 due at time of registration.
- Semester tuition of \$495 due at time of registration and second semester payment of \$495 due by January 15th
- Monthly payments of \$110. First month is due at time of registration. Subsequent monthly payments of \$110 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.

Integrated Physics and Chemistry

Teacher: Courtney Edmonson

Grades: 7,8

Class Schedule: Monday Only

Class Time: 1:00 – 3:00 pm

Duration: 2 hours per week, 32 weeks

Fee(s):

Full Tuition

Supply Fee

\$702.00 \$0- included

Description: We spend one semester on basic concepts in physical science, and one semester on basic chemistry. We use labs to internalize Newton's Three Laws, fluid dynamics, work and machines, energy and heat, electricity, magnetism, wave properties, sound and light, the properties of matter, elements, atoms, chemical bonds, chemical reactions, acids, bases, and atomic energy. You should take this course the year before you start your high school science classes.

Prerequisites: None

Homework: Students can expect to spend 2-3 hours weekly reading the textbook and taking notes, as well as completing weekly homework assignments and preparing for exams (2) and quizzes.

Class Materials: **Text book:** *Holt Science & Technology: Physical Science* © 2004 ISBN-13: **978-0-030-73168-6**

Standard notebook paper (spiral or loose leaf, student's preference), binder, and pens

Payment Options:

1. Full tuition of \$702.00 due at time of registration.
2. Semester tuition of \$351 due at time of registration and second semester payment of \$351 due by January 15th
3. Monthly payments of \$78. First month is due at time of registration. Subsequent monthly payments of \$78 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.

Life Science

Teacher: Ian Seamans

Grades: 5, 6

Class Schedule: Monday Only

Class Time: 10:45 – 12:15 pm

Duration: 1.5 hours per week, 32 wks

Fee(s):

Full Tuition

Supply Fee

\$630.00

\$0- included

Description: Covers basic information about living organisms, ecology, the human body and evolution. We use hands-on activities and labs to explore scientific investigation, cells and cell activity, heredity and DNA, classification of organisms, the six kingdoms, all systems of the human body, radioactive dating, fossils, evolution, and dissection. (Your child can skip the dissections without penalty, if necessary.)

Prerequisites: None

Homework: Students can expect to spend 2-3 hours weekly reading the textbook and taking notes, as well as completing weekly homework assignments and preparing for exams (2) and quizzes.

Class Materials: **Text book:** *Holt Science & Technology: Life Science* © 2004 ISBN **978-0-030-73164-8** or 0-030-73164-X

Standard notebook paper (spiral or loose leaf, student's preference), binder, and pens

Payment Options:

1. Full tuition of \$630.00 due at time of registration.
2. Semester tuition of \$315 due at time of registration and second semester payment of \$315 due by January 15th
3. Monthly payments of \$70. First month is due at time of registration. Subsequent monthly payments of \$70 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.

Physics [Honors]

Teacher: Courtney Edmonson

Grades: 10, 11, 12

Class Schedule: Tuesday/Thursday

Class Time: 10:45 am – 12:15 pm

Duration: 3 hours per week, 32 weeks

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| <u>Fee(s):</u> | <u>Full Tuition</u> | <u>Supply Fee</u> |
| | \$900.00 | \$0- supplies are included in tuition |

Description: This algebra-based Honors Physics course that takes you from kinematics through thermodynamics, vibrations, optics, quantum mechanics, and astrophysics. The course structure builds and enhances physics topics skills using innovative labs, numerous group discussions and activities, plus problem solving using applied mathematics. Honors Physics incorporates additional mathematics and theoretical concepts beyond the middle school Integrated Physics and Chemistry class.

Prerequisites: Algebra II. Basic trigonometry helps but is not required.

Homework: Students can expect to spend 2-4 hours per week on chapter readings and regular homework, as well as preparing for exams (2 per semester)

Class Materials: **Textbook:** *Holt Physics: Pupil Edition 1st Edition* by Serway and Faughn ©2002, ISBN-13: **978-0-030-56544-1**, HOLT, RINEHART AND WINSTON Hardcover

Scientific Calculator
Standard notebook paper (spiral or loose leaf, student's preference), binder, pens, and scientific calculator

Note: Parents can use earlier or later textbook editions based on availability and price; there are only minor differences between publications.

Payment Options:

1. Full tuition of \$900.00 due at time of registration.
2. Semester tuition of \$450 due at time of registration and second semester payment of \$450 due by January 15th
3. Monthly payments of \$100. First month is due at time of registration. Subsequent monthly payments of \$100 on 9/1, 10/1, 11/1, 12/1, 1/1, 2/1, 3/1, 4/1. No tuition is due in May.