



Loyola

HIGH SCHOOL

Secondary 4 Applied Science & Technology

Cycle 2 (Year 2)

Course Outline

Teacher: Dr. N. Newton **E-mail:** newtonn@loyola.ca **Voice Mail:** 514 486 1101 ext.616

Requirements:

- Observatory – The Environment (student textbook)
- One three ring binder (small to medium sized: 2 inch)
- Lined loose leaf paper (at least 25 sheets). Dividers (3 or 4) are recommended.
- A well-stocked pencil case including ruler, pens, highlighters, scientific calculator, pencils etc. A 0.5 mm (or 0.7 mm or any other dimension) lead propelling pencil is recommended instead of pencils.
- iPad (always charged and no apps open during class)

The above equipment is required for **every** lesson. Failure to bring an item will result in JUG.

Course Information:

The AST (Applied Science and Technology) course builds upon the scientific concepts studied in earlier science and technology courses, and students are expected to be familiar with these. Additionally, students are required to apply some of the principles studied in earlier Mathematics programs. In keeping with the Ministry reform, the six-credit course will examine environmental topics, the study of electricity and magnetism, electronics, graphical language, physical principles and mechanical engineering. A two-credit “bridge” course called Science and the Environment (SE), will include an introduction to chemistry. There are extensive hands-on activities to enhance the course content. Students are required to write an exam set by the

Ministry. The SE course will take place from September to December while the AST course will take place from January to June.

Course	Grade Breakdown	
SE	T1 = 40%	T2 = 60%
AST	T2 = 25%	T3 = 75%

Students write a final Loyola exam in December for the SE course which counts for 40% of Term 2 Theory. Students are required to write a Loyola AST exam and a Ministry exam in June for the AST course. Students who want to take the physics and chemistry options in secondary five must obtain a minimum grade of **75%** in **both** the AST and SE courses as well as achieving a grade of **AT LEAST 60%** in the December SE Exam.

Competencies / Evaluation: SE and AST Courses

Section	Competency	Weighting
Practical	Seeks answers and solutions to scientific or technological problems. Communicates in the languages used in science and technology	40%
Theory	Makes the most of his knowledge of science and technology. Communicates in the languages used in science and technology	60%

Several labs are conducted every term and are graded and weighted according to complexity. The theory mark is generally comprised of the following components, shown with their approximate weightings: Tests (50%), Quizzes (20%), Assignment sheets (10%), Online reflections (8%), ePortfolio (10%) and Participation / Department / Holistic Growth (2%).

Students will be expected to participate in class discussions, conduct research and present findings and projects to their classmates (cooperative learning). In addition, a variety of laboratory experiments will be conducted.

Topics: Science & the Environment (T1 & T2), Applied S&T (T2 & T3):

TERM 1	TERM 2	TERM 3
<p>Scientific Method</p> <ul style="list-style-type: none"> ● Laboratory report writing ● Laboratory safety <p>Science Techniques</p> <ul style="list-style-type: none"> ● Review of dimensional analysis ● Review of graphing data <p>Organization of Matter</p> <ul style="list-style-type: none"> ● Lewis notation ● Simplified atomic model ● Relative atomic mass and isotopes ● Types of bonds (covalent, ionic) ● Polyatomic ions ● Nomenclature and notation rules ● Concept of the mole <p>Physical Properties of Solutions</p> <ul style="list-style-type: none"> ● Concentration (g/L, %, mol/L) ● Electrolytes ● pH scale ● Ions ● Electrical conductivity <p>Chemical Changes</p> <ul style="list-style-type: none"> ● Precipitation ● Synthesis and decomposition ● Photosynthesis and respiration ● Acid-base neutralization reactions ● Salts ● Law of Conservation of Mass ● Balancing chemical equations ● Stoichiometry ● Endothermic and exothermic reactions <p>(N.B. The SE course finishes in December which is about 1 month into Term 2).</p>	<p>Graphical Language</p> <ul style="list-style-type: none"> ● Interpretation of exploded views ● Orthogonal drawings (multiview, isometric) ● Dimensions and tolerance <p>Materials</p> <ul style="list-style-type: none"> ● Constraints (tension, compression, deflection, shearing) ● Characteristics of mechanical properties ● Properties (plastics, ceramics, composites, ferrous & non-ferrous alloys, wood) ● Modification of properties (degradation and protection) <p>Electricity</p> <ul style="list-style-type: none"> ● Electrical charge ● Static electricity ● Ohm's Law ● Series and parallel circuits ● Kirchhoff's Laws <p>Electromagnetism</p> <ul style="list-style-type: none"> ● Forces of attraction and repulsion ● Magnetic field of a live wire ● Magnetic field of a solenoid ● Electromagnetic induction <p>Transformation of Energy</p> <ul style="list-style-type: none"> ● Law of Conservation of Energy ● Energy efficiency ● Distinction between heat and temperature ● Relationship between power and electrical energy 	<p>Electrical Engineering</p> <ul style="list-style-type: none"> ● Power supply ● Conduction, insulation and protection ● Resistance and tolerance of resistors ● Switches (pole and throw) ● Transformation of energy (electricity and light, heat, vibration, magnetism) ● Function (capacitor, diode, transistor, relay) <p>Mechanical Engineering</p> <ul style="list-style-type: none"> ● Adhesion and friction of parts ● Linkages and degrees of freedom ● Guiding controls ● Motion transmission systems (gear trains, belt & pulley, friction gears, chain & sprocket, worm gears) ● Gear ratios, resisting and engine torque ● Motion transformation systems (CAM & follower, screw gears type 1 & 2, crank & slider, rack & pinion) <p>Forces & Motion</p> <ul style="list-style-type: none"> ● Types of forces ● Equilibrium of two forces ● Relationship between speed, distance, time ● Mass and weight <p>Environmental Sciences</p> <ul style="list-style-type: none"> ● Ecosystems, food chains, disturbances ● Air masses and circulation ● Energy resources from atmosphere, lithosphere and hydrosphere ● Earth/moon gravitation (tides) ● Minerals and ores ● Biomes and catchment areas

Miscellaneous Information:

Students are required to check Moodle and their Loyola email **every day** for updates and/or information. Programmable calculators are not permitted at any time. Lab coats and safety glasses are required at all times when in the chemistry laboratory; and these are available in the Loyola store for purchase or replacement.

General

Homework is usually assigned every few lessons. It will be collected and marked sporadically. Review and practice of daily work is essential to understanding and retaining the information taught. Failure to complete homework will result in loss of marks and/or disciplinary action. **Homework submitted late will not be accepted and will result in a grade of 0%. Homework submitted without a name will automatically result in a grade of 0%.**

Secondary 4 is an important year as it can influence future subject and career choices as well as choice of CEGEP. Students are expected to further develop their work habits, study habits and time management skills. Extra help in the form of tutorials and meetings is offered as required by appointment (newtonn@loyola.ca) and are usually held at lunch or after school.

Note that if a student misses a class for whatever reason, it is THEIR responsibility to make-up the missed work. If a student misses a lab they have 24 hours to contact Mr Dagher (daghere@loyola.ca) to arrange a time to conduct the lab. They must also notify Dr Newton at least 48 hours in advance if they have prior knowledge of an upcoming absence (for sports or any other activity).

iPad

The iPad is to be used as a tool to aid learning and to search for information. It is not to be used to play games. We have observed low attention spans, poor academic performance and reduced capacity to think in students who play too much on their iPad, cell phone or any other electronic device.

This document is important. Do not lose it.

It can also serve as a basis for your study guide for your exams.