



# Loyola

## HIGH SCHOOL

## Secondary 4

# Applied Science & Technology (AST)

Mr. M. Elie	E-mail	<a href="mailto:eliem@loyola.ca">eliem@loyola.ca</a>	Voice Mail	514-486-1101 ext. 619
-------------	--------	--	------------	-----------------------

### Resources:

- Observatory (student textbook) 2nd year of 2nd cycle
- iPad & Google Drive, Docs, Sheets and Slides apps
- moodle.loyola.ca website (online course website)
  - “Sec. 4 AST Science Mr. Elie” & Guest password is “ science ”
- Slideshows (shown in class), Gizmos online learning activities

### Requirements:

- A well stocked pencil case including ruler, pens, highlighters, scientific calculator, several pencils, an eraser, etc.
- One three ring single subject binder (1 inch)
- 8 or 10 binder dividers with windows for labels
- 90 page Hilroy notebook
- Graph paper (about 10 sheets)

The above equipment plus the student's textbook and iPad are required for every lesson.

### Term breakdown

Term 1	20%
Term 2	20%
Term 3	60% (includes a June exam)
Students write the Ministry uniform exam in June for the AST course which counts for 50% of the full year theory mark. Results are mailed directly from MEES in July.	

### Evaluation, Components & Competencies:

Component	Science Competencies	Examples	Weighting
Practical	Seeks answers or solutions to scientific or technological problems Communicates in the languages used in science and technology	Labs, lab reports activities, etc.	40%
Theory	Makes the most of his knowledge of science and technology Communicates in the languages used in science and technology	Tests, quizzes, homework, exams, etc.	60%

For the Term 1 and Term 3 reports, each student will also have comments regarding at least two (2) of the following four (4) cross-curricular competencies.

**Description:**

**This course is a provincial requirement for graduation, however its successful completion DOES NOT permit the student to take Chemistry or Physics during secondary five.**

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. This course will examine environmental topics, the study of electricity and magnetism, electronics, graphical language, physical principles and mechanical engineering. Students are required to write a Loyola AST exam and a Ministry exam in June.

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

In order to incorporate technology in the classroom, PowerPoint presentations, as well as online resources including certain iPad apps will be used whenever possible.

Homework is usually assigned every couple of lessons (usually worksheets). Small quizzes are frequent and reflect the content taught or assigned for reading in the previous class. Review and practice of daily work is essential to understanding and retaining the information taught. Homework submitted late will result in a penalty of 20%, and if not submitted by the following class then a grade of 0 will be assigned. Homework and labs submitted without a name will automatically result in a grade of 0.

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 (can be purchased) or aprons (supplied) and safety glasses (supplied or can be purchased) are required at all times when in the laboratory; and these are available in the Loyola store for purchase or replacement.

Extra help in the form of tutorials and meetings is offered as required by appointment ([eliem@loyola.ca](mailto:eliem@loyola.ca)) and are usually held at lunch or after school.

If a student is absent from a lab activity (or knows he will be absent due to an activity, medical appointments, etc.), he must contact the lab technician, Elie Dagher ([daghere@loyola.ca](mailto:daghere@loyola.ca)) ahead of time or within 24 hours of the lab in the case of an unexpected absence to make the appropriate plans to complete the lab (before or after class, ped days, during lunch, etc.).

## Secondary 4: Applied Science & Technology (AST)

Content to be covered (specific order & timing subject to change)

Terms 1 & 2	Terms 2 & 3	
<p><b>Scientific Method</b></p> <ul style="list-style-type: none"> <li>Laboratory report writing</li> <li>Laboratory safety</li> </ul> <p><b>Science Techniques</b></p> <ul style="list-style-type: none"> <li>Review of dimensional analysis</li> <li>Review of graphing data</li> </ul> <p><b>Different forms of energy (chapter 3)</b></p> <ul style="list-style-type: none"> <li>What is energy?           <ul style="list-style-type: none"> <li>law of conservation of energy</li> <li>energy efficiency</li> <li>thermal energy (heat vs. temperature)</li> </ul> </li> <li>Motion and forces           <ul style="list-style-type: none"> <li>speed, distance, time</li> <li>force and change in motion</li> <li>types of forces (gravitational, electromagnetic, nuclear forces)</li> <li>equilibrium of two forces</li> </ul> </li> <li>Forces in fluids</li> </ul> <p><b>The Earth and Space</b></p> <ul style="list-style-type: none"> <li>Lithosphere &amp; hydrosphere</li> <li>Atmosphere &amp; space</li> <li>Biosphere, ecosystems &amp; disturbances</li> </ul> <p><b>Changes in Matter (chapter 4)</b></p> <ul style="list-style-type: none"> <li>Chemical changes (combustion &amp; oxidation)</li> </ul>	<p><b>Electricity &amp; magnetism (chapter 5)</b></p> <ul style="list-style-type: none"> <li>What is electricity?           <ul style="list-style-type: none"> <li>Charges, conductors &amp; insulators</li> </ul> </li> <li>Static electricity</li> <li>Dynamic electricity           <ul style="list-style-type: none"> <li>Current &amp; Ohm's Law</li> <li>Power</li> </ul> </li> <li>Circuits (series, parallel)</li> <li>What is magnetism?           <ul style="list-style-type: none"> <li>Magnets &amp; magnetic fields</li> </ul> </li> <li>Electromagnetism           <ul style="list-style-type: none"> <li>Magnetization by electricity               <ul style="list-style-type: none"> <li>magnetic field of a live wire</li> <li>magnetic field of a solenoid</li> <li>electromagnets</li> </ul> </li> <li>Charging by magnetism               <ul style="list-style-type: none"> <li>electromagnetic induction</li> </ul> </li> </ul> </li> </ul> <p><b>Electrical Engineering (chapter 14)</b></p> <ul style="list-style-type: none"> <li>Power supply</li> <li>Conduction, insulation and protection</li> <li>Resistance and tolerance of resistors</li> <li>Switches (pole and throw)</li> <li>Transformation of energy (electricity and light, heat, vibration, magnetism)</li> <li>Function (capacitor, diode, transistor, relay)</li> </ul>	<p><b>The Technological World</b></p> <p><b>Manufacturing technological objects (chapter 12)</b></p> <p><b>Materials, properties, drafting, tools &amp; techniques</b></p> <ul style="list-style-type: none"> <li>Constraints (tension, compression, deflection, shearing)</li> <li>Characteristics of mechanical properties</li> <li>Properties (plastics, ceramics, composites, ferrous &amp; non-ferrous alloys, wood)</li> <li>Modification of properties (degradation and protection)</li> </ul> <p><b>Graphical Language</b></p> <ul style="list-style-type: none"> <li>Interpretation of exploded views</li> <li>Orthogonal drawings (multiview, isometric)</li> <li>Dimensions and tolerance</li> </ul> <p><b>Mechanical Engineering (chapter 13)</b></p> <ul style="list-style-type: none"> <li>Adhesion and friction of parts</li> <li>Linkages and degrees of freedom</li> <li>Guiding controls</li> <li>Motion transmission systems (gear trains, belt &amp; pulley, friction gears, chain &amp; sprocket, worm gears)</li> <li>Gear ratios, resisting and engine torque</li> <li>Motion transformation systems (CAM &amp; follower, screw gears type 1 &amp; 2, crank &amp; slider, rack &amp; pinion)</li> </ul>