Program of Study

An International Baccalaureate World School
2021-2022
Mission Statement

The International Baccalaureate aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect. To this end the organization works with schools, governments and international organizations to develop challenging programmes of international education and rigorous assessment. These programmes encourage students across the world to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right.

In addition to fulfilling the International Baccalaureate mission statement the Downingtown STEM Academy aims to create inquiry learning and growth through the International Baccalaureate and STEM Pathways where innovative thinking with effort dictates success in an ever-changing world.
IB learner profile

The aim of all IB programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world.

As IB learners we strive to be:

INQUIRERS
We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life.

KNOWLEDGEABLE
We develop and use conceptual understanding, exploring knowledge across a range of disciplines. We engage with issues and ideas that have local and global significance.

THINKERS
We use critical and creative thinking skills to analyse and take responsible action on complex problems. We exercise initiative in making reasoned, ethical decisions.

COMMUNICATORS
We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups.

PRINCIPLED
We act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. We take responsibility for our actions and their consequences.

OPEN-MINDED
We critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow from the experience.

CARING
We show empathy, compassion and respect. We have a commitment to service, and we act to make a positive difference in the lives of others and in the world around us.

RISK-TAKERS
We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change.

BALANCED
We understand the importance of balancing different aspects of our lives—intellectual, physical, and emotional—to achieve well-being for ourselves and others. We recognize our interdependence with other people and with the world in which we live.

REFLECTIVE
We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development.

The IB learner profile represents 10 attributes valued by IB World Schools. We believe these attributes, and others like them, can help individuals and groups become responsible members of local, national and global communities.

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What’s New in the Program of Study 2021-2022

Changes to Pathway Names
iMedia, Broadcasting and Filmmaking, Technology Innovation are now named iMedia I, II, III. This is a change in name only.

Interactive Design, Web Design & Informational Architecture, Game Design are now named Interactive Design I, II, III. This is a change in name only.

Blue & Gold Concert and Marching Band
There is an update to the course description. This applies to students who participate at both East and West.
### Downingtown STEM Academy Graduation Requirements

<table>
<thead>
<tr>
<th></th>
<th>STEM / DASD Diploma and International Baccalaureate (IB) Non-Diploma</th>
<th>STEM / DASD Diploma and International Baccalaureate (IB) Diploma*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Social Studies</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Math</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Science</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>World Language</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>21 Credits - Core</td>
<td>21 Credits - Core</td>
</tr>
<tr>
<td><strong>Encore:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health &amp; PE</td>
<td>0.66</td>
<td>0.66</td>
</tr>
<tr>
<td>Engineering</td>
<td>0.66</td>
<td>0.66</td>
</tr>
<tr>
<td>Pathways</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Group 6 Electives</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>1 credit - grade 11</td>
<td>1 credit - grade 11</td>
</tr>
<tr>
<td></td>
<td>1 credit - grade 12</td>
<td>1 credit - grade 12</td>
</tr>
<tr>
<td>Theory of Knowledge</td>
<td>0.66</td>
<td>1.34</td>
</tr>
<tr>
<td></td>
<td>4.98 Credits - Encore</td>
<td>5.66 Credits - Encore</td>
</tr>
<tr>
<td><strong>Minimum Credit Requirements</strong></td>
<td><strong>25.0</strong></td>
<td><strong>26.66</strong></td>
</tr>
<tr>
<td><strong>No Credit:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAS</td>
<td>40 hours</td>
<td>Completion of Learning Outcomes with Continuous Involvement Over 18 Months</td>
</tr>
<tr>
<td>Extended Essay</td>
<td>Not Required</td>
<td>Independent Essay</td>
</tr>
<tr>
<td>STEM Practicum</td>
<td>Required</td>
<td>Required</td>
</tr>
</tbody>
</table>

*In addition to high school course credits outlined in this policy, students must attain a passing score, which varies by course, in an IB Exam in each core area.

In order to earn the IB Diploma students must meet a set score defined by the IB. For more information, please contact the counseling office.
GRADE POINT AVERAGE (GPA)

The GPA is calculated by dividing the total number of Quality points earned by the number of credits attempted. Quality Points are awarded depending upon the final grade earned and the credit value of the course. The credit value of the course is multiplied by quality points in the chart below. GPA can be viewed online as part of the electronic report card accessible through the parent portal. The student’s GPA is recorded on transcripts.

All STEM courses beginning with “S” and ending in the number four are Pre Diploma level courses that have a .50 weight.

<table>
<thead>
<tr>
<th>Standard Course Quality Points</th>
<th>Pre Diploma Courses Quality Points</th>
<th>International Baccalaureate SL Quality Points</th>
<th>International Baccalaureate Higher Level Quality Points</th>
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<tbody>
<tr>
<td>A = 4</td>
<td>A = 4.5</td>
<td>A = 5.0</td>
<td></td>
</tr>
<tr>
<td>B = 3</td>
<td>B = 3.5</td>
<td>B = 4.0</td>
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</tr>
<tr>
<td>C = 2</td>
<td>C = 2.5</td>
<td>C = 3.0</td>
<td></td>
</tr>
<tr>
<td>D = 1</td>
<td>D = 1.5</td>
<td>D = 2.0</td>
<td></td>
</tr>
<tr>
<td>F = 0</td>
<td>F = 0</td>
<td>F = 0</td>
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</table>

For example:

<table>
<thead>
<tr>
<th>Course</th>
<th>Final Grade</th>
<th>Quality Points (QP)</th>
<th>Credits Attempted (CA)</th>
<th>Quality Points X Credits Attempted</th>
<th>QP/CA=GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Diploma World Literature</td>
<td>A</td>
<td>4.5</td>
<td>1.0</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>Pre-Diploma Geometry</td>
<td>A</td>
<td>4.5</td>
<td>1.0</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>Pre-Diploma Universal Physics</td>
<td>C</td>
<td>2.5</td>
<td>1.0</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Pre-Diploma Civics and Government</td>
<td>B</td>
<td>3.5</td>
<td>1.0</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Spanish III</td>
<td>B</td>
<td>3.0</td>
<td>1.0</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Intro to Engineering</td>
<td>A</td>
<td>4.0</td>
<td>.66</td>
<td>2.64</td>
<td></td>
</tr>
<tr>
<td>Recording Studio</td>
<td>A</td>
<td>4.0</td>
<td>.66</td>
<td>2.64</td>
<td></td>
</tr>
<tr>
<td>Physical Wellness</td>
<td>B</td>
<td>3.0</td>
<td>.33</td>
<td>.99</td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td>29</td>
<td>6.65</td>
<td>24.27</td>
<td>24.27/6.65=3.64</td>
<td></td>
</tr>
</tbody>
</table>
Additional Information:

- As of the 2010-2011 school year only grades from courses taken at Downingtown High Schools will be included in the calculation of a student’s GPA. Courses, grades and credits from previous schools will be included in the DASD transcript indicating that the student earned these credits at a previous school.
- Alternative credits for original courses are reported on the official transcript but the grades are not calculated into the GPA.

CLASS RANK

Students are ranked in order of the GPA at the beginning of each school year. Class rank is not recalculated during the school year. Class rank is available by written request from the student or parent; it is not reported on the official transcript.
ALTERNATE CREDIT*

Downingtown students may acquire original through traditional or alternate means. All alternative credit sources need to be pre-approved by the principal.

Traditional Credit Sources:
- DASD courses scheduled throughout the school year
- DASD summer school original credit
- Dual Enrollment courses

Alternate Credit Sources:
- Teacher-Directed Independent Study
- Higher Education Courses (excluding Dual Enrollment courses)
- Online Courses
- Tutoring

*STEM students must earn an 80% or higher on STEM subject midterms and exams.
*STEM students: IB courses cannot be replaced by any form of alternative credit and all 11th and 12th grade core subjects are IB only courses.

REQUIREMENTS: A minimum of seventy five percent (75%) of a student’s credit requirement in each category must come from traditional means of credit acquisition. Please be aware that more than one request in the same content area may not be approved; this is the determination of the high school Headmaster. Alternate credit(s) for original courses are reported on the official transcript, but the grades are not calculated into the GPA with the exception of the Dual Enrollment courses. Courses must be aligned to the PA Core Standards (or national standards if PA standards do not exist) and parallel the DASD curriculum. In order to progress to the next level or replace a DASD course, students must take DASD mid-term and final exams and demonstrate prerequisite skills necessary.

The two categories are:
1. Humanities and Core courses in the following departments: English, Math, Science, Social Studies, and Modern Language.
2. Encore courses in all other content areas, including the required courses in Health & Physical Wellness in the 21st Century.

PROCESS:
1. It is the student’s responsibility to research and identify the alternate credit venue and course.
2. The student completes the Alternate and Remedial Credit Application form.
3. The student meets with his/her guidance counselor who reviews the student’s application.
4. The student submits the completed application, along with required accompanying information to the Headmaster.
5. The Headmaster reviews the application and approves or denies the request.
The following sources are considered for alternate credit; all sources require completion of the above process.

**Teacher-Directed Independent Study:** The student must find a teacher certified in PA in the content area. If the course is a replacement for a Downingtown Area School District course, the student must cover the entire curriculum. The teacher and student will work out how and when the course requirements are met. It is expected that the student will do the work on his/her own and the teachers will provide direction, oversight, and grades. A maximum of .5 credits can be given for independent study.

**Higher Education Courses:** Courses offered at an accredited post-secondary school may be used for enrichment. It is the student’s responsibility to contact the post-secondary school and meet its requirements to register for courses. The student is also responsible to pay for all costs associated with taking the course and his/her transportation. A final grade sheet from the school is necessary to receive the credit. Generally, one Downingtown credit is awarded for a three or four credit college course.

**Online Courses:** Online courses may be used for enrichment. Students must be approved prior to enrollment. The student is responsible for all costs associated with taking the course. The online program will issue the final grade.

**Tutoring:** A PA certified teacher in the content area must conduct the tutoring hours. The following is required for original credit:

<table>
<thead>
<tr>
<th>Credit</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 credit</td>
<td>44 hours</td>
</tr>
<tr>
<td>.5 credit</td>
<td>22 hours</td>
</tr>
<tr>
<td>.33 credit</td>
<td>15 hours</td>
</tr>
</tbody>
</table>

The student and the tutor will agree on the schedule and location of the tutoring sessions. It is expected that the tutor will assign work between tutoring sessions and grade the completed work. The entire curriculum must be covered including mid-term and final exams. The tutor will assign the final grade. Teachers are usually paid an hourly rate for tutoring, and all costs associated with the tutoring are the responsibility of the student.
DOWNINGTOWN GIFTED EDUCATIONAL PROGRAM

Gifted education services are provided through specially designed instruction individually tailored to accelerate and/or to enrich a student’s regular education courses. A Gifted Individualized Educational Plan (GIEP) is developed for students for whom gifted services are appropriate. Students should address questions about gifted education services with their gifted education teacher.

ENGLISH AS A SECOND LANGUAGE (ESL)

ESL classes are for students who have been screened and scored from entering through expanding levels in an English language proficiency-screening test. During ESL classes, the ESL teacher provides the students with structured opportunities to learn and practice all the domains of second language acquisition: listening, speaking, reading and writing. The students also develop content-based academic language as a prerequisite for success in academic programs.

SPECIAL EDUCATION

In order to meet the needs of students who have been identified as exceptional, Individual Educational Plans have been developed. Each IEP team will determine class offerings for identified students. The Learning Support teacher will provide his/her students with an individual list of courses and their corresponding course numbers.
KEY TO COURSE DESCRIPTIONS

Course Number(s)   Course Title   Indicates all grade levels eligible for the course

S0000 – History of Downingtown (Grade 9/10)
6pds/cycle
1 Credit

Indicates the number of times in a 6 day cycle the class will meet
Indicates the number of credits earned upon successful completion of the course
ACADEMIC HONESTY POLICY
IB ACADEMIC INTEGRITY*

A8.1 The meaning of academic integrity

Academic honesty must be seen as a set of values and skills that promote personal integrity and good practice in teaching, learning and assessment. It is influenced and shaped by a variety of factors including peer pressure, culture, parental expectations, role modeling and taught skills. Although it is probably easier to explain to candidates what constitutes academic dishonesty, with direct references to plagiarism, collusion and cheating in examinations, whenever possible the topic must be treated in a positive way, stressing the benefits of properly conducted academic research and a respect for the integrity of all forms of assessment for the Diploma Programme.

Although candidates must be taught to appreciate the merits of academic honesty, there must be no uncertainty over the consequences of acting in a dishonest manner or failing to observe the standard academic practice of acknowledging the work of another person. *To do so would be a breach of the general regulations and constitute malpractice, which may result in the disqualification and/or exclusion from participation in the IB Diploma Programme at the Downingtown STEM Academy.*

Malpractice most commonly involves collusion or plagiarism. However, there are other ways in which a candidate may be in breach of regulations. For example, a candidate may:

- duplicate work to meet the requirements of more than one assessment component
- fabricate data for an assignment
- take unauthorized material into an examination room
- disrupt an examination by an act of misconduct, such as distracting another candidate
- exchange, support, or attempt to support, the passing on of information that is or could be related to the examination
- fail to comply with the instructions of the invigilator or other member of the school’s staff responsible for the conduct of the examination
- impersonate another candidate
- steal examination papers
- disclose or discuss the content of an examination paper with a person outside the immediate school community within 24 hours after the examination
- use an unauthorized calculator during an examination.

Note that a candidate is likely to be found guilty of malpractice if unauthorized material (for example, an electronic device other than a permitted calculator, personal rough paper, notes, a mobile phone) is taken into an examination, regardless of whether any attempt is made to use that material.
For all cases of malpractice in relation to the examinations, the coordinator must send a report to the coordinator help desk at IB Cardiff.

It is the responsibility of Diploma Programme teachers to support candidates in the preparation of their work for assessment and to ensure that all candidates’ work complies with the requirements of the relevant subject guide. Therefore, teachers (or supervisors in the case of extended essays) are in the best position to judge whether a candidate’s work is authentic. Ongoing support and guidance will help with the early detection of plagiarism and will dissuade candidates from deliberately copying another person’s work without acknowledgment because they know their work is regularly subject to scrutiny. However, what is realistic and what can be achieved within the usual constraints of time and workload must be left to the discretion of individual teachers and the coordinator. Ultimately, the candidates are responsible for ensuring that the final version of any work is authentic. Candidates themselves must bear the consequences if they submit any work for assessment that is not their own, regardless of whether the plagiarism was deliberate or careless act. The same principle applies to collusion.

The IB will not accept work for assessment or moderation unless the candidate has signed the coversheet to confirm that the work is his or her authentic work and constitutes the final version of that work. Additionally, the teacher (or supervisor in the case of an extended essay) must also sign the cover sheet to confirm that, to the best of his or her knowledge, the attached work is the authentic work of the candidate. Therefore, all work submitted to the IB for moderation or assessment must be authenticated by the candidate and a teacher and must not include any instances of suspected or confirmed malpractice. If a teacher signs a cover sheet but writes a comment on or attached to the coversheet to the effect that the work may not be authentic, the candidate will not be eligible for a mark in that component and no grade will be awarded. Similarly, it is not appropriate for a teacher to delete the teacher’s declaration and then sign the cover sheet.

The requirement for a cover sheet signed by the candidate and teacher applies to all non-examination components, both internally and externally assessed. For internal assessment, this requirement applies to the work of all candidates, not just to the sample work that will be submitted to an examiner for the purpose of moderation.

When a candidate provides a teacher with the final version of his or her work with the cover sheet signed, ready for signing by the teacher, this is considered the point at which the work is being submitted for assessment. (It is expected that the cover sheet will be signed first by the candidate and then by the teacher/supervisor.) After a candidate has submitted the final version of his or her work to a teacher (or the coordinator) for external or internal assessment, together with the signed cover sheet, it cannot be retracted by the candidate. If the work is in fulfillment of the requirements for internal assessment, the candidate’s mark must be entered on IBIS after the cover sheet has been signed by both the candidate and the appropriate teacher.

**D3.1 Work identified as not authentic before submission**
If the teacher has reason to believe that part or the whole of a candidate’s draft work under discussion prior to submission for assessment might be deemed to be in violation of the principles of academic honesty and therefore constitute a case of malpractice, the teacher must draw the candidate’s attention to this risk and the need to respect the requirements of academic honesty. In other words, if possible malpractice (usually plagiarism or collusion) is identified before the cover sheet has been signed by the candidate, the situation must be resolved within the school and not brought to the attention of the IB.

If it is apparent that the candidate’s draft work may not be entirely authentic, it is not appropriate to allow the candidate to submit the same work with a signed cover sheet with the expectation that the situation will then be resolved by the IB.

D3.2 Work identified as not authentic after submission

Occasionally, through an oversight while checking a candidate’s work for authenticity, the teacher or coordinator may identify plagiarism (or another breach of regulations, such as fabricated data) after a candidate has signed the cover sheet. It may be the case that the cover sheet has also been signed by the teacher and been sent to an examiner for assessment or moderation. If evidence of plagiarism is available the coordinator help desk at IB Cardiff must be informed so that an investigation can be undertaken.

*Please note that in addition to the IB guidelines for academic honesty students are expected to follow the guidelines outlined by the Downingtown Area School District within the Student Code of Conduct*
IB CORE DIPLOMA REQUIREMENTS+

Student enrolled, as IB Diploma Candidates must successfully complete each of the following:

- ST7711 IB Theory of Knowledge Year 1
- ST7721 IB Theory of Knowledge Year 2
- Meets all 7 Learning Outcomes over 18 months
- Maximum 4000 word Extended Essay (EE)
- Minimum 3 HL courses and 3 SL courses in Groups 1-6
  - Please note that with Administrative approval a student may enroll in 4 HL courses and 2 SL courses (The IB allows a maximum of 4 HL courses)

Please note that in order for a student to move into a Year 2 IB course he/she must successfully complete the prerequisite Year 1 IB course.

ST7711 – IB Theory of Knowledge Year 1 (11th Grade)
2pds/cycle
.66 Credit
*Please note that S7711 is a DASD STEM Academy graduation requirement and must be completed successfully to gain a DASD diploma.*

ST7721 – IB Theory of Knowledge Year 2 (12th Grade)
2pds/cycle
.66 Credit

The TOK course, a flagship element in the Diploma Programme, encourages critical thinking about knowledge itself, to try to help young people make sense of what they encounter. Its core content is questions like these: What counts as knowledge? How does it grow? What are its limits? Who owns knowledge? What is the value of knowledge? What are the implications of having, or not having, knowledge? What makes TOK unique, and distinctively different from standard academic disciplines, is its process. At the centre of the course is the student as knower. Students entering the Diploma Programme typically have 16 years of life experience and more than 10 years of formal education behind them. They have accumulated a vast amount of knowledge, beliefs and opinions from academic disciplines and their lives outside the classroom. In TOK they have the opportunity to step back from this relentless acquisition of new knowledge, in order to consider knowledge issues. These include the questions already mentioned, viewed from the perspective of the student, but often begin from more basic ones, like: What do I claim to know [about X]? Am I justified in doing so [how?]? Such questions may initially seem abstract or theoretical, but TOK teachers bring them into closer focus by taking into account their students’ interests, circumstances and outlooks in planning the course and preparing students for the Extended Essay. Interdisciplinary connections are made between knowledge
encountered in different Diploma Programme subjects in preparation for the necessary foundational research skills for the Extended Essay.

**CAS – Creativity, Action, Service**

IB Diploma Student: 7 Learning Outcomes continuously over 18 months. Student may begin to address CAS Learning Outcomes the first day of junior year.

**IB students choosing not to pursue the full IB Diploma are still required to meet the DASD Graduation project requirements. Students will fulfill this requirement through a 40 hour graduation project.**

CAS, One of the core elements of the IB Diploma Program, is intended to help educate the whole person through experiential learning and is individualized according to student interests, skills, values and background. Acceptable CAS activities fall into the following three strands: (1) creativity, (2) physical activity, and (3) community service. Students must distribute experiences reasonably across all three areas.

Overall a student’s CAS experiences must address the seven CAS learning outcomes:
- Identify own strengths and areas for growth.
- Demonstrate that challenges have been undertaken, developing new skills in the process.
- Demonstrate how to plan and initiate a CAS experience
- Demonstrate the skills and recognize the benefits of working collaboratively.
- Show perseverance and commitment in CAS experiences.
- Demonstrate engagement with issues of global significance.
- Recognize and consider the ethics of choices and actions.

Students answer specific CAS reflection questions tied to the learning outcomes to assist them with reflection on their CAS experiences. CAS requires all diploma candidates to complete a variety of extra-curricular activities during the junior and senior years and allows students the opportunity to explore and demonstrate aspects of the IB learner profile in real, practical ways. CAS is intended to enhance a student’s “personal and interpersonal development through experiential learning” (IBO, CAS Guide 2008).

Diploma candidates work to formulate plans for their experiences and are assessed during three required formal interviews. Additional opportunities for individual meetings are available to give students additional support where needed. Additionally, diploma candidates must plan and initiate at least one project over a minimum of one month in duration. This project must be done in collaboration with a partner, a group of students, or with members of the wider community. The CAS project may encompass any of the three strands or may be a combination of strands. This project challenges students to show initiative, demonstrate perseverance, and develop skills such as collaboration, problem solving, and decision-making.

Students who choose not to pursue the IB Diploma are required to spend a minimum of 40 hours providing an unpaid service to the community or learning something entirely new to meet DASD graduation requirements. Examples include volunteering at an organization; working with students at any school for a specific purpose, such as tutoring or helping with the school play; learning a new skill; researching an intriguing concept or idea, etc. The CAS Coordinator will assist non-diploma students with this process.
**EE – Extended Essay**

IB diploma student: 40 hours minimum over 12 months  
Non-diploma students are not required to complete the EE.

The extended essay (EE) offers students an opportunity to investigate a self-chosen topic of interest and craft a maximum 4000-word research paper with guidance from an advisor and the EE Coordinator. The goal of the EE is for students to complete a self-directed, independent project similar to what is expected at a university level. Students begin the EE process during their junior year by choosing an IB approved subject area, conducting preliminary research, and formulating a specific research question. After receiving approval from the advisor, a student’s responsibilities include managing assignment due dates and conducting intensive research to develop an organized, well supported, well written, thoroughly documented outline, draft, and final paper. It will be necessary for students to devote time over the summer to this assignment to remain on schedule. The student is also responsible for scheduling and attending three mandatory reflection and progress meetings with his/her advisor. Responsibilities of the advisor include approving the research question, asking pertinent questions during the required meetings, offering feedback on the outline, reading a full draft and providing verbal feedback and a completed rubric, providing support, and projecting a final score. The EE Coordinator will set benchmark completion dates and provide support and instruction on research and writing skills. EE’s are marked by outside examiners. Along with the Theory of Knowledge course, successful students may gain an additional 1 – 3 points toward the IB diploma. Students must pass the EE to remain eligible for the IB diploma.

**Extended Essay Timeline**

**Year 1 (11th Grade)**
- **January** - Overview of Extended Essay process provided
- **February** - Students identify subject area and begin preliminary research
- **March** - Submit narrowed topic.
- **April** - Continue research. Submit Research Question
- **May** - Begin RRS and complete RPPF #1. Meet with advisor prior to the end of the month.
- **June - August** - Continue research, prepare outline, begin rough draft

**Year 2 (12th Grade)**
- **September** - No subject changes permitted after this date. Submit outline with Research Question, thesis, and bibliography. Update RRS and complete RPPF #2. Schedule appointment and meet with advisor prior to the end of the month.
- **October** - Continue research/writing.
- **November** - Submit rough draft of paper. Set up time with advisor to discuss rough draft.
- **Mid-November - January** - Revise draft and finalize paper. Submit final draft, Complete RRS and RPPF #3. Schedule final meeting with advisor by the end of the month.

*Note: Specific calendar dates will be shared directly with students by the EE supervisor.*
ENGLISH LITERATURE

English Literature is one in a series of academic subjects necessary for entry into the International Baccalaureate courses and college admissions. English Literature is a four-year requirement. It is an intensive literature program that introduces the students to a variety of classical, contemporary, and multicultural literature that reflect the reciprocal nature of the relationship between culture and writing. Students analyze literature to determine how it relates to them and to the world around them. Composition assignments encourage students to improve their skills in the five characteristics of effective writing through narrative, persuasive, and informational pieces.

The subject includes critical thinking skills, a variety of approaches to literature, and the writing process. All courses offer students opportunities to understand, comment on, and analyze the language, content, structure, meaning and significance of writings. The courses will introduce and develop students’ abilities to narrate, describe, analyze, explain, argue, persuade, inform, and express analyses about writings and in writings in a sophisticated manner. Further, all courses require students to express ideas with clarity and coherence, structure ideas and arguments in a sustained and logical way, and support them with relevant examples in an insightful and sophisticated analysis. The courses also provide students with a critical awareness of a range of written and visual texts. All levels of English Literature emphasize the use of correct grammar with appropriate and varied sentence structure, showing awareness of audience and effective and purposeful use of register in formal and informal writings and, formal and informal, oral presentations.

All courses are steeped in inquiry and project based instruction and require students to complete a variety of expository and creative assignments, characterized by independent academic work and classroom presentations. The literature units include key works for further study of literature as well as analyses of the novel, drama, short story and poetry. All courses will require students to embark on interdisciplinary projects that develop research skills and writing as a core requirement and, in some courses, culminate into formal research papers.

Required STEM Academy Courses:

9th Grade: Pre-Diploma World Literature
10th Grade: Pre-Diploma American Literature
11th Grade: IB Language A1 Year 1 – Literature SL
12th Grade: IB Language A1 Year 2 – Literature SL*

or

11th Grade: IB Language A1 Year 1 – Literature HL
12th Grade: IB Language A1 Year 2 – Literature HL**
ST1014 – Pre-Diploma English: World Literature (Grade 9)
6pds/cycle
1 Credit

The ninth grade English curriculum is designed to introduce students to literature that is concerned with our conceptions, interpretations and experiences of the world. It includes the study of various genres of literature, composition, and oral communication while developing students’ grammar and vocabulary skills for improved communication and SAT preparation. The writing includes expression of ideas and arguments with clarity, coherence and structure in a sustained and logical way, which reinforces the five characteristics of effective writing (knowledge of topic, response, literary features, presentation, and use of language) and focuses on the three modes of writing (persuasive, informational and narrative). The literature units encompass key works for further study and include analyses of the novel, drama, short story and poetry.

ST1024 – Pre-Diploma English: American Literature (Grade 10)
6pds/cycle
1 Credit

The tenth grade English curriculum is designed to introduce students to literature that are concerned with the conceptions and interpretations of the American experience. It includes the study of various genres of literature, composition, and oral communication while developing and improving students’ grammar and vocabulary skills for improved communication and SAT preparation. The writing includes insightful expression of ideas and analytical arguments with clarity, coherence and structure in a sustained and purposeful manner, which reinforces, and demonstrates a significant command of, the five characteristics of effective writing (knowledge of topic, response, literary features, presentation, and use of language) and focuses on the three modes of writing (persuasive, informational and narrative). The course requires a formal MLA formatted research paper related to the study of literature. The literature units encompass key works for further study and include analyses of the novel, drama, short story and poetry.
IB LANGUAGE A1 – LITERATURE IN ENGLISH

The Language A1 programme is primarily a pre-university course in literature. It is aimed at students who intend to pursue literature or related studies, at university as well as students whose formal study of literature will not continue beyond this level. The former would normally follow the Higher Level (HL) program and the later Standard Level (SL).

The Language A1 programme encourages students to see literary works as products of art and their authors as craftsmen whose methods of production can be analyzed in a variety of ways and on a number of levels. This is achieved through the emphasis placed on exploring the means used by different authors to convey their subjects in the works studied. It is further reinforced by the comparative framework emphasized for the study of these works in all parts of the programme.

LANGUAGE A1 LITERATURE STANDARD LEVEL

ST1034 – IB Language A1 Year 1 – Literature Standard Level (Grade 11)
6pds/cycle
1 Credit

ST1044 – IB Language A1 Year 2 – Literature Standard Level (Grade 12)
6pds/cycle
1 Credit

Includes a minimum of 11 works of literature from four genres, three periods and with not more than one author studied twice within a syllabus. In addition students must study at least three World Literature works (some works may be used for more than one group).

LANGUAGE A1 LITERATURE HIGHER LEVEL

ST1035 – IB Language A1 – Literature Year 1 Higher Level (Grade 11)
6pds/cycle
1 Credit

ST1045 – IB Language A1 – Literature Year 2 Higher Level (Grade 12)
6pds/cycle
1 Credit

Includes a minimum of 15 works of literature from four genres, three periods and with not more than one author studied twice within a syllabus. In addition students must study five World Literature works (some works may be used in more than one group).
SOCIAL SCIENCES

The goal of the social sciences is to prepare students to be informed, productive, responsible, and conscientious citizens in our democratic society and interdependent global community. All courses offer a comprehensive, standards-based curriculum rooted in the study of the geographic, historical, social, cultural, political, and economic forces that have shaped our nation and the world. Students are required to gain the knowledge and wisdom necessary to understand current domestic and international conditions and events. The integration of content-based knowledge will support critical thinking and social skills to foster democratic values and encourage civic participation. The social sciences will provide the needed skills to grow and mature in a global society. This will enable students to recognize that human activities and opinions are widely diverse and that the study of society requires an appreciation of such diversity.

History should be seen as a collection of questions without one correct answer. Historical study involves the selection and interpretation of data, critical evaluation of primary and secondary historical sources and the work of historians. A study of history requires and develops an individual's understanding of, and empathy for, people living in other periods and contexts. The courses provide students with the opportunity to appreciate the relative nature of historical knowledge and understanding, as each generation reflects its own world and preoccupations. History and the social sciences encourage an understanding of the present and possible future, through critical reflection upon the past.

All courses and levels are steeped in inquiry and interdisciplinary project based instruction, and require students to draw conclusions and to communicate ideas and analyses in a variety of ways that include verbal and written modes. Students will also have the opportunity to think analytically, critically and creatively to solve problems, judge arguments and make decisions. All students will embark upon projects that involve the introduction and development of historically based research and writing as a core requirement and some that culminate in a formal history or social science research paper.

Required STEM Academy Courses:

9th Grade: Pre Diploma Civics and Government

10th Grade: Pre Diploma United States History and the Modern World

Students choose any of the five Year 1 courses listed below followed by the subsequent Year 2.

11th Grade: IB History Year 1 – SL or HL
            IB Economics Year 1 – SL or HL
            IB Psychology Year 1 - SL or HL
            IB Geography Year 1 - SL or HL
            IB Global Politics Year 1 – SL or HL

12th Grade: IB History Year 2 – SL or HL
            IB Economics Year 2 – SL or HL
            IB Psychology Year 2 - SL or HL
            IB Geography Year 2 - SL or HL
History is the process of recording, reconstructing and interpreting the past through the investigation of a variety of sources that promote empathy for, and understanding of, people living in other societies and time periods. The 9th grade Social Studies curriculum is designed to develop a student’s understanding of government, civics and the role of the individual in society. It will begin to frame a student’s knowledge from the while providing a framework for future inquiry into the events of the 20th century. The course includes foundations of western democracy and society, the evolution of the American style of government, as well as further examination of the progression of historical and contemporary examples of major world governments and societies. This course requires students to engage in the exploration and research of primary and secondary historical sources and the works of individuals throughout history.

US History and the World builds on the skills and foundations established during the 9th grade course. Students continue to develop the skills of a historian but now focus on the involvement of the United States and its relationships with other countries. This is accomplished through the analysis of primary and secondary sources to help to frame a student’s knowledge, while providing a framework for future inquiry into the events of the modern world. The course includes deeper explanations of western democracy and society, as well as the evolution of the American style of government, and its responses to issues around the globe.

IB History of the Americas

History is more than the study of the past. It is the process of recording, reconstructing and interpreting the past through the investigation of a variety of sources. It is a discipline that gives people an understanding of themselves and others in relation to the world, both past and present.

Students of history should learn how the discipline works. It is an exploratory subject that poses questions without providing definitive answers. In order to understand the past, students must engage with it both through exposure to primary historical sources and through the work of historians. Historical study involves both selection and interpretation of data and critical evaluation of it. Students of history should appreciate the relative nature of historical knowledge and understanding, as each generation reflects its own world and preoccupations and as more evidence emerges. A study of history both requires and develops an individual's understanding of, and empathy for, people living in other periods and contexts.
The content of the history course is intrinsically interesting and it is hoped that many students who follow it will become fascinated with the discipline, developing a lasting interest in it, whether or not they continue to study it formally.

IB History at the Standard and Higher Levels will encompasses the main developments in 20th century world history, specifically the Causes, Effects and Practices of War. The course will also include an intense focus in the Americas from the periods of pre-World War I through the Cold War and into Post Cold War Era. The Higher Level course also comprises an additional intense study of the Americas through the late 21st Century into the millennium.

**IB History**

**STANDARD LEVEL**

**ST3034 – IB History Year 1 – SL (Grade 11)**
6pds/cycle
1 Credit

**ST3044 – IB History Year 2 – SL (Grade 12)**
6pds/cycle
1 Credit

**IB HISTORY (OF THE AMERICAS) HIGHER LEVEL**

**ST3035 – IB History of the Americas Year 1 – HL (Grade 11)**
6pds/cycle
1 Credit

**ST3045 – IB History of the Americas Year 2 – HL (Grade 12)**
6pds/cycle
1 Credit
IB INDIVIDUALS AND SOCIETIES ELECTIVES
(Can replace Group 6 requirement if two Group 3 courses are selected)

IB Economics Higher and Standard Levels

Economics is a dynamic social science, forming part of group 3—individuals and societies. The study of economics is essentially about dealing with scarcity, resource allocation and the methods and processes by which choices are made in the satisfaction of human wants. As a social science, economics uses scientific methodologies that include quantitative and qualitative elements.

The IB Diploma Programme economics course emphasizes the economic theories of microeconomics, which deal with economic variables affecting individuals, firms and markets, and the economic theories of macroeconomics, which deal with economic variables affecting countries, governments and societies.

These economic theories are not to be studied in a vacuum—rather, they are to be applied to real-world issues. Prominent among these issues are fluctuations in economic activity, international trade, economic development and environmental sustainability.

ST3134 IB Economics Year 1 – SL (Grade 11)
6pds/cycle
1 Credit

ST3144 IB Economics Year 2 – SL (Grade 12)
6pds/cycle
1 Credit

ST3135 IB Economics Year 1 - HL (Grade 11)
6pds/cycle
1 Credit

ST3145 IB Economics Year 2 HL (Grade 12)
6pds/cycle
1 Credit
IB Psychology Higher and Standard Levels

Psychology is the systematic study of behavior and mental processes. Psychology has its roots in both the natural and social sciences, leading to a variety of research designs and applications, and providing a unique approach to understanding modern society. IB psychology examines the interaction of biological, cognitive and sociocultural influences on human behavior, thereby adopting an integrative approach. Understanding how psychological knowledge is generated, developed and applied enables students to achieve a greater understanding of themselves and appreciate the diversity of human behavior. The ethical concerns raised by the methodology and application of psychological research are key considerations in IB psychology.

**ST3434 IB Psychology Year 1 – SL (Grade 11)**
6pds/cycle
1.0 Credit

**ST3444 IB Psychology Year 2 – SL (Grade 12)**
6pds/cycle
1.0 Credit

**ST3435 IB Psychology Year 1 – HL (Grade 11)**
6pds/cycle
1.0 Credit

**ST3445 IB Psychology Year 2 – HL (Grade 12)**
6pds/cycle
1.0 Credit

IB Geography Higher and Standard Levels

Geography is a dynamic subject that is firmly grounded in the real world and focuses on the interactions between individuals, societies and physical processes in both time and space. It seeks to identify trends and patterns in these interactions. It also investigates the way in which people adapt and respond to change, and evaluates actual and possible management strategies associated with such change. Geography describes and helps to explain the similarities and differences between different places. These may be defined on a variety of scales and from the perspectives of a different range of actors, with varying powers over decision-making processes. Within individuals and societies subjects, geography is distinctive in its spatial dimension and occupies a middle ground between social or human sciences and natural sciences. The Diploma Programme geography course integrates physical, environmental and human geography, and ensures that students acquire elements of both socio-economic and scientific methodologies. Geography takes advantage of its position to examine relevant concepts and ideas from a wide variety of disciplines. This helps students develop life skills and have an appreciation of, and respect for, alternative approaches, viewpoints and ideas

STEM Academy Program of Study 2021-2022
IB Global Politics Higher and Standard Levels

The 21st century is characterized by rapid change and increasing interconnectedness, impacting individuals and societies in unprecedented ways and creating complex global political challenges. Global politics is an exciting, dynamic subject that draws on a variety of disciplines in the social sciences and humanities, reflecting the complex nature of many contemporary political issues. The study of global politics enables students to critically engage with different and new perspectives and approaches to politics in order to comprehend the challenges of the changing world and become aware of their role in it as active global citizens.

The Diploma Programme global politics course explores fundamental political concepts such as power, equality, sustainability and peace in a range of contexts. It allows students to develop an understanding of the local, national, international and global dimensions of political activity and processes, as well as to explore political issues affecting their own lives. The course helps students to understand abstract political concepts by grounding them in real-world examples and case studies. It also invites comparison between such examples and case studies to ensure a wider and transnational perspective.

The core units of the course together make up a central unifying theme of “people, power and politics”. The emphasis on “people” reflects the fact that the course explores politics not only at a state level but also explores the function and impact of non-state actors, communities, groups and individuals. The concept of “power” is also emphasized as being particularly crucial to understanding the dynamics, tensions and outcomes of global politics. Throughout the course, issues such as conflict, migration or climate change are explored through an explicitly political lens: “politics” provide a uniquely rich context in which to explore the relationship between people and power.
**MATHEMATICS**

The subject of Mathematics is a series of academic courses necessary for entry into some Science courses and college admission. It is paramount that students and parents investigate and seek consultation regarding the required mathematics courses and suggested sequence of study needed in preparation for higher-level Mathematics and Science courses.

All mathematics courses will give students the opportunities to discover concepts, on their own, describe patterns and relate topics to one another, as well as to employ appropriate use of vocabulary, show adequate working steps and attempt a variety of methods to solve a problem. Mathematics courses provide opportunities for students to solve real-world applications, and offer students opportunities to learn concepts through a variety of instructional strategies that include project-based instruction.

Further, all courses and levels are steeped in inquiry and project based instruction, and require students to develop inquiring minds and curiosity about Mathematics and related concepts, and communicate their ideas, arguments and practical experiences accurately in a variety of ways, including written and verbal modes. They will also have the opportunity to think analytically, critically and creatively to solve problems, judge arguments and draw conclusions. All students will embark upon interdisciplinary projects that involve the introduction and development of Mathematics-based research skills and writing as a core requirement of all courses and, in some courses, culminate into formal research papers.

Beginning with the class of 2021, the IB has changed the series of mathematics courses that students are able to enroll. The names of the two new courses, each at the Higher and Standard Level, are Applications & Interpretations and Analysis & Approaches. Please see the descriptions and content for each of these courses in the next section of the mathematics course descriptions.
Required STEM Academy Courses:

9th Grade:  
- Algebra I
- Pre-Diploma Algebra II
- Pre-Diploma Geometry
- Advanced Topics in Mathematics 1 (HL Weighted)

10th Grade:  
- Pre-Diploma Algebra II
- Pre-Diploma Geometry
- Pre-Diploma Math Analysis
- Advanced Topics in Mathematics 1 or 2 (HL Weighted)

11th Grade:  
- IB Mathematics Applications & Interpretations Y1 Standard Level
- IB Mathematics Applications & Interpretations Y1 Higher Level +
- IB Mathematics Analysis & Approaches Y1 Standard Level ++
- IB Mathematics Analysis & Approaches Y1 Higher Level ++

12th Grade:  
- IB Mathematics Applications & Interpretations Y2 Standard Level
- IB Mathematics Applications & Interpretations Y2 Higher Level
- IB Mathematics Analysis & Approaches Y2 Standard Level
- IB Mathematics Analysis & Approaches Y2 Higher Level

+Successful Completion of Pre-Diploma Geometry and Pre Diploma Algebra II Required
++Successful Completion of Pre-Diploma Math Analysis Required

SEQUENCES TO IB MATHEMATICS
ST5013 - Algebra I (Grade 9)
6pds/cycle
1 credit

Algebra I is the first course in the series of academic math courses necessary for college admission as well as the satisfaction of state/national mathematics content standards. The course will include the following content: the real number system, solving one-variable equations and inequalities, linear equations and inequalities, systems of linear equations and inequalities, coordinate graphing, factoring polynomials, simplifying rational and radical expressions, properties of exponents, and answering questions based on data displays, statistical calculations, and probability. Students will work on problem solving and completing open-ended responses. At the end of this course, students will take the Algebra I Keystone exam.

ST5014– Pre-Diploma Geometry (Grades 9/10)
ST5014B – Blended Pre-Diploma Geometry
6pds/cycle
1 Credit

Geometry is one in a series of academic math courses necessary for entry into the International Baccalaureate courses, state mandated assessments, and college admission. The course includes the systematic study of points, lines, planes, circles congruence and similarity of polygons (with a focus on triangles and quadrilaterals), as well as area and volume of solid figures. This course also studies deductive reasoning through the introduction of two-column proofs. In addition, the course requires students to calculate probability, using area and define geometric shapes algebraically and graphically.

ST5024 – Pre-Diploma Algebra II (Grades 9/10)
6pds/cycle
1 Credit

Algebra II is one course in the series of academic math courses necessary for entry into the International Baccalaureate courses, state mandated assessments, and college admission. The course includes functions, systems of equations, quadratic functions, polynomial functions, exponents, radical equations, rational functions, exponential functions, statistics, and probability. In addition, students are required to explore and apply matrix operations, logarithms, and conics. The primary goal of this course is the genuine working comprehension of the fundamental concepts of Algebra necessary for all higher-level math and science courses.

ST5124 – Pre-Diploma Math Analysis (Grade 10)
Math Analysis is a rigorous course designed to prepare students for the International Baccalaureate Higher Level Mathematics and college admission. The course begins with a review and extension of functions and their graphs, followed by proofs of theorems through mathematical induction. Trigonometry is introduced through circular functions and trigonometric functions of general angles. Practical applications are studied through right triangles, law of sines and cosines, and area formulas. The course also requires students to study limits, sequences and series, exponential and logarithmic functions and functions emphasizing curve sketching and differentiation. A TI-83 or 84 series graphing calculator is highly recommended. TI-89 model calculators are not permitted on tests.

IB MATHEMATICS

The nature of mathematics can be summarized in a number of ways: for example, it can be seen as a well-defined body of knowledge, as an abstract system of ideas, or as a useful tool. For many people it is probably a combination of these, but there is no doubt that mathematical knowledge provides an important key to understanding the world in which we live. Mathematics can enter our lives in a number of ways: we buy produce in the market, consult a timetable, read a newspaper, time a process or estimate a length. Mathematics, for most of us, also extends into our chosen profession: artists need to learn about perspective; musicians need to appreciate the mathematical relationships within and between different rhythms; economists need to recognize trends in financial dealings; and engineers need to take account of stress patterns in physical materials. Scientists view mathematics as a language that is central to our understanding of events that occur in the natural world. Some people enjoy the challenges offered by the logical methods of mathematics and the adventure in reason that mathematical proof has to offer. Others appreciate mathematics as an aesthetic experience or even as a cornerstone of philosophy. This prevalence of mathematics in our lives provides a clear and sufficient rationale for making the study of this subject compulsory within the Diploma Programme.

ST5034 IB Mathematics Applications & Interpretations Year One - SL
6pds/Cycle
1.0 Credit

ST5044 IB Mathematics Applications & Interpretations Year Two - SL*
6pds/Cycle
1.0 Credit

ST5035 IB Mathematics Applications & Interpretations Year One - HL+
6pds/Cycle
1.0 Credit

ST5045 IB Mathematics Applications & Interpretations Year Two - HL**
According to the International Baccalaureate Organization this course is designed for students who enjoy describing the real world and solving practical problems using mathematics, those who are interested in harnessing the power of technology alongside exploring mathematical models and enjoy the more practical side of mathematics. This course is aimed at students who will go on to study subjects such as social sciences, natural sciences, statistics, business, some economics courses, psychology, and design.

The Higher Level Course will include new content, including statistics. It is intended to meet the needs of students whose interest in mathematics is more practical than theoretical but seek more challenging content and requires strong Algebra 2 skills.

**ST5134 IB Mathematics Analysis & Approaches Year One - SL**+  
6pds/Cycle  
1.0 Credit

**ST5144 IB Mathematics Analysis & Approaches Year Two - SL***  
6pds/Cycle  
1.0 Credit

**ST5135 IB Mathematics Analysis & Approaches Year One - HL**++  
6pds/Cycle  
1.0 Credit

**ST5145 IB Mathematics Analysis & Approaches Year Two - HL**++  
6pds/Cycle  
1.0 Credit

According to the International Baccalaureate Organization this course is intended for students who wish to pursue studies in mathematics at university or subjects that have a large mathematical content; it is for students who enjoy developing mathematical arguments, problem solving and exploring real and abstract applications, with and without technology. This course is aimed at students who will go onto study areas of substantial mathematics content such as mathematics itself, engineering, physical sciences, or some economics courses.
EXPERIMENTAL SCIENCES

Science works through a variety of approaches to produce explanations to many complex questions about our world, but all sciences rely upon data from thorough and reliable observations and experiments using inductive or deductive reasoning. In support of these foundations, science courses in the STEM Academy emphasize and ensure that students are well versed in the scientific method. Courses will offer students experience in applying scientific principles to solve realistic problems where they learn to design and implement experiments, analyze and critique data, draw conclusions, and communicate results. The science courses also provide students with the opportunity to evaluate the moral, ethical, social, economic, and environmental implications of using science and technology.

Further, all courses and levels are steeped in inquiry and project based instruction, and require students to develop inquiring minds and curiosity about science and the natural world, to develop skills of scientific inquiry to design and carry out scientific investigations, evaluate scientific evidence, to draw conclusions and to communicate scientific ideas, arguments and practical experiences accurately in a variety of ways that include verbal and written modes. Students will also have the opportunity to think analytically, critically and creatively to solve problems, judge arguments and make decisions in scientific and other contexts. All students embark upon projects that involve the introduction and development of science-based research and writing as a core requirement and, in some courses, culminate in a formal science based research paper.

Required STEM Academy Courses:

9th Grade: Pre Diploma Universal Physics

10th Grade: Pre Diploma Biology and Pre Diploma Chemistry

11th Grade: IB Biology Standard Level Year One
12th Grade: IB Biology Standard Level Year Two OR

11th Grade: IB Biology Higher Level Year One
12\textsuperscript{th} Grade: IB Biology Higher Level Year Two

11\textsuperscript{th} Grade: IB Chemistry Standard Level Year One
12\textsuperscript{th} Grade: IB Chemistry Standard Level Year Two
OR
11\textsuperscript{th} Grade: IB Chemistry Higher Level Year One
12\textsuperscript{th} Grade: IB Chemistry Higher Level Year Two

11\textsuperscript{th} Grade: IB Physics Standard Level Year One
12\textsuperscript{th} Grade: IB Physics Standard Level Year One
OR
11\textsuperscript{th} Grade: IB Physics Higher Level Year One
12\textsuperscript{th} Grade: IB Physics Higher Level Year Two

**IB BIOLOGY SEQUENCE**

- IB Biology HL or SL
- Pre Diploma Biology
- Intro to Engineering
- Pre Diploma Chemistry
- Pre Diploma Universal Physics

**IB CHEMISTRY SEQUENCE**

- IB Chemistry HL or SL
- Pre Diploma Biology
- Intro to Engineering
- Pre Diploma Chemistry
- Pre Diploma Universal Physics
IB PHYSICS SEQUENCE

BIOLOGY

ST4124 Pre Diploma Biology (This is a PA Keystone Required Course) (Grade 10)
6pds/cycle
1 Credit

The tenth grade Pre Diploma Biology course will introduce students to fundamental concepts and experimental methods of modern Biology: structure and function, universality vs. diversity, equilibrium within systems and evolution. The course offers students the opportunity, through continued use of the scientific method, to investigate life at a molecular, cellular and organismal level. It will also require students to use this knowledge to think critically about the structure and function of living organisms, evolution, and the importance of equilibrium within chemical, biological and ecological systems.

IB BIOLOGY HIGHER AND STANDARD LEVELS

ST4134 IB Biology Year One Standard Level
6pds/cycle
1.0 Credit

ST4144 IB Biology Year Two Standard Level*
6pds/cycle
1.0 Credit

ST4135 IB Biology Year One Higher Level
6pds/cycle
1.0 Credit

ST4145 IB Biology Year Two Higher Level**
6pds/cycle
1.0 Credit
Biologists have accumulated huge amounts of information about living organisms, and it would be easy to confuse students by teaching large numbers of seemingly unrelated facts. In the Diploma Programme biology course, it is hoped that students will acquire a limited body of facts and, at the same time, develop a broad, general understanding of the principles of the subject. Although the Diploma Programme biology course at standard level (SL) and higher level (HL) has been written as a series of discrete statements (for assessment purposes), there are four basic biological concepts that run throughout: Structure and Function, Universality v. Diversity, Equilibrium within Systems, and Evolution.

While the Standard Level and Higher Level Chemistry courses cover many of the same topics, the Higher Level requires a more intensive study of the content and labs that reflect the depth of knowledge required of the course curriculum.

**CHEMISTRY**

**ST4224 - Pre Diploma Chemistry (Grade 10)**  
**ST4224B – Blended Pre Diploma Chemistry (Grade 10)**  
6pds/cycle  
1.0 Credit

Chemistry is an experimental science that combines academic study with the acquisition of practical and investigational skills. It is called the central science, as chemical principles underpin both the physical environment in which we live and all biological systems. Topics addressed include atomic structure, periodicity, bonding, energetics, chemical reactions, acids and bases, measurement and data processing, and quantitative chemistry. In addition to addressing content, the course develops students’ skills in several areas, including making detailed observations, elements of sound experimental design, and using inductive and deductive reasoning to critically evaluate data.

**IB CHEMISTRY HIGHER AND STANDARD LEVELS**

**ST4234 IB Chemistry Year One Standard Level**  
6pds/cycle  
1.0 Credit  
**ST4044 IB Chemistry Year Two Standard Level**  
6pds/cycle  
1.0 Credit

**ST4235 IB Chemistry Year One Higher Level**  
6pds/cycle  
1.0 Credit  
**ST4245 IB Chemistry Year Two Higher Level**  
6pds/cycle  
1.0 Credit
Biology is intimately related to chemistry; therefore, most International Baccalaureate Diploma courses have chemistry or physical science (with chemistry as a major component) as a prerequisite for Diploma Biology. Further, this course is one in a series of academic science courses that may be necessary for entry into the International Baccalaureate courses and college admissions. This laboratory course covers in detail the mathematical, theoretical, and physical aspects of the composition and structure of matter. Topics covered include: measurement, atomic structure, chemical reactions, stoichiometry, solutions, periodicity, bonding, organic chemistry, energetics, kinetics, equilibrium, acids and bases, oxidation-reduction reactions, and additional special topics. Further, the course offers students the opportunity to develop inquiring minds and curiosity about science and the natural world, to develop skills of scientific inquiry to design and carry out scientific investigations and evaluate scientific evidence to draw conclusions and to communicate scientific ideas, arguments and practical experiences accurately in a variety of ways. They will also have the opportunity to think analytically, critically and creatively to solve problems, judge arguments and make decisions in scientific and other contexts. All students will embark upon projects that involve the introduction and development of science based research as a core requirement. This course offers students opportunities to learn through a variety of instructional strategies that include project-based instruction.

While the Standard Level and Higher Level Chemistry courses cover many of the same topics, the Higher Level requires a more intensive study of the content and labs that reflect the depth of knowledge required of the course curriculum.

PHYSICS

ST4014 - Pre Diploma Universal Physics (Grades 9/10)
6pds/cycle
1.0 Credit

Physics is the most fundamental of the experimental sciences, as it seeks to explain the universe itself, from the very smallest particles to the vast distances between galaxies. The ninth grade physics course will introduce students to the world of physics. The course study includes using the scientific method to investigate the world around them. These investigations will entail the study of forces (mechanical and electromagnetic), applications of energy, waves, and thermodynamics. Student driven investigations and research will develop the following skills: skeptical questioning, appropriate data collection and analysis, making scientific observations, drawing research supported conclusions. The course requires students to share their work, findings and ideas with local and global communities in verbal and written modes.

IB PHYSICS HIGHER AND STANDARD LEVELS

ST4034 IB Physics Year One Standard Level
6pds/cycle
IB Physics is based on theory and experiments undertaken by all students. They should complement one another naturally, as they do in the wider scientific community. The Diploma Programme Nature of the subject physics course allows students to develop traditional practical skills and techniques and increase facility in the use of mathematics, which is the language of physics. It also allows students to develop interpersonal skills, and information and communication technology skills, which are essential in modern scientific endeavour and are important life-enhancing, transferable skills in their own right.

Standard level includes topics such as mechanics, thermal physics, oscillations, electric currents, fields and forces, atomic and nuclear physics, and energy, power, and climate. Higher level includes all the same topics as Standard level but also includes digital technology, quantum physics, electromagnetic induction, motion in fields, and wave phenomena.

IB SCIENCE ELECTIVES (Replaces Group 6 Requirement)

ST4334 IB Environmental Systems and Societies Standard Level Y1 (Grade 11)
6pds/cycle
1.0 Credit

ST4344 IB Environmental Systems and Societies Standard Level Y2 (Grade 12)
6pds/cycle
1.0 Credit

*Successful Completion of Related Standard Level Year One science course required.
**Successful Completion of Related Higher Level Year One science course required.

As a trans-disciplinary subject, environmental systems and societies is designed to combine the techniques and knowledge associated with group 4 (the experimental sciences) with those associated with group 3 (individuals and societies). By choosing to study a trans-disciplinary...
course such as this as part of their diploma, students are able to satisfy the requirements for both groups 3 and 4 of the hexagon, thus allowing them to choose another subject from any hexagon group (including another group 3 or 4 subject). Trans-disciplinary subjects therefore introduce more flexibility into the IB Diploma Programme. The environmental systems and societies course is offered at SL only.

The prime intent of this course is to provide students with a coherent perspective of the interrelationships between environmental systems and societies; one that enables them to adopt an informed personal response to the wide range of pressing environmental issues that they will inevitably come to face. Students’ attention can be constantly drawn to their own relationship with their environment and the significance of choices and decisions that they make in their own lives. It is intended that students develop a sound understanding of the interrelationships between environmental systems and societies, rather than a purely journalistic appreciation of environmental issues. The teaching approach therefore needs to be conducive to students evaluating the scientific, ethical and socio-political aspects of issues.

MODERN LANGUAGES

The study of modern language entails acquiring a language system and applying it in four active and interrelated ways: through listening, speaking, reading and writing. These four skills involve exchanging ideas and effective communication. Effective communication, in turn, involves the intellectual process of understanding how ideas can be best expressed to the audience concerned. Understanding ideas, and expressing them clearly and convincingly, demands an awareness of the cultural characteristics of the audience. At the STEM academy, modern language courses are communicative in nature, encouraging students to immerse themselves in the language and culture of study. Students complete meaningful tasks that contribute to their overall proficiency. Current and authentic materials enhance student-learning experiences. Technology further aids students in their studies. Each course provides them with a comfortable, yet challenging, environment, in which they work towards the goal of becoming lifelong learners of their chosen modern language.

Modern language courses are based in interdisciplinary, inquiry-based instruction, requiring students to investigate, analyze, create, and draw conclusions in the target language. Projects supported by second language acquisition-based research require students to think critically about cultural and academic criteria using oral, aural, verbal, and written modes. Demonstrations of understanding in some courses culminate in a formal research paper.

Required STEM Academy Courses:

9th Grade: Spanish 9  
          French 9  
          German 9
10th Grade: Spanish Level 10
French Levels 10
German Level 10

11th Grade: IB Spanish Year One Standard Level+
12th Grade: IB Spanish Year Two Standard Level*
 OR
11th Grade: IB Spanish Year One Higher Level++
12th Grade: IB Spanish Year Two Higher Level**
 OR

11th Grade: IB French Year One Standard Level+
12th Grade: IB French Year Two Standard Level*
 OR
11th Grade: IB French Year One Higher Level++
12th Grade: IB French Year Two Higher Level**
 OR
11th Grade: IB German Year One Standard Level+
12th Grade: IB German Year Two Standard Level*
 OR
11th Grade: IB German Year One Higher Level++
12th Grade: IB German Year Two Higher Level**

+Successfully completed two years of related language required before entering IB Language B Standard Level Year One.
++Successfully completed a minimum of three years of related language before entering IB Language B Higher Level.
*Successfully completed year one of the related IB Language B Year One Standard Level
**Successfully completed year one of the related IB Language B Year One Higher Level

ST2014 – Spanish 9
ST2114 – French 9
ST2214 – German 9
6pds/cycle
1.0 Credit

Grade 9 Modern Language course continues to develop students’ proficiency from previous years in essential language skills – listening, speaking, reading, and writing – with emphasis on the ability to communicate orally and in writing. In this course, students learn to function in real-life situations using more complex sentences and language structures. Students will read material on familiar topics and produce short writing samples and continue to explore as they study the themes of Home Life, Student Life, Leisure Time, and Vacation and Travel. Students will also comprehend the main ideas of the authentic language-specific materials that they read and hear and are able to identify details. Students gain a deeper understanding of the world around them while studying the target language and culture.
Grade 10 Modern Language course builds from those skills, proficiencies and understandings from Grade 9 Modern Language where students continue to develop and refine their proficiency in essential language skills – listening, speaking, reading and writing – with emphasis on the ability to interact orally and in writing. They communicate using more complex language structures on a variety of topics, moving from concrete to more abstract concepts. This course provides more advanced levels of application and comprehension in the language, and prepares students for Higher Level International Baccalaureate Language B. Students develop more sophisticated communication skills in all areas of the language with emphasis on the ability to interact orally and in writing. Authentic language-specific reading selections are emphasized at this level. Students communicate using more complex language structures and express abstract ideas with reasonable fluency. They are also able to describe, summarize, analyze and evaluate current events, and literary, cultural and social topics.

**IB MODERN LANGUAGE B**

The study of modern language entails acquiring a language system and applying it in four active and interrelated ways: through listening, speaking, reading and writing. These four skills involve exchanging ideas and effective communication. Effective communication, in turn, involves the intellectual process of understanding how ideas can best be expressed to the audience concerned. Understanding ideas, and expressing them clearly and convincingly, demands an awareness of the cultural characteristics of the audience.

**MODERN LANGUAGE B STANDARD LEVEL**

**ST2034 – IB Language B Spanish Year One SL+**  
6pds/cycle  
1.0 Credit  
**ST2044 – IB Language B Spanish Year Two SL**  
6pds/cycle  
1.0 Credit  

**ST2134 – IB Language B French Year One SL+**  
6pds/cycle  
1.0 Credit  
**ST2144 – IB Language B French Year Two SL**  
6pds/cycle  
1.0 Credit
ST2234 – IB Language B German Year One SL+
6pds/cycle
1.0 Credit

ST2244 – IB Language B German Year Two SL*
6pds/cycle
1.0 Credit

+Successfully completed two years of related language required before entering IB Language B Standard Level Year One a requirement.
*Successfully completed year one of the related IB Language B Year One Standard Level a requirement.

The focus of the SL course is language acquisition and intercultural understanding. The syllabus covers the three core topics (Communication and Media; Global Issues; Social Relationships), as well as two of the five options (Cultural Diversity; Customs and Traditions; Health; Leisure; Science and Technology). By the end of the course, students are expected to demonstrate the following learning outcomes:

Receptive skills
● Understand straightforward recorded or spoken information on the topics studied.
● Understand authentic written texts related to the topics studied and that use mostly everyday language.

Productive skills
● Communicate orally in order to explain a point of view on a designated topic.
● Describe with some detail and accuracy experiences, events and concepts.
● Produce texts where the use of register, style, rhetorical devices and structural elements are generally appropriate to the audience and purpose.

Interactive skills
● Demonstrate interaction that usually flows coherently, but with occasional limitations.
● Engage in conversations on the topics studied, as well as related ideas.
● Demonstrate some intercultural engagement with the target language and culture(s).

ST2035 – IB Language B Spanish Year One HL++
6pds/cycle
1.0 Credit

ST2045 – IB Language B Spanish Year Two HL**
6pds/cycle
1.0 Credit

ST2135 – IB Language B French Year One HL++
6pds/cycle  
1.0 Credit  
**ST2145 – IB Language B French Year Two HL**

6pds/cycle  
1.0 Credit  
++ST2235 – IB Language B German Year One HL++

6pds/cycle  
1.0 Credit  
ST2245 – IB Language B German Year Two HL**

++Successfully completed a minimum of three years of related language before entering IB Language B Higher Level a requirement.  
**Successfully completed year one of the related IB Language B Year One Higher Level a requirement.

The focus of the HL course is language acquisition and intercultural understanding. The syllabus covers the three core topics (Communication and Media; Global Issues; Social Relationships), as well as two of the five options (Cultural Diversity; Customs and Traditions; Health; Leisure; Science and Technology) in great depth. Additionally, the students will study two works of literature. By the end of the course, students are expected to demonstrate the following learning outcomes:

**Receptive skills**  
- Understand complex recorded or spoken information on the topics studied.  
- Appreciate literary works in the target language.  
- Understand complex authentic written texts related to the topics studied.

**Productive skills**  
- Communicate orally in order to explain in detail a point of view.  
- Describe in detail and accurately experiences and events, as well as abstract ideas and concepts.  
- Produce clear texts where the use of register, style, rhetorical devices and structural elements are appropriate to the audience and purpose.  
- Produce clear and convincing arguments in support of a point of view.

**Interactive skills**  
- Demonstrate interaction that flows coherently with a degree of fluency and spontaneity.  
- Engage coherently in conversations in most situations.  
- Demonstrate some intercultural engagement with the target language and culture(s).
HEALTH/PHYSICAL EDUCATION

ST7811 – HEALTH & PHYSICAL WELLNESS IN THE 21ST CENTURY I
2pds/cycle
.33 Credit

The first course of Physical Wellness in the 21st Century is designed to promote general health and physical activity as well as disease prevention as central components. The focus is on fitness for the purpose of beneficial experiences, attitudes, knowledge and skills that foster a lifelong active lifestyle. Students set personal goals and participate in physical activities that incorporate the health components of fitness through an inquiry and project based approach that emphasizes a broad scope of independent and collaborative projects designed to enhance cardiovascular fitness, muscular strength, endurance, flexibility and body composition. All lessons emphasize attention to the cognitive, affective and behavioral components of physical activity.

ST7812 – HEALTH & PHYSICAL WELLNESS IN THE 21ST CENTURY II
2pds/cycle
.33 Credit

This course expands upon the goals of Physical Wellness in the 21st Century I and continues to improve students’ individual levels of fitness. Students are required to design and implement personal fitness programs in order to incorporate healthy components of fitness and wellbeing into their personal lives. Students will deepen their knowledge of human anatomy, exercise, physiology, diet and nutrition

ST4434 IB Sports, Exercise and Health Sciences Standard Level Y1
1 .0 credit

ST4444 IB Sports, Exercise and Health Sciences Standard Level Y2
1 .0 credit

ST4435 IB Sports, Exercise and Health Sciences Higher Level Y1
1 .0 credit

ST4445 IB Sports, Exercise and Health Sciences Higher Level Y2
1 .0 credit

Sports, exercise and health science (SEHS) is an experimental science that combines academic study with the acquisition of practical and investigative skills. It is an applied science course within group 4, with aspects of biological and physical science being studied in the specific context of sports, exercise and health. Moreover, the subject matter goes beyond the traditional
science subjects to offer a deeper understanding of the issues related to sports, exercise and health in the 21st century. Apart from being worthy of study in its own right, SEHS is a good preparation for courses in higher or further education related to sports fitness and health, and serves as a useful preparation for employment in sports and leisure industries.

The course incorporates the traditional disciplines of anatomy and physiology, biomechanics, psychology and nutrition, which are studied in the context of sports, exercise and health. Students will cover a range of core and option topics, and carry out practical (experimental) investigations in both laboratory and field settings. This will provide an opportunity to acquire the knowledge and understanding necessary to apply scientific principles and critically analyze human performance. Where relevant, the course will address issues of international dimension and ethics by considering sports, exercise and health relative to the individual and in a global context.

8397C DRIVER SAFETY EDUCATION (10,11,12)
Online: .33 credit

Driving a motor vehicle is a huge responsibility for a student. This course provides students with the knowledge needed to enter the traffic system as a vehicle operator. By assisting students with driving related decision-making, students learn to think critically and develop proper attitudes toward defensive driving. The course uses the Pennsylvania Enhanced Driver Education module and meets the state’s requirement of 30 classroom instructional hours. The class includes vehicle maintenance, vehicle purchasing and automobile insurance information. This course, in combination with behind the wheel training, may enable students to receive lower insurance rates.
VISUAL ARTS

ART IN THE 21ST CENTURY

ST6011 - Art in the 21st Century I (Grades 9/10)
4 pds/cycle
.66 Credit

Experience the creative process for personal enjoyment or for the pursuit of additional art courses. In context training and practice of tools and materials in various media will jump-start students’ imagination and understanding of the world around them. Areas of study include drawing, painting, graphic design, digital imaging and sculpture. Emphasis is on creative and critical thinking, problem solving and personal expression through inquiry and project based instruction.

ST6021 – Art in the 21st Century II (Grade 10)
4 pds/cycle
.66 Credit

This course is designed to inspire the student to build upon the skills, techniques and worldly perspective acquired in Art in the 21st Century I, and to reflect and demonstrate their abilities in body of work for a portfolio. A wide range of materials and skills will be integrated into the curriculum through inquiry and project based instruction.

IB VISUAL ARTS

ST6034 IB Visual Arts Year One Standard Level+
6pds/cycle
1.0 Credit
ST6044 IB Visual Arts Year Two Standard Level*
6pds/cycle
1.0 Credit

ST6035 IB Visual Arts Year One Higher Level++
6pds/cycle
1.0 Credit
ST6045 IB Visual Arts Year Two Higher Level**
6pds/cycle
1.0 Credit

IB Visual Arts is an excellent choice for students who wish to strengthen their innovative, creative thinking and analytical skills in order to complement their STEM studies. A variety of media and techniques make this course diverse and challenging for students who are interested in exploring artistic traditions from past, present and emerging cultural backgrounds as well as producing a portfolio and exhibition of their work. Students choose between a focus on studio
work and a focus on arts investigation. The course is designed to enable students to study visual arts in higher education and also welcomes those students who seek life enrichment through visual arts. IB Visual Arts offers two options: Higher Level, which provides more opportunity to develop a body of work in greater depth and breadth, and Standard Level which provides the opportunity for the same high level of performance in a smaller body of work. The IB Visual Arts course is designed to present students with many opportunities for creative growth.

Requirements:

+ **Standard Level** – No previous art experience necessary, but limited experience is helpful.
++ **Higher Level** – Some previous high school level art experience necessary.
*Successful completion of IB Visual a Year One Standard Level a requirement
**Successful completion of IB Visual Arts Year One Higher Level a requirement

ENGINEERING AND TECHNOLOGY

**ST7014 - Introduction to Engineering (Grade 9 Requirement)**
4 pds/cycle
.66 Credit

This course provides an introduction to engineering and technology design processes. Students create ideas, designs, develop innovations and engineer practical solutions. It also provides students with the opportunity to apply technological concepts and processes in order to creatively solve problems and innovate designs. This course will utilize students’ Mathematics and Science skills from concept to production and evaluation in all aspects of the processes.

**ST7013 - Communications Technology (Grade 9/10)**
4 pds/cycle
.66 Credit

This course provides an in-depth look into communication technologies and processes, and requires students to create and use technology effectively and creatively communicate through a variety of avenues. The course also exposes students to digital communications, digital photography, web page design, video technologies, editing software, and advertising. The course provides a hands-on introduction to many forms of software such as Photoshop, Illustrator, InDesign, C#, Java, imovie, Final Cut Pro, and more.

**ST5510 – Computer Programming Java (Grades 9/10)**
7 pds/cycle
.66 Credit
The course introduces the fundamentals of programming language, and is designed for students who have an interest in the sciences, mathematics or technologies. The course is utilizes inquiry and project based instruction to introduce and develop the topics of input and output, strings, conditionals, loops, functions and procedures. The primary language of the course is Java.

**ST5514 – Principles and Practices of Computer Science (Grades 9/10)**
4 pds/cycle  
.66 Credit

This course will build on the fundamentals of computer programming by introducing intermediate concepts such as arrays, recursion and abstraction. Using a variety of object oriented languages and development environments, students will learn how to identify a need and develop an algorithm and solution that is most appropriate for the end user. Students will create mobile applications for the Android platform, as well as solutions coded in VBA as part of this course.

**ST0724 Engineering Technology (Grade 10)**
4 pds/cycle  
.66 Credit

*Successful Completion of Intro to Engineering Recommended*

**Engineering Technology:** Engineering Technology will offer students the opportunity to understand and apply knowledge and skills required to link science, technology, engineering and mathematics together and apply it to solve problems. The course also provides students an opportunity to engage in real world case studies and learning activities that focus on the engineering process and making the world a better place to live and work. This course will maintain a focus on how engineers apply their creativity, resourcefulness, mathematical, scientific, and technical knowledge and skills in the creation or refinement of technological products and systems. A key approach will be the use of a sequential and iterative design and development process to solve authentic engineering tasks and problems.

**IB ENGINEERING AND TECHNOLOGY COURSES**
(Replaces Group 6 Requirement)

**ST7034 IB Design Technology Year 1 Standard Level (Grade 11)**
6pds/cycle  
1.0 Credit

**ST7044 IB Design Technology Year 2 Standard Level (Grade 12)**
6pds/cycle  
1.0 Credit

**ST7035 IB Design Technology Year 1 Higher Level (Grade 11)**
6pds/cycle  
1.0 Credit
To design with technology is to use human ingenuity in selected activities in order to meet needs and find solutions. This can be achieved through existing or new technologies. Design consists of gathering information about the problem or opportunity, processing that information, and planning for some kind of intervention either by modifying what is already there or by introducing something new. The designer is interested not just in the material environment but also in the social, technological, economic, environmental, political, legislative and ethical considerations that affect people’s priorities.

Diploma Programme design technology is based on a model of learning that incorporates knowledge, skills and design principles in problem-solving contexts, while at the same time maximizing the use of local and readily available resources. It assumes no previous experience in either technology or design. The intent is not solely the acquisition of knowledge about design and technology, which may change or become outdated, but it is about learning how to adapt to new experiences and to approach problems with the appropriate skills and the relevant techniques to identify the important elements and, crucially, to develop the optimum solutions.

The design cycle is at the core of the course, and it is expected that students will use this process in the practical investigative work as well as in the theory. Each element in the design cycle represents an aspect of design technology, which, when viewed together, constitutes a holistic approach. Any given element is therefore only to be seen in the context of the whole process.

Technology relies on the laws and properties of nature and the accumulated knowledge of technology to create new products, techniques and systems. Design technology sits comfortably in the Diploma Programme experimental sciences, because the design cycle involves inquiry, and students need to study scientific principles in order to understand advances made in society and to be able to speculate what might be achieved in the future. The range of syllabus topics has been chosen to ensure a balance and interest for all students regardless of their gender and previous experience. It includes options that will be attractive to all students, not only those whose future studies will be in the field of science, technology or engineering, and it offers opportunities for in-depth studies of relevant technological issues for those who will study such subjects.

The design cycle to technology is the equivalent of the scientific method to science. The emphasis is therefore on using the design cycle to solve a problem or to realize an opportunity using relevant information and production techniques. Practical and/or investigative work centres on developing skills and ideas, the properties of materials, mechanisms, control systems and production techniques, as they apply to constructing a product or system.
Busines and management is a rigorous and dynamic discipline that examines business decision-making processes and how these decisions impact on and are affected by internal and external environments. It is the study of both the way in which individuals and groups interact in an organization and of the transformation of resources.

The Diploma Programme business and management course is designed to develop an understanding of business theory, as well as an ability to apply business principles, practices and skills. The application of tools and techniques of analysis facilitates an appreciation of complex business activities. The course considers the diverse range of business organizations and activities and the cultural and economic context in which business operates. Emphasis is placed on strategic decision-making and day-to-day business functions of marketing, production, human resource management and finance.

Links between the topics are central to the course, and this integration promotes a holistic overview of business activity.
MUSIC EDUCATION AT STEM

ST6112 (I)/S6122 (II) - Recording Studio I & II (Grades 9/10)
4 pds/cycle
.66 Credit

After a thorough investigation of the song writing process, students will have the opportunity to create, perform, produce, and publish an original composition as a means of personal and communal identity. The rigorous and exploratory nature of this course can also be used to enter an International Baccalaureate music class.

ST6211 – Concert Choir I (9)
ST6212 – Concert Choir II (10)
ST6213 – Concert Choir III (11)
ST6214 - Concert Choir IV (12)
3pds/cycle
.5 Credit

Concert Choir I, II, III, IV is a choir of men's and women's voices. Its primary objectives are to develop the vocal instrument and sight-reading skills. Emphasis is placed on choral development through the study of the vocal anatomy (breathing, posture, vocal placement, etc.) and the sight-reading of music through the use of solfeggio syllables. Students focus on the performance of a cappella and accompanied compositions. Members are required to attend occasional evening rehearsals and all concerts. Students receive instruction on all aspects of vocal technique and sight-reading. Students will also work on particular areas of their concert music. A $50 fee may be assessed for uniforms, equipment, or transportation for students enrolled in this course. Students with financial concerns should speak to individual directors.
ST6511E - Blue and Gold Concert and Marching Band (Grade 9 - East Students)
ST6512E - Blue and Gold Concert and Marching Band (Grade 10 - East Students)
ST6513E - Blue and Gold Concert and Marching Band (Grade 11 - East Students)
ST6514E - Blue and Gold Concert and Marching Band (Grade 12 - East Students)
ST6511W - Blue and Gold Concert and Marching Band (Grade 9 - West Students)
ST6512W - Blue and Gold Concert and Marching Band (Grade 10 - West Students)
ST6513W - Blue and Gold Concert and Marching Band (Grade 11 - West Students)
ST6514W - Blue and Gold Concert and Marching Band (Grade 12 - West Students)

3pds/cycle
0.5 Credit

This organization will consist of members functioning together as both a concert band and marching band as determined by their respective performance schedules. Membership is open to all instrumentalists who have participated in Middle School Band, or successfully completed a required audition. All members are required to perform in all scheduled concerts, parades, football games, competitions, adjudications and other special events. In addition to the regularly scheduled band class periods, additional rehearsals outside of regular school hours are required, including Band Camp in August. This organization will include a $100 required District Activity Fee to be applied to all Band students. There may be additional fees which will be communicated to students prior to course selection.

ST6311 – Chamber Orchestra I (Grade 9)
ST6312 - Chamber Orchestra II (Grade 10)

4 pds/cycle
0.5 Credit

Chamber Orchestra provides committed students with an opportunity to excel and achieve higher musical goals through the development and application of skills, techniques and artistic styles in both a small ensemble and large string orchestra setting. Chamber Orchestra meets as a small ensemble 3 periods/cycle, the remaining 3 periods/cycle allows students the opportunity to play in the larger String Orchestra. Students will improve their comprehension and understanding of composition and theory, as well as gain greater depth of skill on their instrument. Orchestra members participate in two formal concerts per year (Winter and Spring), and the high school graduation ceremony. In addition, orchestra trips and competitions, and community performances may be scheduled throughout the year. Students also have the additional opportunities to participate in Vivace!, Chamber Ensemble, pit orchestra for the school musical and PMEA festivals (audition required for districts, regionals, and states). This program will include a $50 required District Activity Fee to be applied to all Orchestra students.
String Orchestra provides committed students with an opportunity to excel and achieve higher musical goals through the development and application of skills, techniques, and artistic styles in an ensemble setting. In addition to the regularly scheduled String Orchestra class, individual assessment and technique lessons are required for each string student, a minimum of three times each marking period. Students will improve their comprehension and understanding of composition and theory, as well as gain greater depth of skill on their instrument. Orchestra members participate in two formal concerts per year (winter and spring), and the high school graduation ceremony. In addition, orchestra trips and competitions, and community performances may be scheduled throughout the year. Students also have the additional opportunities to participate in Vivace!, Chamber Ensemble, pit orchestra for the school musical and PMEA festivals (audition required for districts, regionals, and states). This program will include a $50 required District Activity Fee to be applied to all Orchestra students.
IB MUSIC

ST6134 IB Music Solo Performance Year One Standard Level
6pds/cycle
1.0 Credit

ST6144 IB Music Solo Performance Year Two Standard Level*
6pds/cycle
1.0 Credit

Music functions as a means of personal and communal identity and expressions, and embodies the social and cultural values of individuals and communities. Through the study of these functions, we learn to hear relationships of pitch in sound, pattern in rhythm and unfolding sonic structures. This course will explore similarities, differences and links in music from within our own culture and that of others across time. Informed and active musical engagement allows the students to explore and discover relationships between lived human experience and specific sound combinations and technologies, thus informing students more fully of the world around them, and the nature of humanity. The Diploma Programme music course provides an appropriate foundation for further study in music at university level or in music career pathways. It also provides an enriching and valuable course of study for students who may pursue other careers. This course also provides all students with the opportunity to engage in the world of music as lifelong participants.

Standard Level Solo Performance is specifically designed for the student who has a background in musical performance or with a general interest in music. All Standard Level IB music students will study “Musical Perception and Analysis” as well as focus on their specific means of performance. It is highly recommended that SLS students also receive private music instruction in addition to this course.

ST6154 IB Music Creating Year One Standard Level
6pds/cycle
1.0 Credit

ST6164 IB Music Creating Year Two Standard Level*
6pds/cycle
1.0 Credit

Music functions as a means of personal and communal identity and expressions, and embodies the social and cultural values of individuals and communities. Through the study of these functions, we learn to hear relationships of pitch in sound, pattern in rhythm and unfolding sonic structures. This course will explore similarities, differences and links in music from within our
own culture and that of others across time. Informed and active musical engagement allows the students to explore and discover relationships between lived human experience and specific sound combinations and technologies, thus informing students more fully of the world around them, and the nature of humanity. The Diploma Programme music course provides an appropriate foundation for further study in music at university level or in music career pathways. It also provides an enriching and valuable course of study for students who may pursue other careers. This course also provides all students with the opportunity to engage in the world of music as lifelong participants.

Standard Level Composition is specifically designed for the student who has a background in musical composition or with general interest in music. All Standard Level IB music students will study “Musical Perception and Analysis” as well as focus on their specific abilities as a composer. It is recommended that SLC students also receive private music instruction in addition to this course.

**ST6174 IB Music Group Performance Year One Standard Level**
6pds/cycle  
1.0 Credit

**ST6184 IB Music Group Performance Year Two Standard Level***
6pds/cycle  
1.0 Credit

Music functions as a means of personal and communal identity and expressions, and embodies the social and cultural values of individuals and communities. Through the study of these functions, we learn to hear relationships of pitch in sound, pattern in rhythm and unfolding sonic structures. This course will explore similarities, differences and links in music from within our own culture and that of others across time. Informed and active musical engagement allows the students to explore and discover relationships between lived human experience and specific sound combinations and technologies, thus informing students more fully of the world around them, and the nature of humanity. The Diploma Programme music course provides an appropriate foundation for further study in music at university level or in music career pathways. It also provides an enriching and valuable course of study for students who may pursue other careers. This course also provides all students with the opportunity to engage in the world of music as lifelong participants.

Standard Level Group Choral is specifically designed for the student who has a background in choral performance or with a general interest in music. All Standard Level IB music students will study “Musical Perception and Analysis” as well as focus on their specific abilities as a member of a singing ensemble. It is recommended that SLG students also receive private music instruction in addition to this course.

*Successful completion of Year One of relevant course required.*
ST6135 IB Music Solo Performance and Creating Year One Higher Level
6pds/cycle
1.0 Credit

ST6145 IB Music Solo Performance and Creating Year Two Higher Level**
6pds/cycle
1.0 Credit

Music functions as a means of personal and communal identity and expressions, and embodies the social and cultural values of individuals and communities. Through the study of these functions, we learn to hear relationships of pitch in sound, pattern in rhythm and unfolding sonic structures. This course will explore similarities, differences and links in music from within our own culture and that of others across time. Informed and active musical engagement allows the students to explore and discover relationships between lived human experience and specific sound combinations and technologies, thus informing students more fully of the world around them, and the nature of humanity. The Diploma Programme music course provides an appropriate foundation for further study in music at university level or in music career pathways. It also provides an enriching and valuable course of study for students who may pursue other careers. This course also provides all students with the opportunity to engage in the world of music as lifelong participants.

The Higher Level course is designed for the music student who has a background or major interest in music performance. This student may intend to pursue music at university or conservatory level, or perform in a professional band, or have the skills to perform at an advanced level. The HL music student must be able to read standard music notation and have rudimentary music theory skills as a prerequisite. It is highly recommended that a Higher Level music students receive private music instruction in addition to this course. This course may require a music theory placement test.

**Successful completion of Year One IB Music Solo Performance and Creating HL required.
PATHWAYS*
In partnership with businesses, corporations, parents, and students, the Academy identified five critical areas of academia that will promote student growth through inquiry and project-based learning. The five “Academies” are an opportunity for students to explore, create, and innovate in a 21st Century STEM program. Each Academy culminates in the senior year with an individualized STEM Practicum in which students participate in a university-credited course, an internship with partnering business/corporation, or an independent study. The Academies are:

- Academy of Engineering and Applied Science
- Academy of Biological Science
- Academy of Corporate and Mathematical Innovation
- Academy of Health and Medicine
- Academy of Technology, Media and Communications

*All students are required to take pathway courses throughout their junior and senior years.

NOTE: Senior year pathways will occur during the second and third marking periods. Senior will report to an assigned revision period during the first marking period for the sole purpose of completing their extended essay, CAS logs, college applications and STEM Practicum Portfolio.

ACADEMY OF ENGINEERING AND APPLIED SCIENCE

ST7511 Design Engineering I (Grade 11)
2 pds/cycle – Fall Semester
.33 Credit

Design Engineering I will expand upon the foundations that are common to all engineering and experimental science disciplines; the strategic identification of a problem, planning and development of a solution and the execution of the plan. The course will ask students to use their interdisciplinary knowledge of physics, chemistry and biology. In addition, the course will allow students to acquire skills that will help them identify and define a valid technical problem, thoroughly research the science included, and develop a plan to engineer a unique solution. Students will also investigate specific materials and components included in their plans for future use in prototypes or models. The course will expect students to select a concentration for further study: Architectural, Civil, Mechanical, or Transportation Engineering.
**ST7512 Design Engineering II (Grade 11)**
2 pds/cycle – Spring Semester
.33 Credit

*Design Engineering II* will provide a more specific focus in the chosen area of concentration from Design Engineering II while expanding on the planning completed in the previous semester and begin the prototyping and refining stages of the engineering and scientific processes. The course will ask students to create models of the designed solutions, experimentally test their effectiveness, analyze the data from the tests, and make revisions to the solution.

**ST7513 Design Engineering III (Grade 12)**
2 pds/cycle – 2nd & 3rd Marking Period
.33 Credit

*Design Engineering III* will be the culmination of the engineering and scientific processes in each of the concentrations. The course will afford students the opportunity to finalize designs and construct a final product or model of the planned solution.

**Robotics**

**ST7516 Robotics I (Grade 11)**
2 pds/cycle – Fall Semester
.33 Credit

*Robotics I* will introduce students to the evolution and basic science and engineering foundations of robotics. Students will explore the mechanical, automation, and computer control systems used in basic robotics. Additionally, students will be introduced to the energy transfers that lead to the proper function of the robotic system.

**ST7517 Robotics II (Grade 11)**
2 pds/cycle – Spring Semester
.33 Credit

*Robotics II* builds on the knowledge from Robotics to include the development of a robot that can complete more complex tasks such as increasing robot mobility and implementing manipulation equipment to have the robot interact with the environment.
**ST7518 Robotics III (Grade 12)**
2 pds/cycle – 2nd & 3rd Marking Period
.33 Credit

Robotics III probes students to further explore the limits of robotics. Students will be asked to develop robotic systems that interact with their environment at levels of autonomy beyond basic response to human command.

**Forensic Science**

**ST4501 Forensic Science I (Grade 11)**
2 pds/cycle – Fall Semester
.33 Credit

Forensic Science I will introduce students to the legal process, proper isolation and documentation of a crime scene. Students will also be introduced to the basics of collection, storage and analysis of physical evidence such as but not limited to fingerprinting, fiber analysis and blood residue that may be left at a crime scene.

**ST4502 Forensic Science II (Grade 11)**
2 pds/cycle – Spring Semester
.33 Credit

Forensic Science II builds upon the basic evidence collection and analysis skills from Forensic Science I to explore the evidence that can be provided by the human body. This will include an overview of serology, toxicology, and entomology.

**ST4503 Forensic Science III (Grade 12)**
2 pds/cycle – 2nd & 3rd Marking Period
.33 Credit

Forensic Science III further uses the evidence collection and analysis skills developed in Forensic Science II in order to introduce higher-level topics such as handwriting analysis, ballistics, arson, and criminal psychology.
ST7612 Global Marketing (Grade 11)
2pds/cycle – Fall Semester
.33 Credit

This course develops the knowledge and skills in students that are necessary when marketing products or services that have a universal demand. Marketing strategies will be explored in the process of identifying successful global product placement. Emphasis will be placed on the use of various technologies, including the use of social media as global marketing tools.

ST7613 Finance (Grade 11)
2pds/cycle – Spring Semester
.33 Credit

This course focuses on the use of investments to increase personal wealth. It emphasizes return on investing, liquidity, risk, and the importance of diversification. Units on the stock market, fixed-income investments, and mutual funds as forms of personal and corporate investment strategies are included.

ST7614 STEM, Inc. (Grade 12)
2pds/cycle – 2nd & 3rd Marking Period
.33 Credit

This course will develop students’ entrepreneurial skills as they create a profitable business in partnership with the Exton Chamber of Commerce. The course provides student support along the way by local businesses and corporations as students develop their own businesses and market plans. The course will explore additional facets of business including financial plans, budgets and personnel management. All proceeds generated from STEM, Inc. will be donated to a charity of the students’ choosing.

ST5631 Information Science, Services and Systems I (Grade 11)
2pds/cycle – Fall Semester
.33 Credit

Information Sciences, Services, and Systems I will introduce students to the IT development field with in-depth study in the roles of IT programmers, project managers, business analysts, and quality assurance engineers. Students will work to design software of the teacher/student’s choice. Students will each fill a role of the design process with the opportunity to work with students from other pathways to develop a software application for production.
**ST5632 Information Science, Services and Systems II (Grade 11)**
2pds/cycle – Spring Semester
.33 Credits

Information Sciences, Services, and Systems II will continue to build upon the skills learned as well as with the design process from Information Technology 1. Students will continue his/her work as a member of the design team with the opportunity to expand roles.

**ST5633 Information Science, Services and Systems III (Grade 12)**
2pds/cycle – 2nd & 3rd Marking Period
.33 Credits

Information Sciences, Services, and Systems III will be the culmination of the design process. This course will afford students the opportunity to finalize designs and develop a final product of the planned application.
Health & Medicine Pathway

Throughout the three semesters students will explore medical application of biotechnology, Anatomy & Physiology, genetics, cancer research, as well as microbiology and immunology.

**ST4521 Health and Medicine I (Grade 11)**
2 pds/cycle – Fall Semester
.33 Credit

Health and Medicine I will expand upon student’s knowledge of Biology to explore the medical applications of Biotechnology. Students will develop their critical thinking and research skills by examining the scientific method, what makes good science, and the current and potential use of Biotechnology in disease treatment and prevention. Students will also perform laboratories that use common molecular biology techniques and diagnostic tools.

**ST4522 Health and Medicine II (Grade 11)**
2 pds/cycle – Spring Semester
.33 Credit

Health and Medicine II will provide a structured overview in the areas of Anatomy, Physiology, and Genetics. Students will use case studies, peer reviewed papers, and short research projects to examine current diagnostics and treatments in these areas. They will also continue to develop their critical thinking and presentation skills by identifying a specific disease, thoroughly researching what is known, creating a research plan to address the issue, and communicating this plan to “colleagues.” Students will have the option of creating cross-curricular projects with students from other Pathways Academies. Students will also perform laboratories that use common molecular biology techniques and diagnostic tools.

**ST4523 Health and Medicine III (Grade 12)**
2 pds/cycle – 2nd & 3rd Marking Period
.33 Credit

Health and Medicine III will provide a structured overview in the areas of Cancer, Immunology, and Microbiology. Students will use case studies, peer reviewed papers, and short research projects to examine current diagnostics and treatments in these areas. They will have the opportunity to extend their project from H&M2 or create a new one. Students will also perform microbiology laboratories that use common molecular biology techniques and diagnostic tools.
ACADEMY OF BIOLOGICAL SCIENCE

Biotechnology Pathway

Throughout the three semesters students will explore Biotechnology and drug discovery, genetics, environmental sciences, genetic engineering, and microbiology.

**ST4511 Biotechnology I (Grade 11)**
2 pds/cycle – Fall Semester
.33 Credit

BioTechnology I is designed for students who are interested in biological or environmental research. This course will expand upon student’s knowledge of Biology to explore the expanding role of Biotechnology and Drug Discovery in modern society. Students will develop their critical thinking and research skills by examining the scientific method, what makes good science, and the ethical use of Biotechnology in scientific research and the development of new therapeutic drugs and treatments. They will also perform laboratories that use common molecular biology techniques and diagnostic tools.

**ST4512 Biotechnology II (Grade 11)**
2 pds/cycle – Spring Semester
.33 Credit

BioTechnology II will provide a specific and structured research based study of the areas of Genetics, Genetics Engineering, and Environmental Sciences. Students will use case studies, peer reviewed papers, and short research projects to examine current diagnostics and treatments in Genetics. They will learn about and discuss current environmental challenges and will delve deeper into the process of genetic engineering for use in cloning, gene therapy, and drug discovery by simulating the process that scientists use. Students will also continue to hone the critical thinking and presentation skills needed to identify and define a valid problem in a pathogenic or genetic disease, thoroughly research the science, develop a plan to create a novel solution, and communicate their plan to potential “investors.” They will also perform laboratories that use common molecular biology techniques and diagnostic tools.

**ST4513 Biotechnology III (Grade 12)**
2 pds/cycle – 2nd & 3rd Marking Period
.33 Credit

BioTechnology III will provide a specific and structured medically based study of the area of Microbiology and other topics of class interest. Students will use case studies, peer reviewed papers, and short research projects to examine the current level of research in these areas. They will have the opportunity to extend their project from Biotech 2 or create a new one. Students will also perform microbiology laboratories that use common molecular biology techniques and diagnostic tools.
ST7411 iMedia I (Grade 11)
2pds/cycle – Fall Semester
.33 Credit

This course will create many opportunities for our students interested in multimedia design. The course will explore environmental design of specific lighting, sound, and video production for a performance, event, or presentation. Areas of study include communicating ideas and stories through different media.

ST7412 iMedia II (Grade 11)
2pds/cycle – Spring Semester
.33 Credit

This course provides students with the opportunity to engineer recording and television sessions with live talent. The course examines the pre production work including script, storyboards, preparing budgets, and scheduling shoots to the post production process of cutting, rearranging and enhancing, adding sound effects, and music, as well as adding visual effects and titles.

ST7413 iMedia III (Grade 12)
2pds/cycle – 2nd & 3rd Marking Period
.33 Credit

This course will provide students with an opportunity to experience the design process with their own technology-based project. The project will begin with a problem of their choice. The course requires that students work in small groups, and investigate the research, practice, and theories that suggest causes of and ways to address problems through the lens of technology. The research will guide students in the development of an innovative idea that incorporates appropriate uses of technology (computers, smartphones, TV, game machines, etc.) as needed for the project’s targeted audience and context. The course will culminate with the testing and revising of student ideas, gathering of feedback, and preparing a final presentation to share their findings with the school community.
ST7416 Interactive Design I (Grade 11)
2pds/cycle – Fall Semester
.33 Credit

Interactive design is the practice of designing interactive digital products, environments, systems, and services. This course will encourage students to focus on synthesis and imagining on possibilities rather than merely on the current state of systems or processes. This course also challenges students to create meaningful relationships between people and the products and services that they use, from computers to mobile devices to appliances and beyond.

ST7417 Interactive Design II (Grade 11)
2pds/cycle – Spring Semester
.33 Credit

This interdisciplinary course will aid students in the construction of multimedia communication channels. This course incorporates the use of modern technologies with classic design principles to create an interactive, media-rich presence in the classroom and in projects. Utilizing web-authoring tools that allow for flexibility and creativity, the course provides students with the opportunity to gain an insight into target audience, technical limitations/capabilities and universal access as they follow a web development model.

ST7418 Interactive Design III (Grade 12)
2pds/cycle – 2nd & 3rd Marking Period
.33 Credit

Learn to write 2D and 3D games with minimal programming experience by harnessing the advanced 2D/3D graphics features of a gaming centric Integrated Development Environment! Game Design will give students the opportunity to gain development. Course topics will focus on working with data types and variables, implementing conditional logic, repeating statement execution using iteration structures, and organizing code logic using functions. Students will incorporate graphics, sound, and other multimedia elements in their games. As a culminating project, students will create self-contained executable games with the graphics and sound files stored inside the exe file, suitable for exporting to other platforms such as Windows, MAC, iOS (iPad, iPhone), and Android.
STEM PRACTICUM

Each Academy culminates in the senior year with an individualized STEM Practicum in which students participate in a career exploration, independent research project or a university-credited course. Below are the descriptions for Practicum options.

Career Exploration
Career Exploration is for students who wish to explore career opportunities in the STEM field of their choice that is not included in the traditional school curriculum. This program allows students to complete their academic requirements as well as participate in a career experience in their desired STEM field. Students may begin their Career Exploration as early as the end of their junior year. It is designed to help students simultaneously develop critical thinking while also gaining practical career skills. While participating in a Career Exploration, students will attend a partnership at an off-campus location in the community. This provides them with the opportunity to gain experience within our own community and make informed decisions regarding their future career choice in a specialized program to meet their individual needs.

Academy Independent Research Project
In conjunction with a faculty member, students who choose to complete an independent research project will select a specific topic for research in their areas of interest. A faculty member will serve as his/her advisor. This will include scheduling meeting times with the advisor, who, in turn, will assist in finding resources and opportunities for the execution of a defined project and define more completely the expectation for the quality of the final outcome that will serve as the basis for assessment of the independent research project.

Pathway College/University Course
Schedule Dependent upon Institution
College Credit to be Awarded by Institution
In partnership with local colleges/universities, the STEM Academy may offer students the opportunity to enroll in a college level course. Students participating in college coursework will receive college credit per the participating institution and Practicum recognition only. No credit for IB courses or other STEM courses will be awarded. The college establishes admittance and other criteria for participation. Students will be responsible for tuition, fees and course materials. Students should investigate the feasibility of credit transfers from partnering universities to the student’s post-high school university of choice. Each university has processes, procedures and practices for accepting credits from other universities.