# COURSE INFORMATION

**DATE:** September 2023
**SCHOOL:** Yeshiva High School of Ottawa
**DEPARTMENT HEAD:** N/A
**TEACHER:** Mr. Atef Morcous
**DEPARTMENT:** General Studies

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| **CURRICULUM POLICY DOCUMENT** | The Ontario Curriculum: Grades 11 and 12 – Science (2008, revised) | | |
| **COURSE TITLE** | Physics, Grade 12 | **COURSE CODE** | SPH4U |
| **PRE-REQUISITE** | Physics, Grade 11, University Preparation | **GRADE & TYPE** | Grade 12 University |
| **FULL YEAR / SEMESTER** | Semester | **CREDIT VALUE** | 1.0 |

**COURSE DESCRIPTION**

This course enables students to deepen their understanding of physics concepts and theories. Students will continue their exploration of energy transformations and the forces that affect motion, and will investigate electrical, gravitational, and magnetic fields and electromagnetic radiation. Students will also explore the wave nature of light, quantum mechanics, and special relativity. They will further develop their scientific investigation skills, learning, for example, how to analyse, qualitatively and quantitatively, data related to a variety of physics concepts and principles. Students will also consider the impact of technological applications of physics on society and the environment.

**UNIT DESCRIPTIONS:**

**UNIT 1 – FORCES AND MOTION: DYNAMICS** **TIME: 30 HOURS**

Students analyze the motions of objects in horizontal, vertical, and inclined planes, and predict and explain the motions by analyzing the forces acting on the objects. Opportunities are given to investigating motion in a plane using experiments and/or simulations. Students will analyze and solve problems involving forces acting on an object in linear, projectile, or circular motion using vectors, graphs and free-body diagrams and will analyze ways in which the study of forces relates to the development and use of technological devices, such as vehicles and sports equipment.

**UNIT 2 — ENERGY AND MOMENTUM** **TIME: 15 HOURS**

Students apply the concepts of work, energy, and momentum and the laws of conservation of energy and momentum for objects moving in two dimensions, and explain them in qualitative and quantitative terms. Students continue to investigate the laws of conservation of momentum and of energy (including elastic and inelastic collisions) through experiments or simulations, and analyze and solve problems involving these laws with the aid of vectors, graphs, and free-body diagrams. Analyzing and describing the application of the concepts of energy and momentum to the design and development of a wide range of collision and impact-absorbing devices used in everyday life.

| UNIT 3 — ELECTRIC, GRAVITATIONAL AND MAGNETIC FIELDS | TIME: 20 HOURS |
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| Students demonstrate an understanding of the concepts, principles and laws related to electric, gravitational, and magnetic forces and fields, and explain them in qualitative and quantitative terms, and conduct investigations and analyze and solve problems related to electric, gravitational and magnetic fields. Students will learn about the roles of evidence and theories in the development of scientific knowledge related to electric, gravitational, and magnetic fields. Student evaluate and describe the social and economic impact of technology developments related to the concept of fields. | |
| **UNIT 4 – THE WAVE LIGHT NATURE OF LIGHT** | **TIME: 25 HOURS** |
| In this unit, students demonstrate an understanding of the wave model of electromagnetic radiation and describe how it explains diffraction patterns, interference and polarization. Students perform experiments relating the wave model of light and technical applications of electromagnetic radiation to the phenomena of refraction, diffraction, interference and polarization. Students also analyze phenomena involving light and colour, and explain them in terms of the wave model of light, and explain how this model provides a basis for developing technological devices. | |
| **UNIT 5 – MATTER-ENERGY INTERFACE** | **TIME: 10 HOURS** |
| In this unit, students demonstrate an understanding of basic concepts of Einstein's special theory of relativity and of the development of models of matter, based on classical and early quantum mechanics, that involve an interface between matter and energy. Students interpret data to support scientific models of matter, and conduct thought experiments as a way of exploring abstract scientific ideas. Finally, students describe how the introduction of new conceptual models and theories can influence and change scientific though and lead to the development of new technologies. | |
| **UNIT — SUMMATIVE PERFORMANCE TASKS** | **TIME: 10 HOURS** |
| This course will include a summative project and a final exam, both including content from all units of the course. | |

| STUDENT EVALUATION CRITERIA | | | | |
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| **TERM – 70%** | | **FINAL – 30%** | | **FINAL REPORT CARD GRADE CALCULATION** |
| Knowledge/Understanding | 25% | Knowledge/Understanding | 25% | **TERM TOTAL + FINAL TOTAL = REPORT CARD MARK** |
| Inquiry/Thinking | 25% | Inquiry/Thinking | 25% | |
| Communication | 25% | COMMUNICATION | 25% | |
| Application | 25% | Application | 25% | |

| ASSESSMENT METHODS | | |
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| **OBSERVATIONS:** | **CONVERSATIONS:** | **PRODUCTS:** |
| ● Informal presentations<br>● Reading skills<br>● Writing process steps (graphic organizers, research notes, outlines, drafts, editing checklists)<br>● Listening and speaking skills<br>● Self-assessment<br>● Records of practice including checklists, anecdotal notes (homework, classroom contributions, metacognition charts, notetaking) | ● Peer feedback / editing<br>● Group work records<br>● Conferences (student- teacher, group)<br>● Classroom contributions<br>● Composition/ arrangements<br>● Response Journals | ● Review quizzes<br>● Unit tests<br>● Projects<br>● Oral presentations<br>● Assignments<br>● Summative tasks<br>● Final Examination (30%) |

| LEARNING SKILLS<br>Report Cards will include a letter grade for the following Learning Skills: | |
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| **INDEPENDENT WORK** | **The student:**<br>▪ accomplishes tasks independently<br>▪ accepts responsibility for accomplishing tasks<br>▪ follows instructions<br>▪ regularly completes assignments on time and with care<br>▪ uses time effectively |
| **COLLABORATION** | **The student:**<br>▪ works willingly and cooperatively with others<br>▪ listens attentively, without interrupting<br>▪ takes responsibility for his/her share of the work to be done<br>▪ helps to motivate others, encouraging them to participate<br>▪ shows respect for the ideas and opinions of others |
| **ORGANIZATION** | **The student:**<br>▪ organizes work when faced with a number of tasks<br>▪ devises and follows a coherent plan to complete a task<br>▪ demonstrates ability to organize and manage information<br>▪ follows an effective process for inquiry and research |
| **RESPONSIBILITY** | **The student:**<br>▪ completes homework on time and with care<br>▪ follows directions<br>▪ shows attention to detail<br>▪ perseveres with complex projects that require sustained effort<br>▪ applies effective study practices |
| **INITIATIVE** | **The student:**<br>▪ seeks out new opportunities for learning<br>▪ seeks necessary and additional information<br>▪ requires little prompting to complete a task,<br>▪ approaches new learning situations with confidence and a positive attitude<br>▪ seeks assistance when needed |
| **SELF-REGULATION** | **The student:**<br>▪ sets individual goals and monitors own progress<br>▪ seeks clarification or assistance when needed<br>▪ reflects and assesses critically own strengths, needs and interests<br>▪ perseveres and makes an effort when responding to challenges |

**NOTE:** The above chart is a reformatting of the skills identified in the Ministry of Education's ***Guide to the Provincial Report Card, Grades 9 – 12*** **:** ***Appendix C: pages 27 to 29*** .

| POLICIES AND PROCEDURES | |
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| **ATTENDANCE** | The Ontario Ministry of Education requires 110 hours of instruction for each course. As such, it is essential for the students to arrive punctually to each class.<br>Students arriving more than ten minutes late will be marked "Late" on their report card.<br>Students who are absent for an acceptable reason (see below) still have to make up the number of hours missed under the supervision of a teacher or the principal according to their availability. It is the student's duty to determine and arrange this supervision, and YHSO does not guarantee teacher's or principal's availability.<br><br>***Students who are absent for non-acceptable reasons will forfeit their credit.***<br><br>ACCEPTABLE REASONS FOR ABSENCE<br>• Medical reason (may require a physician's note)<br>• Family trips or special occasions (up to four missed classes per course)<br><br>Regardless of reason for an absence, if a student misses more than 26 classroom hours they will forfeit their credit. |
| **ASSIGNMENTS** | Students are responsible to complete all their assignments and homework on time. Teachers will write all assignments, homework and tests on a classroom board, along with their due dates, but students are accountable to complete these assessments punctually. ***Assignments handed in late may result in a deduction of marks.***<br>Teachers will post all assessments and assignments and their due dates on Google Classroom. Students and their parents will have access to the Google Classroom for their courses. |
| **BEHAVIOUR** | Students may not act in any manner that disrupts the education of another, or distracts a teacher. This includes:<br>• Excessive noise<br>• Physical disruptions<br>• Eating (unless granted individual permission)<br>• Use of technology not for schoolwork purposes<br>• Acts of disrespect such as name calling, abusive or offensive language or gestures<br>Failure to adhere to these rules will result in disciplinary action as described in the Student Handbook and Course Calendar. |
| **PLAGIARISM** | Academic integrity and honesty is expected from every student in Yeshiva High School of Ottawa. We take all instances of suspected dishonesty, plagiarism, or any form of "cheating" very seriously. A student who submits work that is, in whole or in part, plagiarized, will be subject to academic penalties. Repeated infractions may result in the loss of a credit and further disciplinary action. A student who assists another student in academic dishonesty may face academic consequences, including revocation of a credit. |