JMH Physics 112
Course Outline 2015 - 2016

Teacher: Mr. Peter MacDonald
Room 721
peter.macdonald3@nbed.nb.ca
http://jmh.nbed.nb.ca/teacher/mr-macdonald
YouTube: P. MacDonald (Lectures & Example Problems)
Twitter: @mrpmacdonald (Nerd stuff mainly)

Part I – Course Content

Unit 1: Introduction to Physics
- Problem Solving Models
- Mathematical Review
- Metric Units

Unit 2: Kinematics in 1D
- Position, Displacement and Velocity
- Acceleration
- Graphical Analysis
- Mathematical Analysis

Unit 3: Dynamics in 1D
- Types of Forces and FBDs
- Newton's Laws

Unit 4: Vector Graphical Analysis
- Vector problems in 2D.

Unit 5: Waves
- Properties & Wave Equation
- Transmission & Reflection
- Wave Interference

Unit 6: Vibrations and Sound
- Transmission and Speed
- Doppler Effect

Unit 7: Light & Optics
- Characteristics of Light
- Refraction
- Lenses
- Diffraction

Part II – Laboratory Projects

In groups of up to two, you will develop two of your own laboratory projects (where data will be collected and analyzed). Some class time will be given but working outside of class time will be necessary. More evaluation details and a timeline will be revealed in the near future.

Evaluation:*

Part I	55%
Part II	15%
Final Exam	30%

Materials:
Binder & Paper
USB Memory Stick
Scientific Calculator
Ruler/Protractor
Pen/Pencil

Additional Resources: http://jmh.nbed.nb.ca/teacher/note/digital-resources-fall-2015-courses-0

*Your overall grade will be evaluated twice: once with the lowest score dropped and again with no dropped mark but the exam will be marked lower than 100 to give a bonus. The method that gives you the highest grade will be your mark.

"…high schools face intense criticism from college educators, policymakers, education reformers, and the public for graduating a significant number of students who are not well prepared for college and do not possess needed technological and problem-solving skills to enter the workplace." – Physics Today, May 2002.

Focus on General Physics & Science Skills

Physics is the study of nature, of matter and energy and their interactions. Mastery of physics happens through the use of concepts and calculations. The ability to predict what will happen in nature given changes in certain quantities is conceptual and mathematics is the language used to communicate those concepts through calculations. The skills you will develop and strive for are summarized below, and in general they apply to all disciplines of science.

- **Proficiency in mathematics**
  - You don't need to know everything; however, strong equation solving, algebra, and graphing skills are a necessity.
  - Review skills needed for a particular problem.
- **Problem Solving & Scientific Reasoning**
  - The ability to apply logic reasoning to arrive at a solution.
  - Familiarity with the scientific method.
  - Study other science courses.
  - Science Fair participation.
  - Keep your brain sharp through logical activities (reading, puzzles, chess, video games with a problem solving element, etc.)
- **Technical Knowledge**
  - Become comfortable with computers (tablets, smartphones, etc.) and their software. That includes exposure and use of new computer programs frequently used in science and general strategies of how to learn any new computer program.
  - Strong emphasis on learning to use spreadsheet programs for problem solving/data analysis (Excel).
  - Basics of how machines and electronic devices work.
- **Excellent Study Habits**
  - Pay attention; stay focused – especially during the transition from lecture to class work.
  - Review notes and text daily (especially any new vocabulary and concepts).
  - YouTube videos while you work on similar problems.
  - Do assigned work.
  - Efficient use of time (nearly all assigned tasks can be completed in allotted class time).

Rethinking High School Physics/Science

- Deepen understanding and knowledge of Science and Mathematics.
- Contextual and conceptual understanding of Physics.
- Promote scientific inquiry/thinking and logic.
- Important Physics does not come from facts.
- Successfully problem-solve your way through unfamiliar situations.
- Stimulate student question generation.
- Accommodate student interests.
- Awareness and self-monitoring of learning.
- Go from a "hands-on" to a "minds-on" approach.