

NSTA Online Short Course: Force and Motion

Dates: Wednesdays, Jan. 30, Feb. 6, Feb. 13, Feb. 20, Feb. 27

Time: 8:00 p.m. to 9:30 p.m. Eastern time

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Welcome to the NSTA Online Short Course: Force and Motion. This short course will explore Newton's Laws and related applications, including Newton's law of gravitation. The online short course will be delivered to science teachers of students in grades 3-9, using interactions with a course instructor and moderator via five live web sessions, an asynchronous discussion listserv, and a number of electronic materials related to the topic of Force and Motion, such as: NSTA SciPack, NSTA SciGuide, two Journal articles, and the NSTA Press publication Stop Faking It!: Force and Motion written by Dr. William C. Robertson.

Course Materials:

- NSTA SciPack: Force and Motion
- NSTA SciGuide: Force and Motion
- Book: Stop Faking It: Force and Motion, by Dr. William C. Robertson
- Journal Articles about Force and Motion
- Live Web Sessions' presentation slides

Course work:

- At least one entry in the FORCES discussion listserv per week.
- Attendance at all five live web sessions (or, attendance at four web sessions, with additional participation in the listserv after viewing the web session archive).
- Completion of the Force and Motion SciPack and its final assessment.
- Pilot with students of a Force and Motion SciGuide lesson plan. One-page reflection paper required for those taking the course for credit.
- Completion of suggested readings from the Force and Motion book and related journal articles.

Short course participants spend, on average, thirty hours (30) completing the course requirements: Discussion listserv (5 hrs.), five web sessions (7.5 hrs.), SciPack (8 hrs.), SciGuide (3.5 hrs.). In addition, the average participant spends six (6) hours reading the Force and Motion book and related journal articles.

After successful (70% or higher) completion of the SciPack final assessment, all course participants receive a certificate from NSTA demonstrating understanding of the topic. Below is a description of the content covered in each of the live web sessions. On the right, note the reading assignments and the SciPacks' Science Objects that are recommended for each week.

Web Session Date	Topics	Assignments
January 30	Introduction <ul style="list-style-type: none"> • Physics and the Laws of Nature • Units of Length, Mass, and Time • Vectors: Position, Distance, and Displacement • Average Speed and Velocity • Instantaneous Velocity • Motion with Constant Acceleration 	Science Object on Position and Motion Participate in the FORCES listserv. Read Chapter 1.
February 6	Newton's First Law of Motion <ul style="list-style-type: none"> • Coin-in-glass experiment • Force definition and force addition • Newton's First Law of Motion • Inertia • Examples 	Science Object on Newton's 1 st law. Participate in the FORCES listserv. Read Chapter 2.
February 13	Newton's Second Law of Motion <ul style="list-style-type: none"> • Acceleration • Relations between acceleration, velocity, position, and time • Mass • Forces — Examples (gravity, magnetism, friction, contact forces vs. forces at a distance, etc.) • Examples 	Science Object on Newton's 2 nd law. Participate in the FORCES listserv. Read Chapters 3 and 4. Read journal article #1.
February 20	Newton's Third Law <ul style="list-style-type: none"> • Forces always occur in pairs • Examples (gravity, magnetism, friction, contact forces vs. forces at a distance, etc.) • Rockets 	Science Object on Newton's 3 rd law. Participate in the FORCES listserv. Read Chapters 4 and 5. Read journal article #2. Pilot SciGuide lesson plan with students.

<p>February 27</p>	<p>Newton's Law of Gravitation</p> <ul style="list-style-type: none"> • Weight • Falling Objects • Circular Motion • Centrifugal Force • Kepler's Laws of Orbital Motion • Galileo's Experiment (and how Newton's laws explain it!) • Examples (gravity from earth, planets; tides) 	<p>Complete the Final Assessment on the SciPack: Force and Motion</p> <p>Participate in the FORCES listserv.</p> <p>Read Chapters 5 and 7.</p> <p>Pilot SciGuide lesson plan with students.</p>
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