

Appendix C. Maryland Physics Expectation (MPEX) Survey

This section contains a list of the 34 MPEX Survey items and a copy of the scantron pre-course version of the survey form (v. 4.0). Note that the survey items on the scantron version are numbered 60-94 for use with scantron form NCS 4887.

The MPEX Survey items:

Note that individual items from this survey should not be used to evaluate individual students. On any single item, students may have atypical interpretations or special circumstances which make the “non-expert” answer the best answer for that student. Furthermore, students often think that they function in one fashion and actually behave differently. A more detailed observation is required to diagnose the difficulties of individual students. This survey is primarily intended to evaluate the impact of one or more semesters of instruction on an overall class. It can be used to illuminate some of the student reactions to instruction of a class that are not observable using traditional evaluations. In this context, it, together with evaluations of student learning of content, can be used as a guide for improving instruction. The numbers 1 to 5 represent a five point Likert scale where 1 = “strongly disagree” and 5 = “strongly agree.”

1	All I need to do to understand most of the basic ideas in this course is just read the text, work most of the problems, and/or pay close attention in class.	1 2 3 4 5
2	All I learn from a derivation or proof of a formula is that the formula obtained is valid and that it is OK to use it in problems.	1 2 3 4 5
3	I go over my class notes carefully to prepare for tests in this course.	1 2 3 4 5
4	Problem solving in physics basically means matching problems with facts or equations and then substituting values to get a number.	1 2 3 4 5
5	Learning physics made me change some of my ideas about how the physical world works.	1 2 3 4 5
6	I spend a lot of time figuring out and understanding at least some of the derivations or proofs given either in class or in the text.	1 2 3 4 5
7	I read the text in detail and work through many of the examples given there.	1 2 3 4 5
8	In this course, I do not expect to understand equations in an intuitive sense; they just have to be taken as givens.	1 2 3 4 5
9	The best way for me to learn physics is by solving many problems rather than by carefully analyzing a few in detail.	1 2 3 4 5

10	Physical laws have little relation to what I experience in the real world.	1 2 3 4 5
11	A good understanding of physics is necessary for me to achieve my career goals. A good grade in this course is not enough.	1 2 3 4 5
12	Knowledge in physics consists of many pieces of information each of which applies primarily to a specific situation.	1 2 3 4 5
13	My grade in this course is primarily determined by how familiar I am with the material. Insight or creativity has little to do with it.	1 2 3 4 5
14	Learning physics is a matter of acquiring knowledge that is specifically located in the laws, principles, and equations given in class and/or in the textbook.	1 2 3 4 5
15	In doing a physics problem, if my calculation gives a result that differs significantly from what I expect, I'd have to trust the calculation.	1 2 3 4 5
16	The derivations or proofs of equations in class or in the text have little to do with solving problems or with the skills I need to succeed in this course.	1 2 3 4 5
17	Only very few specially qualified people are capable of really understanding physics.	1 2 3 4 5
18	To understand physics, I sometimes think about my personal experiences and relate them to the topic being analyzed.	1 2 3 4 5
19	The most crucial thing in solving a physics problem is finding the right equation to use.	1 2 3 4 5
20	If I don't remember a particular equation needed for a problem in an exam there's nothing much I can do (legally!) to come up with it.	1 2 3 4 5
21	If I came up with two different approaches to a problem and they gave different answers, I would not worry about it; I would just choose the answer that seemed most reasonable. (Assume the answer is not in the back of the book.)	1 2 3 4 5
22	Physics is related to the real world and it sometimes helps to think about the connection, but it is rarely essential for what I have to do in this course.	1 2 3 4 5
23	The main skill I get out of this course is learning how to solve physics problems.	1 2 3 4 5
24	The results of an exam don't give me any useful guidance to improve my understanding of the course material. All the learning associated with an exam is in the studying I do before it takes place.	1 2 3 4 5
25	Learning physics helps me understand situations in my everyday life.	1 2 3 4 5
26	When I solve most exam or homework problems, I explicitly think about the concepts that underlie the problem.	1 2 3 4 5
27	Understanding physics basically means being able to recall something you've read or been shown.	1 2 3 4 5

28	Spending a lot of time (half an hour or more) working on a problem is a waste of time. If I don't make progress quickly, I'd be better off asking someone who knows more than I do.	1 2 3 4 5
29	A significant problem in this course is being able to memorize all the information I need to know.	1 2 3 4 5
30	The main skill I get out of this course is to learn how to reason logically about the physical world.	1 2 3 4 5
31	I use the mistakes I make on homework and on exam problems as clues to what I need to do to understand the material better.	1 2 3 4 5
32	To be able to use an equation in a problem (particularly in a problem that I haven't seen before), I need to know more than what each term in the equation represents.	1 2 3 4 5
33	It is possible to pass this course (get a "C" or better) without understanding physics very well.	1 2 3 4 5
34	Learning physics requires that I substantially rethink, restructure, and reorganize the information that I am given in class and/or in the text.	1 2 3 4 5

Introductory Physics Diagnostic Testing

Force Concept Inventory & MPEX Survey: Pre-Course

This diagnostic testing is to learn about what happens in introductory physics classes. The results will help us design materials to help us make this a better course. This testing is voluntary. The results will have no impact on your grade in this course. We do, however, appreciate your cooperation.

- Use a number 2 or H/HB pencil to fill out the scantron form.
- Fill in the bubbles completely.
- Erase completely any marks you made by mistake
- See marking instructions on side 2 of the scantron form if you have questions.

SIDE 1:

A. Fill out NAME and SEX in the spaces provided

B. For GRADE OR EDUC, please indicate which of the following Colleges or Universities you attend:

=> **0.) University of Maryland at College Park**

- 1.) University of Minnesota
- 2.) Ohio State University
- 4.) University of Maine
- 5.) Prince Georges Community College
- 6.) Joliet Junior College
- 7.) Dickinson College
- 8.) Moorhead State University
- 9.) Carroll College
- 10.) Skidmore College
- 11.) Forsyth Technical Community College
- 12.) Nebraska Wesleyan University
- 13.) Whittier College
- 14.) University of Northern Iowa
- 15.) Drury College

C. Write TODAY'S DATE. in the space marked "birth date".

D. Write your STUDENT IDENTIFICATION NUMBER in the space marked "identification number". The first digit of your student ID number should go in box A.

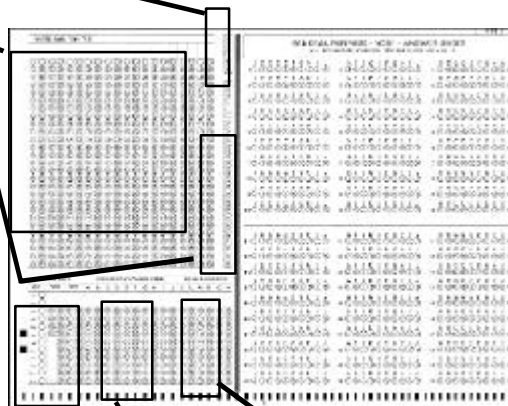
E. For SPECIAL CODES:

K and L.) What is your age? Example: If you are 20 K => 2, L => 0.

M.) Where is this course in the sequence? Most of the classes we survey are part of a multiterm introductory physics sequence. Is this class

- 1.) first term.
- 2.) second term.
- 3.) third term.
- 4.) fourth term.

N, O, and P.) This is a code to determine which professor teaches your class and what discussion section you are in (where applicable). The code should be on a sheet given to you or provided by the instructor administering this diagnostic. For UMCP students for example, use the last 3 digits of your section number.



The Force Concept Inventory

If you are doing the Force Concept Inventory (FCI) with the survey, you will be given the FCI on a separate handout. It uses items 1-30. If you are not taking the FCI now, skip down to the next section and begin with item 31.

If you are doing the FCI, fill in items 1-30 on the right half of side 1 of your scantron sheet as follows:

Fill in the answers to questions 1-30 on the FCI in the bubbles numbered 1-30.

Example:

- 1.) Answer FCI question 1.

When you are done with the FCI return here, go down to the next section, and begin with item 31.

Your Background

We use items 31-60 to help us understand your background.

Place the answer for each item in the correspondingly numbered set of bubbles.

What is you major? Choose from among the items in the lists 31-35.

If you are undecided, choose 35g. If you are a double major, choose your primary major.

- 31.) Engineering
 - a) Aerospace Engineering
 - b) Agricultural Engineering
 - c) Civil Engineering
 - d) Chemical Engineering
 - e) Electrical Engineering
 - f) Fire Protection Engineering
 - g) Engineering Materials
 - h) Mechanical Engineering
 - i) Nuclear Engineering
 - j) Other Engineering
- 32.) Physical Science
 - a) Physics
 - b) Chemistry
 - c) Mathematics/Statistics
 - d) Astronomy
 - e) Meteorology
 - f) Geology
 - h) Chemical Physics
 - i) Other Physical Science
- 33.) Biological Sciences
 - a) Biology
 - b) Botany
 - c) Marine Biology
 - d) Biochemistry
 - e) Marine/Environmental Science
 - f) Agronomy
 - g) Animal Science
 - h) Zoology/Entomology
 - i) Pre-med/Pre-vet
 - j) Other Biological Science
- 34.) Applied
 - a) Computer Science
 - b) Telecommunications
 - c) Business, Management, and Accounting
 - d) Architecture
 - e) Journalism
 - f) Kinesiology
 - g) Health, Nutrition, and Food Science
 - h) Systems Analysis/Engineering
 - i) Computer/Software engineering
 - g) Pre-Law
- 35.) Other
 - a) Philosophy
 - b) Other Humanities
 - c) Social Science
 - d) Music/Performing Art
 - e) Art
 - f) Education
 - g) Undecided
 - h.) None of the majors listed

- 36.) Have you taken a physics course before? (Select only one of the following.)
- a) Yes, in high school
 - b) Yes, in another college/university
 - c) Yes, both in high school and another college/university
 - d) Yes, in this college/university
 - e) Yes, in high school and this college university
 - f) No, this is my first physics course
- 37.) Are you repeating this course?
- a.) Yes, at this college/university.
 - b) Yes, at another college/university
 - c.) No.

Answer 38, 39, & 40 only if you have taken a physics course before.

- 38.) Did you feel it was a good course?
- a) yes
 - b) no
 - c) so-so
- 39.) Did you feel you did well in that course?
- a) yes
 - b) no
 - c) so-so
- 40.) When did you take it?
- a) this year
 - b) last year
 - c) two years ago
 - d) three years ago
 - e) four years ago
 - f) five years ago
 - g) more than five years ago
- 41.) What was the last math class you completed prior to taking this course?
- a) first year Algebra
 - b) Geometry
 - c) second year Algebra
 - d) Trigonometry/Math Analysis
 - e) first semester Calculus
 - f.) second semester Calculus
 - g) third semester Calculus
 - h) Other
- 42.) When did you take it ?
- a) this year
 - b) last year
 - c) two years ago
 - d) three years ago
 - c) four years ago
 - f) five years ago
 - g) more than five years ago
- 43.) Did you take calculus in high school?
- a) yes
 - b) no

For 44 & 45, use the following responses

- | | |
|---------------|------------------------|
| a.) 0 hours | f.) 9-10 hours |
| b.) 1-2 hours | g.) 11- 12 hours |
| c.) 3-4 hours | h.) 13-14 hours |
| d.) 5-6 hours | i.) 15-16 hours |
| e.) 7-8 hours | j.) more than 16 hours |

44.) The number of hours per week I plan to spend reading, studying, and doing homework for this course(not counting time in labs, writing lab reports, and reviewing for exams) is about: _____

45.) The number of hours I plan to spend preparing for an exam in this course is about: _____

46.) I plan to work with others _____ of the total time I plan to spend on physics outside of class (excluding labs).

- | | |
|----------|-----------|
| a.) 0 % | f.) 50 % |
| b.) 10 % | g.) 60 % |
| c.) 20 % | h.) 75 % |
| d.) 30 % | i.) 90 % |
| e.) 40 % | j.) 100 % |

For the list of skills below in 47 - 58, rate some of your relevant abilities using the following scale:

A = Excellent	B = Good	C = Average	D = Weak	E = Poor	F = Can't say
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- 47.) Understanding physics textbooks
- 48.) Understanding physics lectures (if you had them)
- 49.) Understanding experiments and demonstrations
- 50.) Taking tests
- 51.) Laboratory skills
- 52.) Solving homework problems on your own
- 53.) Expressing yourself clearly in writing
- 54.) Convincing others of your point of view
- 55.) Algebra
- 56.) Trigonometry
- 57.) Calculus
- 58.) Vectors

PLEASE SKIP ITEMS 59 & 60 AND CONTINUE WITH THE MPEX SURVEY ON THE NEXT TWO PAGES.

SIDE 2: MPEX Survey

TURN THE SCANTRON ANSWER SHEET OVER AND START WITH NUMBER 61.

Here are 35 statements (Items 60 - 95) which may or may not describe your beliefs about this course. You are asked to rate each statement by circling a number between A and E where the letters mean the following:

A: Strongly Disagree	B: Disagree	C: Neutral	D: Agree	E: Strongly Agree
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Answer the questions by circling the number that best expresses your feeling. Work quickly. Don't over-elaborate the meaning of each statement. They are meant to be taken as straightforward and simple. If you do not understand a statement, leave it blank. If you understand, but have no strong opinion one way or the other, circle C. If an item combines two statements and you disagree with either one, choose A or B.

- 61.) All I need to do to understand most of the basic ideas in this course is just read the text, work most of the problems, and/or pay close attention in class.
- 62.) All I learn from a derivation or proof of a formula is that the formula obtained is valid and that it is OK to use it in problems.
- 63.) I plan to go over my class notes carefully to prepare for tests in this course.
- 64.) "Problem solving" in physics basically means matching problems with facts or equations and then substituting values to get a number.
- 65.) Learning physics will make me change some of my ideas about how the physical world works.
- 66.) I expect to spend a lot of time figuring out and understanding at least some of the derivations or proofs given either in class or in the text.
- 67.) I plan to read the text in detail and work through many of the examples given there.
- 68.) In this course, I do not expect to understand equations in an intuitive sense; they just have to be taken as givens.
- 69.) The best way for me to learn physics is by solving many problems rather than by carefully analyzing a few in detail.
- 70.) Physical laws have little relation to what I experience in the real world.
- 71.) A good understanding of physics is necessary for me to achieve my career goals. A good grade in this course is not enough.
- 72.) Knowledge in physics consists of many pieces of information each of which applies primarily to a specific situation.
- 73.) My grade in this course will be primarily determined by how familiar I am with the material. Insight or creativity will have little to do with it.
- 74.) Learning physics is a matter of acquiring new knowledge that is specifically located in the laws, principles, and equations given in class and/or in the textbook.

- 75.) In doing a physics problem, if my calculation gives a result that differs significantly from what I expect, I'd have to trust the calculation.

A: Strongly Disagree	B: Disagree	C: Neutral	D: Agree	E: Strongly Agree
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- 76.) The derivations or proofs of equations in class or in the text has little to do with solving problems or with the skills I will need to succeed in this course.
- 77.) Only very few specially qualified people are capable of really understanding physics.
- 78.) To understand physics, I expect to think about my personal experiences and relate them to the topic being analyzed.
- 79.) The most crucial thing in solving a physics problem is finding the right equation to use.
- 80.) If I didn't remember a particular equation needed for a problem in an exam there is nothing much I could do (legally!) to come up with it.
- 81.) If I came up with two different approaches to a problem and they gave different answers, I would not worry about it; I would just choose the answer that seemed most reasonable. (Assume the answer is not in the back of the book.)
- 82.) Physics is related to the real world and it sometimes helps to think about the connection, but it is rarely essential for what I will have to do in this course.
- 83.) The main skill I expect to get out of this course is learning how to solve physics problems.
- 84.) The results of an exam won't give me any useful guidance to improve my understanding of the course material. All the learning associated with an exam will be in the studying I do before it takes place.
- 85.) Learning physics helps or will help me understand situations in my everyday life.
- 86.) When I solve most exam or homework problems, I explicitly think about the concepts that underlie the problems.
- 87.) "Understanding" physics basically means being able to recall something you've read or been shown.
- 88.) Spending a lot of time (half an hour or more) working on a problem is a waste of time. If I don't make progress quickly, I am better off asking someone who knows more than I do.
- 89.) A significant problem in this course will be being able to memorize all the information I need to know.
- 90.) The main skill I expect to get out of this course is to learn how to reason logically about the physical world.
- 91.) I will use the mistakes I make on homework and on exam problems as clues to what I need to do to understand the material better.
- 92.) To be able to use an equation in a problem (particularly a problem that I haven't seen before), I need to know more than what each term in the equation represents.
- 93.) It is possible to pass this course (get a "C" or better) without understanding physics very well.
- 94.) Learning physics requires that I substantially rethink, restructure, and reorganize the information that I am given in class and/or the text.

