

Transition from High School to University Physics- 2006 Academic Year

Introduction

This report is based on final marks in first year physics courses at UBC, for the first term (September-December 2006). The study includes only students who graduated from Canadian high schools in 2006. Students must also have Physics 12 or Physics 11 requirements fulfilled. As a result, the sample used in this study represents about 67% of the total number of students enrolled in UBC first year physics courses in the Fall of 2006. This sample is useful for studying the transition from BC high schools to university.

Following the initiative started by the UBC Mathematics Department (First Year Calculus Results), the report will compare students' participation and performance in UBC Physics courses by region, school and gender. Since the largest proportion of students graduated from B.C. high schools (93.7%), findings are significant at the provincial level. The 2006 high school graduates from Alberta (2.5%) and Ontario (2.5%) enrolled in UBC first year physics courses are also included in the comparative analysis. About 1% of students who graduated from other provinces across Canada are not included in the analysis.

Significance of the Ranking

The ranking is intended to measure the success, in first year physics at UBC, of graduates from different high schools. Students who take physics at UBC are mainly in the Faculties of Science and Applied Science. The ranking is based on the percentage of students who passed and the percentage who received an A, as well as by how much the average mark drops in going from high school to university. Since UBC admission is primarily based on high school grades, students from all schools should have about the same average high school marks when they enter the university. Therefore good performance at UBC in terms of the number of students with A's and the number passing will be reflected in a small decline in marks between high school and university. This means that a school with a high percentage of graduates passing and with A's at UBC, is likely to show a smaller decline in marks between high school and university.

Five Year Summary

In this report we include for the first time a ranking of BC schools, based on data for the past five years (2002-2006). This information is included in the last section.

First Year UBC Physics courses (Term I)

A. UBC Physics courses with Mathematics 12 & Physics 12 requirements.

PHYSICS 101: Energy and Waves (combined lecture/lab course).

PHYSICS 107: Physics I.

PHYSICS 109: Introductory to Experimental Physics (lab course).

PHYSICS 153: Elements of Physics (this is a two-term course; only first term results are included in the analysis; the first term is a lecture course only)

NOTE: Since PHYS 107&109 are derived from PHYS 121, an Honours course that was offered in the past, data for these two courses will be combined. Results can be compared to previous years' results on PHYS 121 (2000-2001) or PHYS 107&109 (2002-2005). Most students (84%) enrolled in both PHYS 107 & 109 and in this case, their average grades are included in analysis. PHYS 107 grades are considered for students who enrolled only in the lecture course, while there are no students who enrolled only in PHYS 109.

B. UBC Physics course with Mathematics 12 & Physics 11 requirements.

PHYSICS 100: Introductory Physics.

Enrolment and performance in UBC first year physics courses (Term I)

(includes students from the 2006 graduating classes of Canadian high schools with Physics 12 or Physics 11 requirement provided, only)

- **Table IA** compares performance for each course based on high school Physics 12. For each course, the average Physics 12 and UBC course grades are given.
- **Table IB** shows performance in PHYS 100. Physics 11 and PHYS 100 average grades are given.
- **Graph IA-B** shows the distribution of grades in all UBC vs. high-school physics courses.

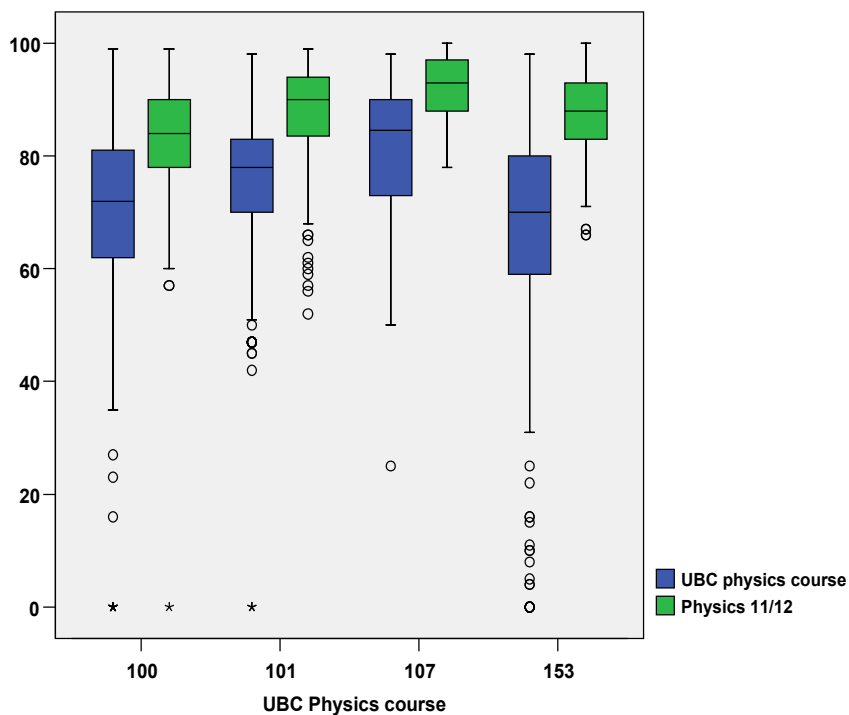
Table IA Performance in courses with Physics 12 requirement (2005 results in brackets)

UBC Physics Course	Number of students	Percentage passing	Percentage with A standing	Average school mark → Average UBC mark
101	567 (535)	96 (93)	45 (38)	88 → 76 (86 → 74)
107	36 (46)	97 (94)	67 (59)	92 → 81 (93 → 77)
153	555 (449)	84 (90)	28 (32)	88 → 68 (88 → 71)
ALL	1158 (1030)	90 (91)	37 (36)	88 → 72 (87 → 73)

Table IB Overall Performance - Physics 11 requirement (2005 results in brackets)

UBC Physics Course	Number of students	Percentage passing	Percentage with A standing	Average school mark → Average UBC mark
100	372 (341)	88 (89)	30 (47)	83 → 71 (83 → 76)

Graph I A-B: Distribution of marks in UBC and high-school physics courses



Note: The clustered box plots offer summaries of values for separate variables. Each box contains 50% of cases and the line across the box indicates the median. The whiskers are lines that extend from the box to the highest and lowest values, excluding the outliers (cases with values between 1.5 and 3 box lengths from the upper or lower edge of the box) and extremes (values more than 3 box lengths from the box).

UBC Physics courses by gender

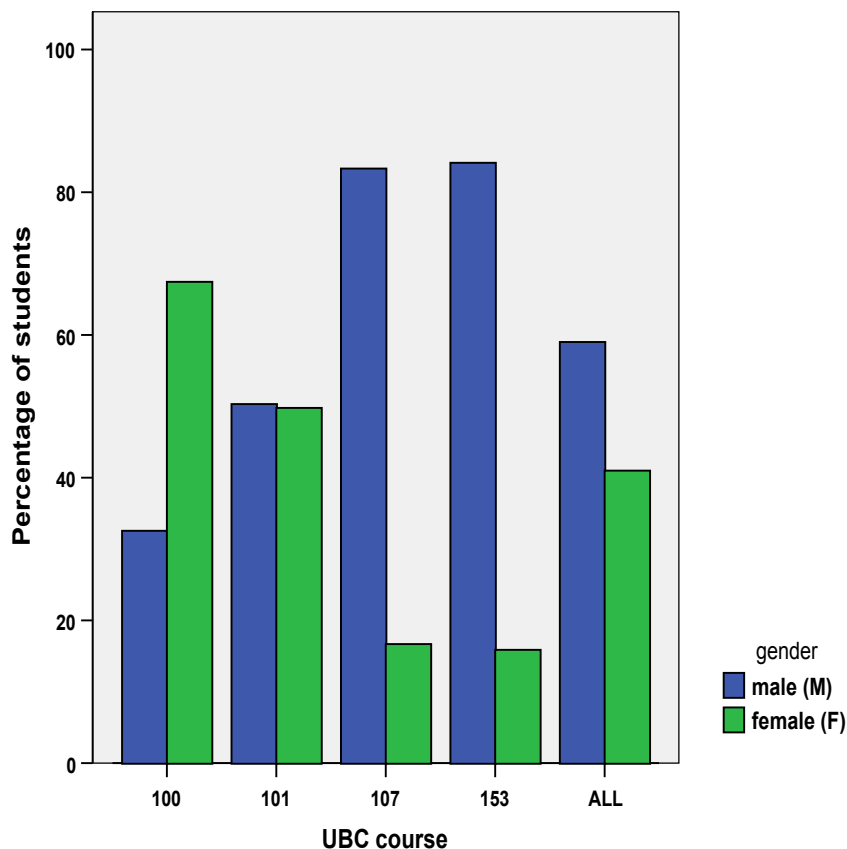
(includes students from the 2006 graduating classes of Canadian high schools with Physics12 or Physics11 grades provided)

Table IC Gender (2005 results in brackets)

UBC Physics Course	Gender	Number of students	Percentage passing	Percentage with A standing	Average school mark → Average UBC mark
100	male	121 (113)	89 (89)	34 (55)	82 → 72 (81 → 77)
	female	251 (228)	87 (89)	28 (43)	84 → 70 (84 → 75)
101	male	285 (293)	97 (92)	52 (42)	88 → 77 (87 → 74)
	female	282 (242)	94 (93)	38 (34)	87 → 74 (86 → 73)
107	male	30 (34)	97 (91)	63 (53)	92 → 80 (93 → 76)
	female ^a	6 (12)	100 (100)	83 (75)	91 → 84 (94 → 80)
153	male	467 (376)	85 (89)	28 (32)	88 → 69 (88 → 71)
	female	88 (73)	81 (90)	26 (30)	87 → 68 (87 → 71)

^a Due to the small size of this group, results should be interpreted with caution.

Graph IC: Gender representation in UBC physics courses



Note: There is no significant statistical difference between male and female students’ performance in the Physics courses. However, gender is a factor that introduces a significant difference in course participation for PHYS 100 (ratio M:F about 1:2), PHYS 107 (ratio M:F about 5:1) and PHYS 153 (ratio M:F about 5:1).

Comparison by region and school type

(includes students from the 2006 graduating classes of BC high schools with Physics12 or Physics11 requirement)

Table II compares results by region and school type, cumulating data for courses with Physics 12 requirement, i.e. PHYS 101, PHYS 107/PHYS 109, PHYS 153, currently included in Group A. The B.C. schools identified by region are public schools. Private and Catholic schools from all over the province form two separate groups. Vancouver schools are grouped in Vancouver east and Vancouver west. Suburban Vancouver includes Burnaby, Langley, New Westminster, Maple Ridge, Surrey, Coquitlam, Delta, North Vancouver, West Vancouver, and Richmond school districts. Vancouver Island, B. C. Interior schools and students from other provinces are grouped separately. For comparison, Ontario and Alberta high school students are included in the ranking. Only regions with at least **25** students in UBC physics courses from Group A are “ranked”.

Table II Region and School Type (2005 results in brackets)

School Type or Region	Students in Group A courses	% Passing	% with A Standing	Avg. school mark → Avg. UBC mark	% stud in Group A courses
1. West Vancouver (12)	29 (32)	100 (81)	45 (34)	86 → 77 (86 → 70)	74 (71)
2. Vancouver east (2)	120 (119)	94 (92)	45 (45)	85 → 76 (85 → 75)	63 (65)
3. Vancouver west (5)	137 (110)	94 (91)	48 (40)	88 → 75 (88 → 73)	74 (75)
4. Richmond (1)	133 (127)	95 (95)	43 (46)	89 → 76 (87 → 76)	78 (78)
4. Burnaby (3)	116 (185)	95 (92)	41 (41)	86 → 75 (85 → 74)	79 (73)
6. North Vancouver (4)	33 (36)	97 (97)	33 (33)	87 → 72 (87 → 74)	72 (67)
7. Delta (6)	36 (38)	92 (92)	39 (39)	89 → 73 (89 → 72)	90 (73)
8. Private (9)	47 (52)	87 (88)	40 (31)	88 → 72 (88 → 72)	70 (85)
9. Coquitlam (10)	111 (79)	87 (90)	37 (29)	90 → 72 (88 → 71)	85 (85)
9. Vancouver Is. (7)	27 (30)	89 (87)	30 (37)	88 → 73 (90 → 73)	71 (75)
12. Catholic (9)	50 (32)	90 (88)	28 (31)	86 → 70 (87 → 71)	67 (63)
13. B. C. Interior (7)	68 (58)	85 (90)	37 (33)	90 → 70 (88 → 71)	79 (76)
13. Surrey (13)	96 (103)	83 (91)	33 (23)	88 → 69 (87 → 70)	70 (79)
Alberta	38 (35)	89(100)	34 (51)	NA→72 (NA→78)	97 (85)
Ontario	27 (29)	78 (97)	22 (24)	NA→67 (NA→71)	71 (81)

Ranking procedure

The ranking is based ONLY on students' participation in Group "A" courses (courses with Physics 12 requirement: PHYS 101, PHYS 107/PHYS 109, PHYS 153).

The ranking is determined by equally weighting ranks in the categories:

- % passing in Group A courses
- % with A standing (A-, A, A+) in these courses
- the relative change of average grades in high school vs. UBC Physics courses.

High values of % passing, % with A standing, as well as small variation in grades would contribute to higher ranks. Regions or schools are first ranked in each category (a-c) and then a total rank is computed.

Tables also show the % of students in Group A courses vs. total number of students in UBC physics courses. These data are not considered in ranking, but provide additional information about students' course choice.

School-by-school results

The school-by-school Tables (III, IV, V) include ranking of schools with at least 10 students in UBC physics courses with Physics 12 requirement (PHYS 101, PHYS 107/PHYS 109, PHYS 153) in September 2006. Results are organized in three tables: Vancouver schools, Suburban Vancouver schools and B. C. schools outside Metropolitan Vancouver. Schools outside Metropolitan Vancouver (Table V) are not ranked, since the number of students was too small (results given in alphabetical order).

Ranking procedure

The ranking is based ONLY on students' participation in Group "A" courses (courses with Physics 12 requirement: PHYS 101, PHYS 107/PHYS 109, PHYS 153).

The ranking is determined by equally weighting ranks in the categories:

- % passing in Group A courses
- % with A standing (A-, A, A+) in these courses
- the relative change of average grades in high school vs. UBC Physics courses.

High values of % passing, % with A standing, as well as small variation in grades would contribute to higher ranks. Regions or schools are first ranked in each category (a-c) and then a total rank is computed.

Tables also show the % of students in Group A courses vs. total number of students in UBC physics courses. These data are not considered in ranking, but provide additional information about students' course choice.

Table III Vancouver Schools (2005 results in brackets)

School	Students in Group A courses	% Passing	% with A Standing	Avg. school mark → Avg. UBC mark	% stud. in Group A courses
1. Eric Hamber (7)	25 (16)	100 (94)	72 (44)	89 → 81 (86 → 75)	63 (70)
2. Winston Churchill (8)	30 (22)	100 (91)	37 (32)	81 → 76 (84 → 70)	53 (49)
2. Gladstone (2)	10 (11)	100(100)	40 (45)	83 → 76 (87 → 79)	53 (73)
2. Kitsilano (11)	16 (14)	94 (86)	56 (36)	87 → 79 (87 → 68)	89 (70)
5. Lord Byng (6)	15 (17)	100(100)	53 (47)	90 → 77 (90 → 77)	75 (81)
6. Killarney (4)	32 (27)	91 (89)	56 (52)	86 → 76 (85 → 76)	78 (79)
7. David Thompson (2)	14 (18)	93(100)	50 (44)	89 → 77 (84 → 77)	74 (69)
8. University Hill (5)	18 (18)	100(94)	33 (50)	86 → 72 (87 → 75)	95 (100)
9. Point Grey (8)	21 (11)	95 (91)	33 (36)	88 → 73 (87 → 73)	70 (65)
10. Vancouver Tech	10	90	40	83 → 68	62
11. Magee (8)	21 (16)	86 (88)	48 (44)	88 → 73 (87 → 74)	72 (73)
12. Prince of Wales (12)	20 (16)	85 (88)	40 (19)	88 → 69 (89 → 68)	74 (67)
13. Vancouver College	13	85	31	84 → 69	68

Table IV Lower Mainland Not Including Vancouver (2005 results in brackets)

School	Students in Group A courses	% Passing	% with A Standing	Avg. school mark → Avg. UBC mark	% students in Group A courses
1. Richmond (1)	20 (25)	100(100)	70 (72)	90 → 83 (85 → 82)	57 (86)
2. Moscrop	10	100	50	84 → 81	77
2. West Vancouver (5)	17 (15)	100 (93)	53 (47)	86 → 79 (87 → 77)	81 (75)
4. Hugh Boyd	10	90	30	85 → 75	71
5. Charles London (9)	14 (16)	100(100)	50 (38)	92 → 79 (90 → 75)	82 (70)

6. Burnaby North (7)	43 (21)	95 (90)	47 (43)	88 → 75 (87 → 74)	91 (81)
7. Charles Best	10	90	60	90 → 77	100
8. Seaquam (4)	14 (11)	86 (91)	50 (82)	86 → 76 (91 → 80)	100 (73)
8. Steveston (16)	18 (20)	100 (80)	44 (40)	89 → 76 (85 → 70)	100 (91)
8. Carson Graham	10	90	30	86 → 68	77
11. Burnaby South (13)	29 (29)	100 (86)	38 (34)	88 → 75 (83 → 73)	66 (88)
12. Burnaby Central (6)	11 (13)	91 (100)	45 (38)	88 → 73 (85 → 73)	79 (59)
12. Fraser Heights (21)	10 (14)	90 (86)	50 (21)	90 → 73 (88 → 68)	77 (100)
14. Semiahmoo Sr. (10)	13 (25)	92 (92)	38 (36)	88 → 73 (87 → 74)	76 (96)
14. Hugh McRoberts (3)	11 (10)	91(100)	45 (50)	91 → 73 (89 → 78)	92 (63)
16. Riverside	11	100	36	91 → 73	92
17. Port Moody (22)	24 (17)	92 (82)	29 (18)	87 → 73 (85 → 69)	80 (85)
17. Centennial (18)	23 (20)	91 (90)	43 (30)	91 → 72 (89 → 72)	85 (91)
19. J. N. Burnett (17)	29 (22)	90 (95)	38 (23)	92 → 74 (90 → 73)	83 (90)
20. Gleneagle	10	100	20	91 → 72	77
21. Burnaby Mountain	10	80	20	79 → 66	71
22. Elgin Park (19)	11 (11)	82 (100)	27 (9)	85 → 68 (87 → 68)	85 (79)
23. Pinetree (10)	24 (16)	71 (100)	38 (31)	89 → 69 (87 → 75)	83 (65)
24. North Surrey	10	80	20	87 → 67	100

Table V Schools Outside Vancouver Area- (alphabetical order)

School	Students in Group A courses	% Passing	% with A Standing	Avg. school mark → Avg. UBC mark	% in Group A courses
Mount Douglas	6	67	33	89 → 69	86
St. Michaels Univ. School	7	100	57	93 → 79	100
W. J. Mouat	8	75	13	83 → 60	89
Yale Senior	7	71	57	92 → 61	100

Five year Summary 2002-2006

In the next table (Table VI) we rank all the BC schools with more than 20 students in group A first year physics courses, using the aggregate data from the past five years (2002-2006). A number of schools with relatively small numbers of students enrolled in first year physics courses each year, now meet the threshold for ranking. In the five year summary, two inner city Vancouver schools and a Richmond school – Templeton, Richmond Secondary and Windemere – take the top three places. In addition there are enough students from several private and catholic schools, for them to be included on the list as well.

Although the average school grades are similar for all the schools, consistent with the fact that UBC uses high school grades to make admission decisions, the average UBC grades for students from one of the eight schools at the top of the list is B+ (78%) while the average grade for students from one of the eight schools at the bottom of the list is C+ (67%), a full letter grade lower.

Table VI Five year Average - Schools with more than 20 students in group A courses (2002-2006)

Rank / School	Students in UBC physics courses req. grade 12	% Passing	% with A standing	School mark→ UBC mark	% Students in UBC physics courses req. grade 12
1. Templeton	45	100	58	91→81	98
1. Richmond	127	99	56	86→78	79
3. Windermere	45	96	60	88→79	76
4. Earl Marriott	26	92	65	89→79	65
4. Eric Hamber	107	96	53	87→77	63
6. Sutherland	21	95	57	91→79	68
7. Hugh McRoberts	50	98	52	90→76	72
8. Killarney	119	93	52	86→76	79
9. Robert A McMath	57	96	46	88→77	79
9. Sir Winston Churchill	161	96	42	83→76	59
11. Lord Byng	71	96	49	90→75	82
11. West Vancouver	70	96	46	88→77	81
11. Burnaby Central	57	95	46	86→75	70
11. University Hill	82	99	43	88→76	89
15. Kitsilano	60	93	50	88→75	77
15. Penticton	23	96	48	91→76	85
15. Moscrop	48	96	38	83→77	68
18. Handsworth	51	96	45	90→77	78
18. Little Flower Academy	23	96	43	87→75	33
18. Sir Charles Tupper	21	95	43	86→75	55
18. R.C. Palmer	47	96	38	82→74	81
22. Argyle	48	96	42	88→76	75
23. Terry Fox Senior	49	92	51	91→74	83
23. Cambie	36	94	39	85→76	64
25. Seaquam	73	90	48	88→74	80
25. Charles London	67	97	42	90→75	74
25. David Thompson	85	96	38	86→75	73
28. St. George's	41	93	44	87→73	77
28. Burnaby Mountain	39	92	44	85→72	75
28. Kelowna Senior	24	96	42	90→76	100
31. Burnaby North	147	95	39	88→75	84
31, Britannia	21	100	33	84→71	64
33. Hugh Boyd	38	92	42	89→76	70
33. Semiahmoo Senior	81	91	42	87→75	88
35. Magee	80	93	40	88→74	75
35. Carson Graham	50	96	38	89→74	74
37. North Delta	56	95	38	90→75	66
38. New Westminster	42	95	40	91→73	70

38. Steveston	102	92	40	89→74	82
38. Burnaby South	145	91	39	87→74	79
41. Riverside	34	88	47	91→73	85
41. Matthew McNair	37	95	30	84→74	71
43. J.N. Burnett	114	94	37	90→74	84
43. Prince of Wales	109	94	36	89→73	72
43. Port Moody	122	93	36	87→74	82
43. Delta Senior	44	100	32	91→73	88
47. Point Grey	83	94	35	89→74	72
47. Alpha	37	95	32	87→73	80
49. Yale Senior	25	80	40	81→69	83
49. Tamanawis	30	97	27	88→74	71
51. Gladstone	55	95	27	87→73	67
52. Rockridge	27	93	33	88→70	87
53. Centennial	101	92	36	91→73	86
53. Fleetwood Park	33	91	33	88→72	77
55. Pinetree	86	86	38	88→72	77
55. Gleneagle	62	95	31	90→71	89
57. Sentinel	55	93	25	87→73	74
58. Cariboo Hill	20	90	30	86→69	87
59. Johnston Heights	42	86	36	90→71	86
59. Charles Best	36	94	25	89→71	97
61. Elgin Park	40	93	25	87→70	80
62. Vancouver College	42	86	29	86→72	66
63. W. J. Mouat	23	91	26	88→68	82
63. North Surrey	27	89	26	89→71	82
65. St. Michaels U. School	24	83	29	87→70	96
65. Vancouver Technical	48	88	21	83→69	67
65. Enver Creek	30	93	20	85→66	58
68. Princess Margaret	30	87	27	89→69	47
69. Fraser Heights	47	87	23	88→69	84
70. South Delta	35	89	20	87→67	73
71. Walnut Grove	26	88	8	87→67	79
72. Dover Bay	21	86	14	88→66	75
73. Guildford Park	22	73	23	89→65	85
Western Canada High Sch.	26	96	50	NA→77	100