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Hybrid Learning in a Canadian College Environment – Appendix

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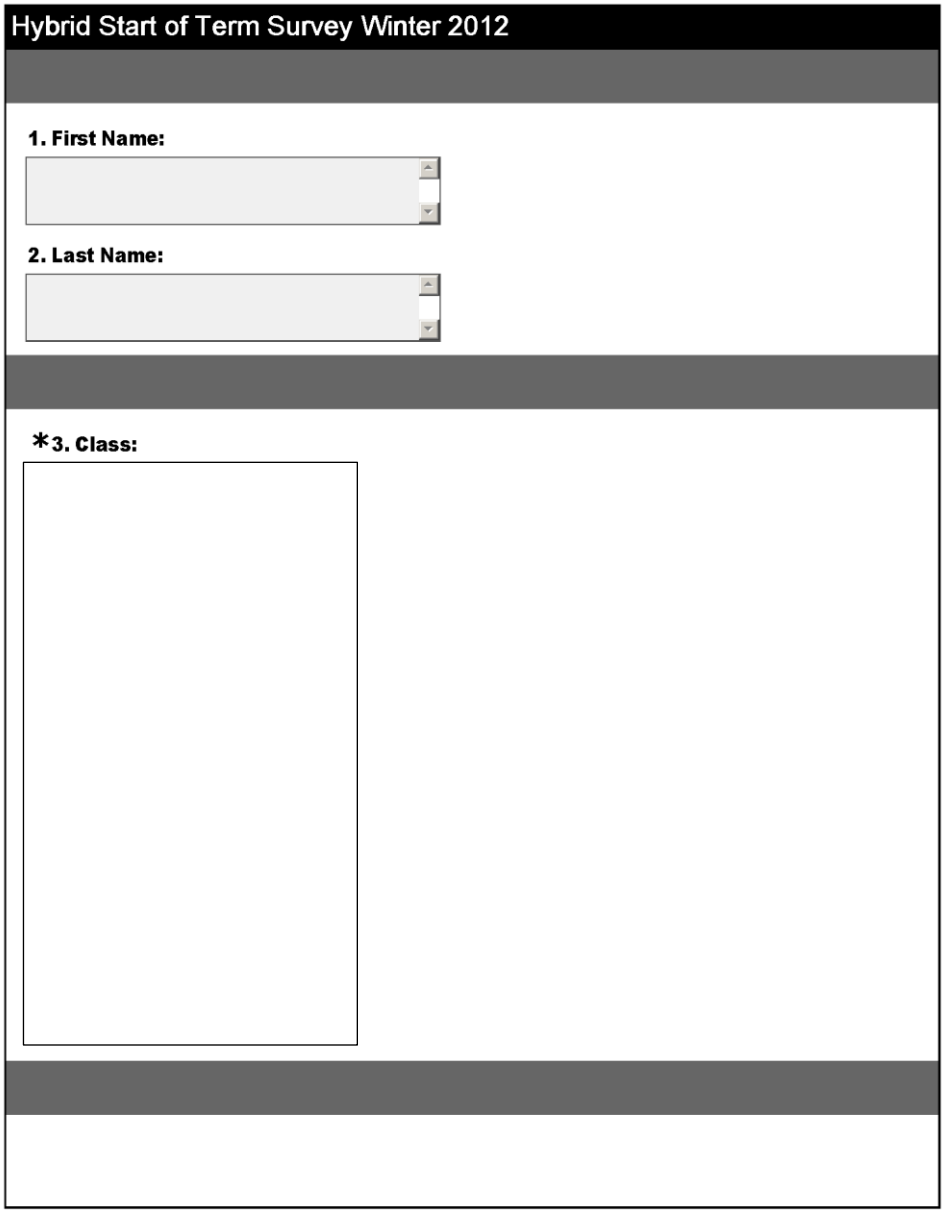
Table of Contents

Appendix A – Beginning-of-Term Survey



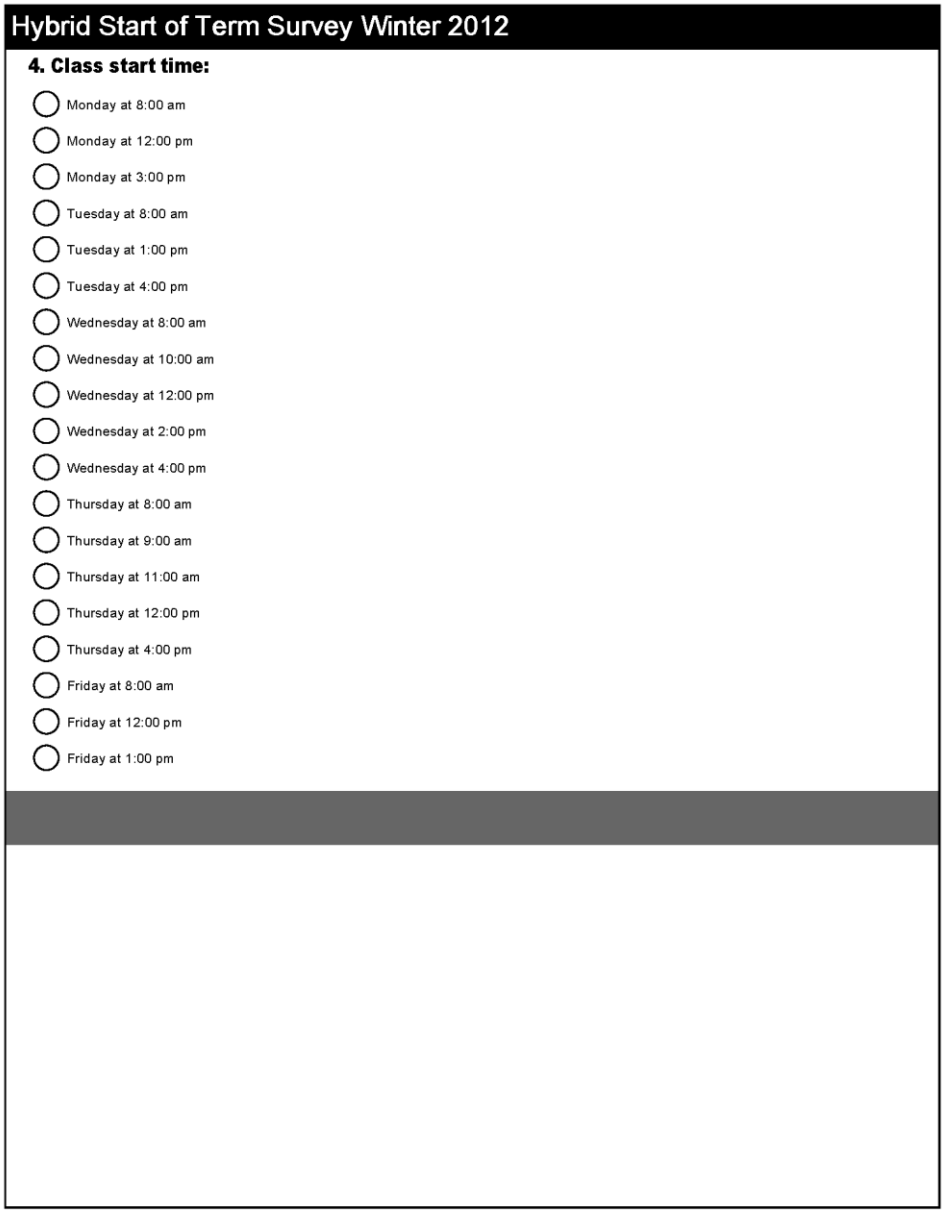
Hybrid Start of Term Survey Winter 2012

1. First Name:

2. Last Name:

*3. Class:

Page 1

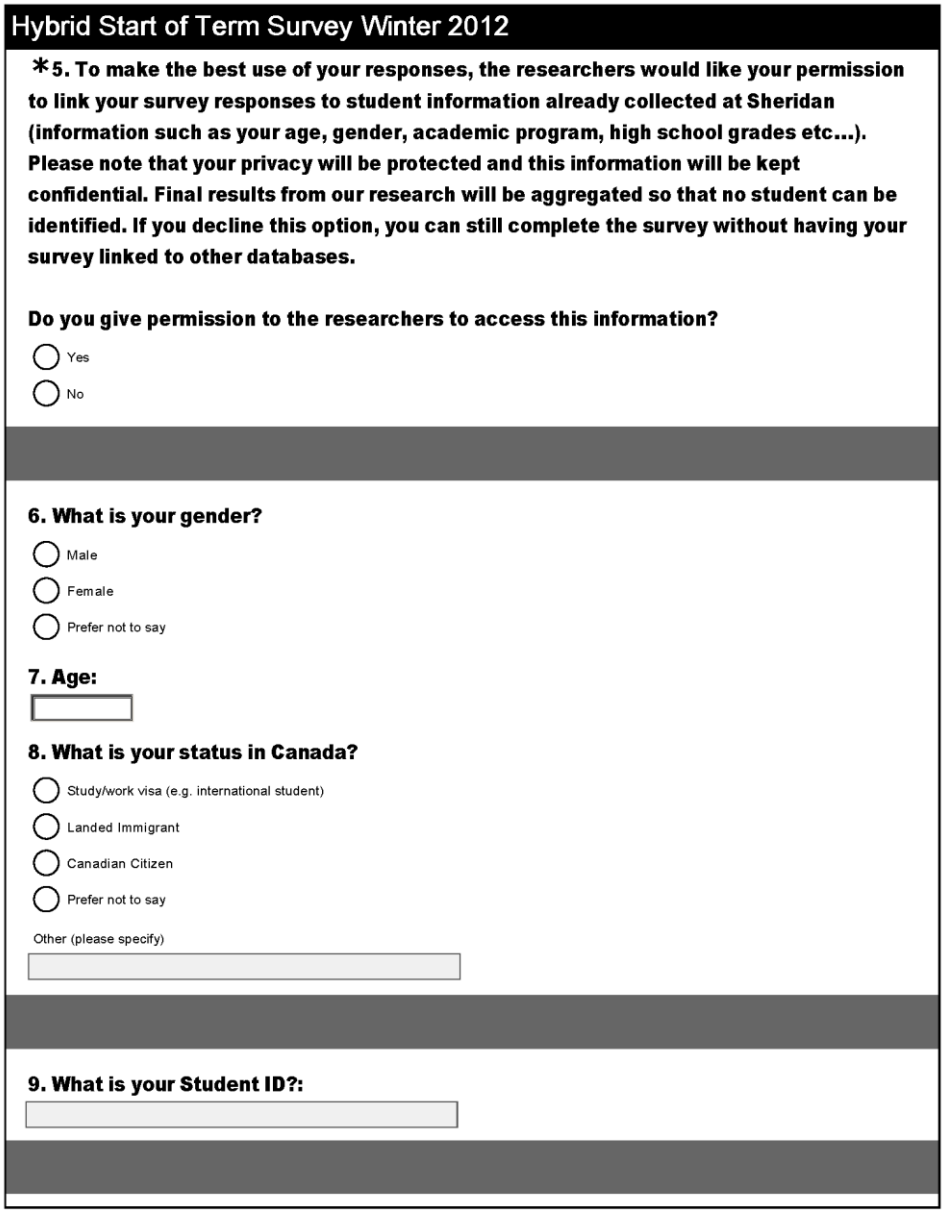


Hybrid Start of Term Survey Winter 2012

4. Class start time:

- ◯ Monday at 8:00 am
- ◯ Monday at 12:00 pm
- ◯ Monday at 3:00 pm
- ◯ Tuesday at 8:00 am
- ◯ Tuesday at 1:00 pm
- ◯ Tuesday at 4:00 pm
- ◯ Wednesday at 8:00 am
- ◯ Wednesday at 10:00 am
- ◯ Wednesday at 12:00 pm
- ◯ Wednesday at 2:00 pm
- ◯ Wednesday at 4:00 pm
- ◯ Thursday at 8:00 am
- ◯ Thursday at 9:00 am
- ◯ Thursday at 11:00 am
- ◯ Thursday at 12:00 pm
- ◯ Thursday at 4:00 pm
- ◯ Friday at 8:00 am
- ◯ Friday at 12:00 pm
- ◯ Friday at 1:00 pm

Page 2



Hybrid Start of Term Survey Winter 2012

***5. To make the best use of your responses, the researchers would like your permission to link your survey responses to student information already collected at Sheridan (information such as your age, gender, academic program, high school grades etc...). Please note that your privacy will be protected and this information will be kept confidential. Final results from our research will be aggregated so that no student can be identified. If you decline this option, you can still complete the survey without having your survey linked to other databases.**

Do you give permission to the researchers to access this information?

- ◯ Yes
- ◯ No

6. What is your gender?

- ◯ Male
- ◯ Female
- ◯ Prefer not to say

7. Age:

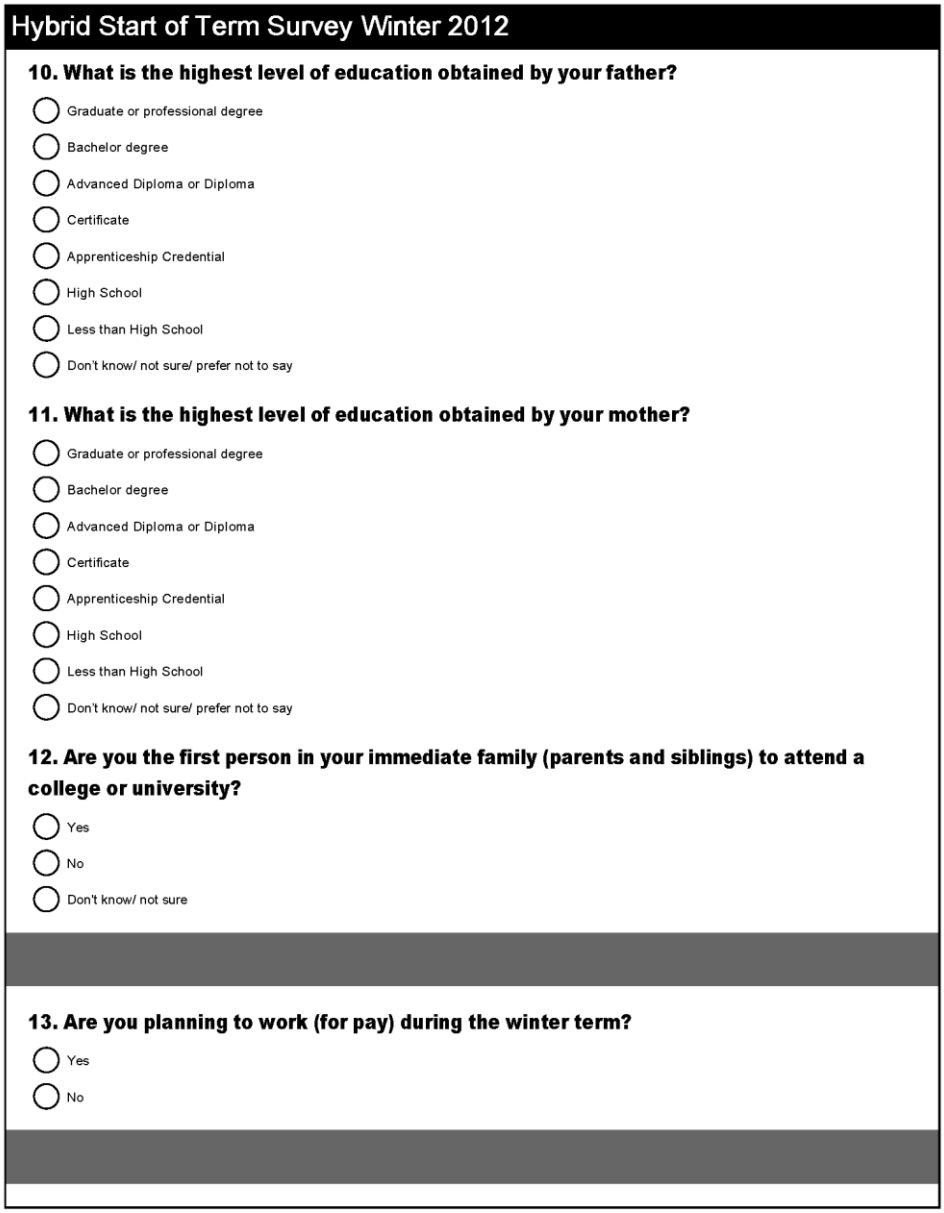
8. What is your status in Canada?

- ◯ Study/work visa (e.g. international student)
- ◯ Landed Immigrant
- ◯ Canadian Citizen
- ◯ Prefer not to say

Other (please specify)

9. What is your Student ID?:

Page 3



Hybrid Start of Term Survey Winter 2012

10. What is the highest level of education obtained by your father?

- ◯ Graduate or professional degree
- ◯ Bachelor degree
- ◯ Advanced Diploma or Diploma
- ◯ Certificate
- ◯ Apprenticeship Credential
- ◯ High School
- ◯ Less than High School
- ◯ Don't know/ not sure/ prefer not to say

11. What is the highest level of education obtained by your mother?

- ◯ Graduate or professional degree
- ◯ Bachelor degree
- ◯ Advanced Diploma or Diploma
- ◯ Certificate
- ◯ Apprenticeship Credential
- ◯ High School
- ◯ Less than High School
- ◯ Don't know/ not sure/ prefer not to say

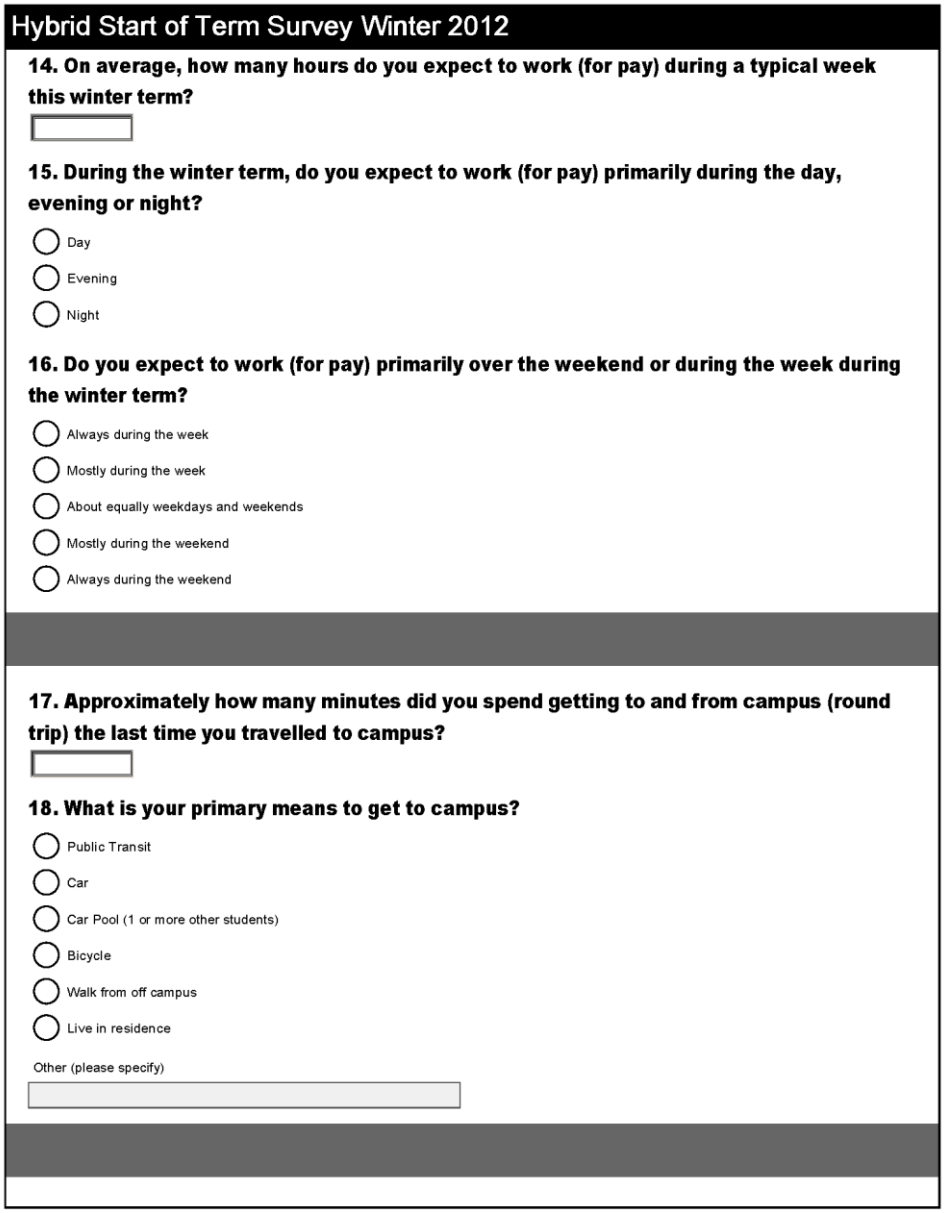
12. Are you the first person in your immediate family (parents and siblings) to attend a college or university?

- ◯ Yes
- ◯ No
- ◯ Don't know/ not sure

13. Are you planning to work (for pay) during the winter term?

- ◯ Yes
- ◯ No

Page 4



Hybrid Start of Term Survey Winter 2012

14. On average, how many hours do you expect to work (for pay) during a typical week this winter term?

15. During the winter term, do you expect to work (for pay) primarily during the day, evening or night?

- Day
- Evening
- Night

16. Do you expect to work (for pay) primarily over the weekend or during the week during the winter term?

- Always during the week
- Mostly during the week
- About equally weekdays and weekends
- Mostly during the weekend
- Always during the weekend

17. Approximately how many minutes did you spend getting to and from campus (round trip) the last time you travelled to campus?

18. What is your primary means to get to campus?

- Public Transit
- Car
- Car Pool (1 or more other students)
- Bicycle
- Walk from off campus
- Live in residence

Other (please specify)

Page 5

Hybrid Start of Term Survey Winter 2012

19. Do you have any children or dependants?

- ◯ Yes
- ◯ No

20. Have you ever been diagnosed with a learning disability?

- ◯ Yes
- ◯ No
- ◯ Don't know/ not sure/ prefer not to say

21. How many hours per week on average do you expect to put into <u>this class</u> over the course of the term?

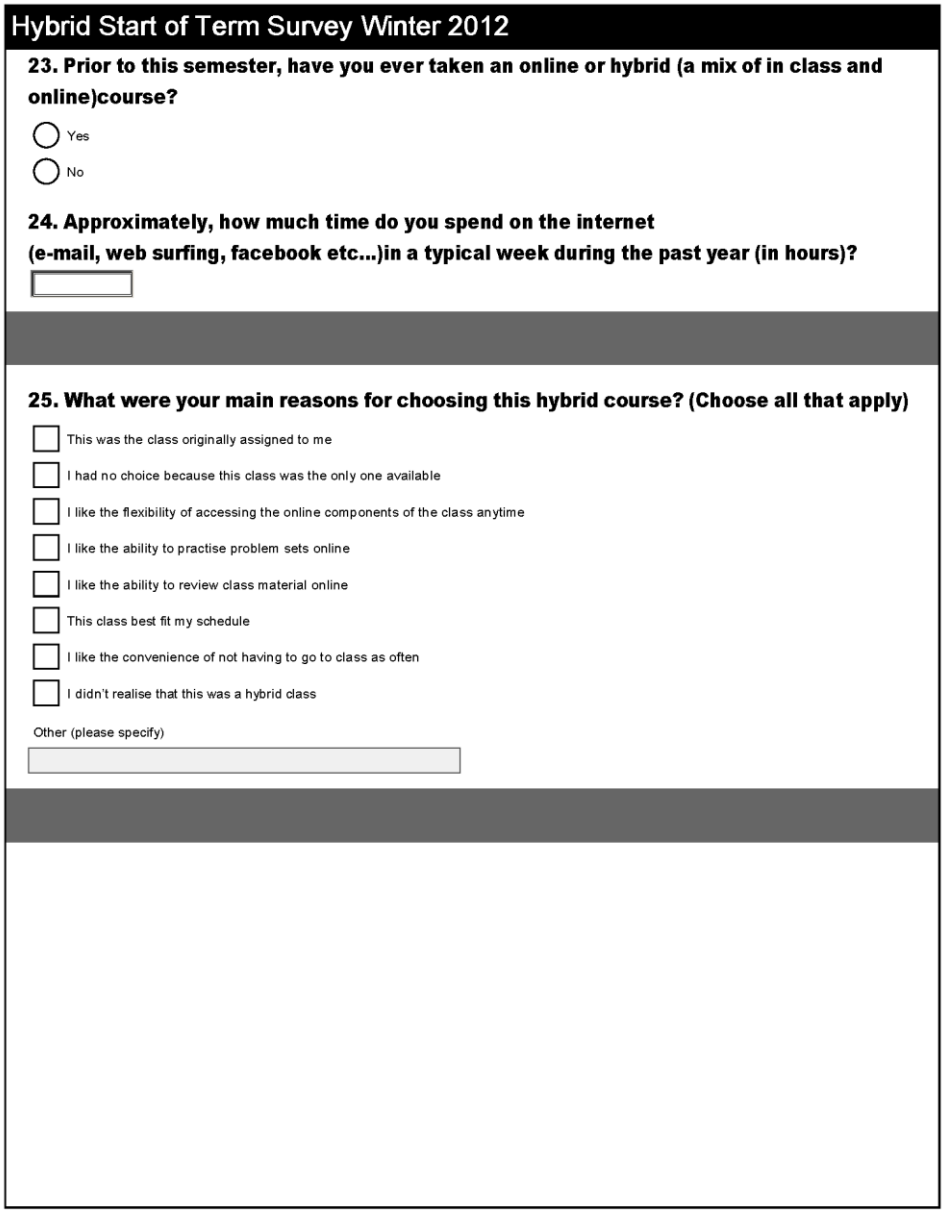
	None	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	More than 15 hours
Attending class in a class room	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Attending class in an online class	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Working on assignments	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Additional time studying	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

Other (please specify)

22. For your <u>other classes</u>, on a per class basis, approximately, how many hours per week on average do you expect to put in over the course of the term?

	None	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	More than 15 hours
Attending class in a class room	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Attending class in an online class	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Working on assignments	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Additional time studying	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

Page 6



Hybrid Start of Term Survey Winter 2012

23. Prior to this semester, have you ever taken an online or hybrid (a mix of in class and online)course?

- ◯ Yes
- ◯ No

24. Approximately, how much time do you spend on the internet (e-mail, web surfing, facebook etc...)in a typical week during the past year (in hours)?

25. What were your main reasons for choosing this hybrid course? (Choose all that apply)

- ☐ This was the class originally assigned to me
- ☐ I had no choice because this class was the only one available
- ☐ I like the flexibility of accessing the online components of the class anytime
- ☐ I like the ability to practise problem sets online
- ☐ I like the ability to review class material online
- ☐ This class best fit my schedule
- ☐ I like the convenience of not having to go to class as often
- ☐ I didn't realise that this was a hybrid class

Other (please specify)

Page 7

Hybrid Start of Term Survey Winter 2012

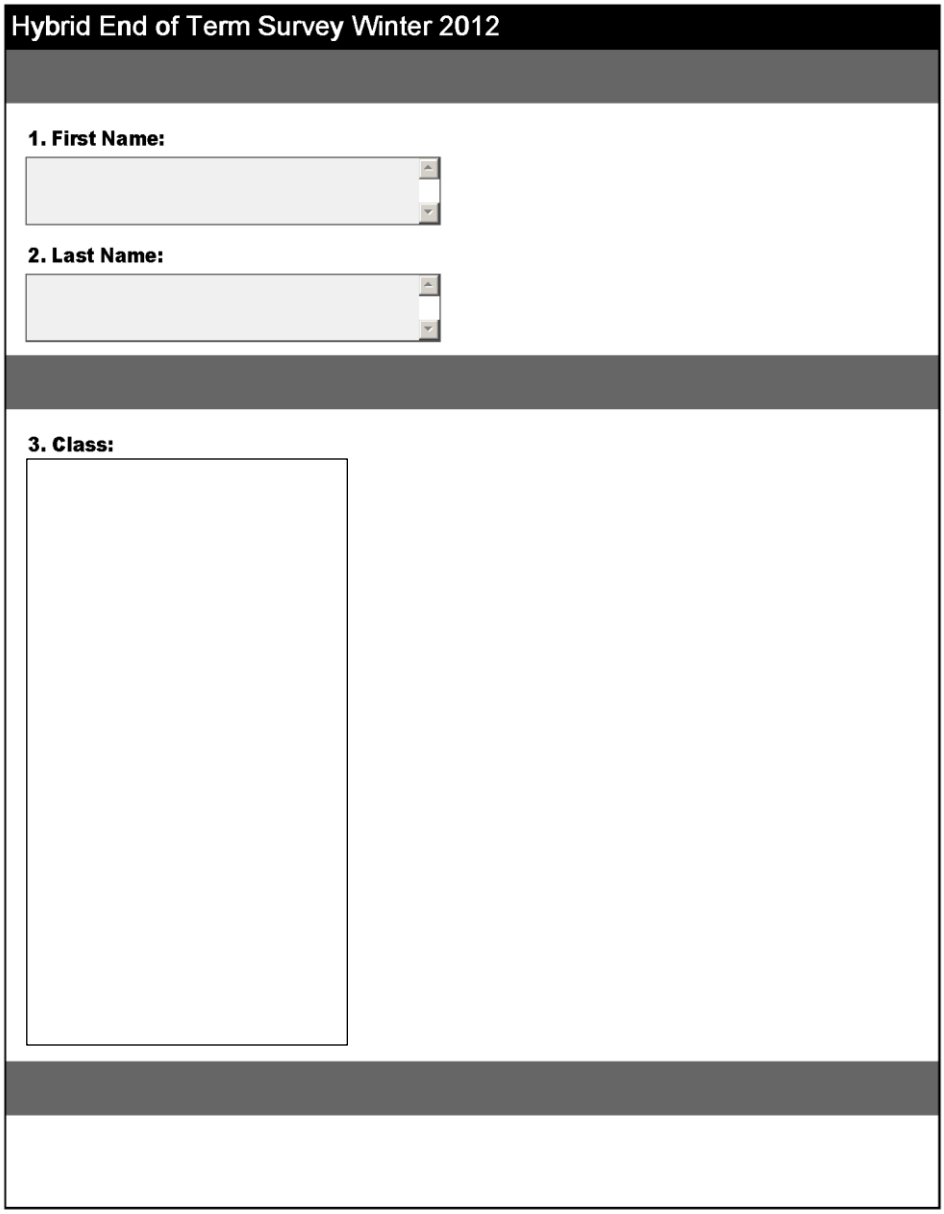
26. Please complete the following opinion related to yourself:

	Not like me at all	Not much like	Somewhat like me	Mostly like me	Very much like me
New ideas and projects sometimes distract me from old ones	○	○	○	○	○
Setbacks don't discourage me	○	○	○	○	○
I have been obsessed with a certain idea or project for a short time but later lost interest	○	○	○	○	○
I prefer to spend as much time as possible in class	○	○	○	○	○
I am a hard worker	○	○	○	○	○
I often set a goal but later choose to pursue a different one	○	○	○	○	○
I have difficulty maintaining my focus on projects that take more than a few months to complete	○	○	○	○	○
I feel that it is important to attend every class in school	○	○	○	○	○
I finish whatever I begin	○	○	○	○	○
I am diligent	○	○	○	○	○
I like to try new things	○	○	○	○	○
I like using computers	○	○	○	○	○
I am excited to take a class that incorporates technology into learning	○	○	○	○	○

Thank You

Page 8

Appendix B – End-of-Term Survey



Hybrid End of Term Survey Winter 2012

1. First Name:

2. Last Name:

3. Class:

Page 1

Hybrid End of Term Survey Winter 2012

4. Class start time:

- ◯ Monday at 8:00 am
- ◯ Monday at 12:00 pm
- ◯ Monday at 3:00 pm
- ◯ Tuesday at 8:00 am
- ◯ Tuesday at 1:00 pm
- ◯ Tuesday at 4:00 pm
- ◯ Wednesday at 8:00 am
- ◯ Wednesday at 10:00 am
- ◯ Wednesday at 12:00 pm
- ◯ Wednesday at 2:00 pm
- ◯ Wednesday at 4:00 pm
- ◯ Thursday at 8:00 am
- ◯ Thursday at 9:00 am
- ◯ Thursday at 11:00 am
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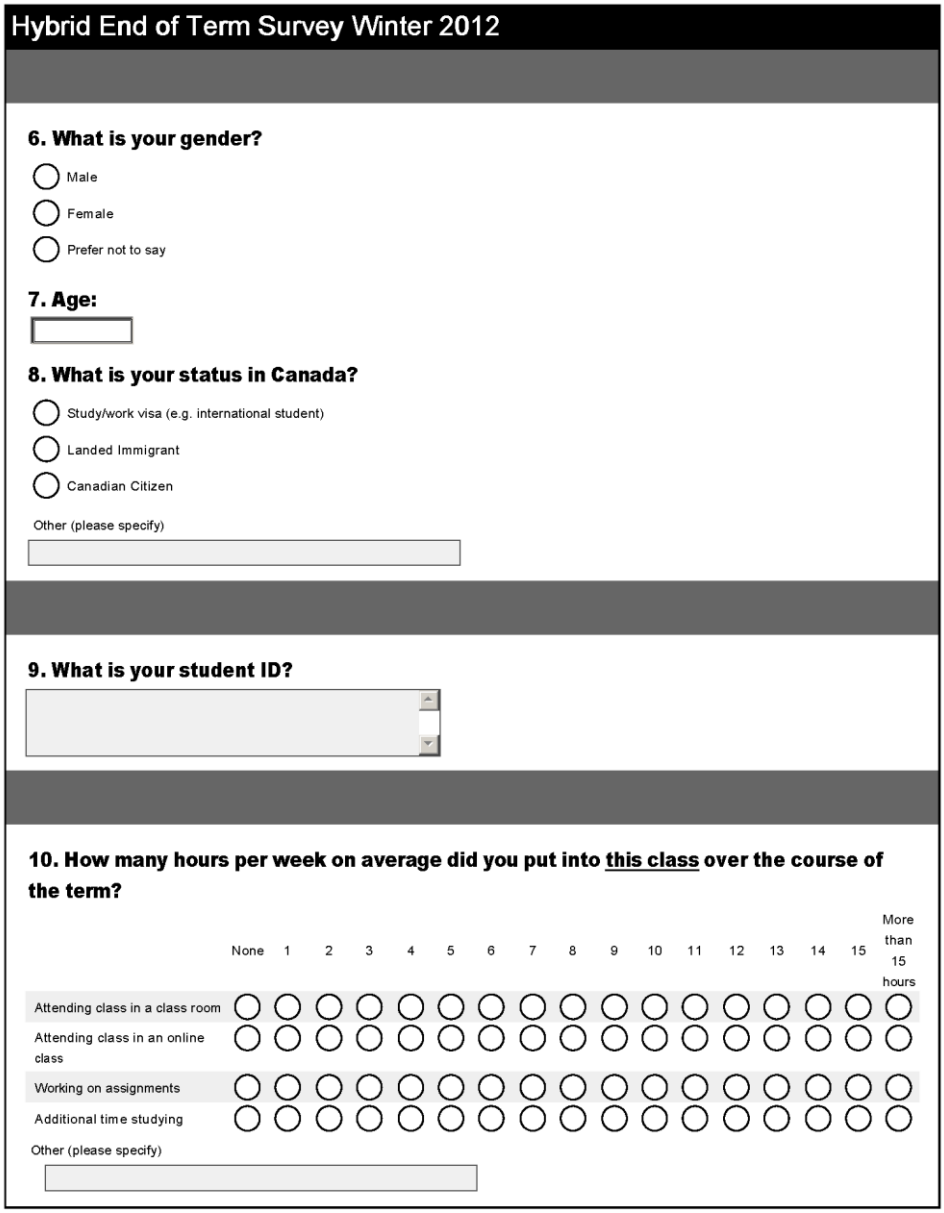
***5. To make the best use of your responses, the researchers would like your permission to link your survey responses to student information already collected at Sheridan (information such as your age, gender, academic program, high school grades etc...). Please note that your privacy will be protected and this information will be kept confidential. Final results from our research will be aggregated so that no student can be identified.**

Do you give permission to the researchers to access this information?

- ◯ Yes
- ◯ No

Page 2



Hybrid End of Term Survey Winter 2012

6. What is your gender?

- Male
- Female
- Prefer not to say

7. Age:

8. What is your status in Canada?

- Study/work visa (e.g. international student)
- Landed Immigrant
- Canadian Citizen

Other (please specify)

9. What is your student ID?

10. How many hours per week on average did you put into this class over the course of the term?

	None	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	More than 15 hours
Attending class in a class room	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Attending class in an online class	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Working on assignments	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Additional time studying	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Other (please specify)

Page 3

Hybrid End of Term Survey Winter 2012

11. For your other classes, on a per class basis, how many hours per week on average did you put in over the course of the term?

	None	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	More than 15 hours
Attending class in a class room	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Attending class in an online class	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Working on assignments	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Additional time studying	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Other (please specify)

12. Given a choice, would you enroll in another hybrid course?

- ○ Definitely
- ○ Possibly
- ○ Not Sure
- ○ Possibly not
- ○ Definitely not

13. In general, how do feel the online component of your hybrid class affects the following, when compared with your face-to-face classes?

	Much worse	Worse	About the same	Better	Much better
The amount of time you interact with other students	○	○	○	○	○
The quality of your interaction with other students	○	○	○	○	○
The amount of time you interact with the instructor	○	○	○	○	○
The quality of your interaction with the instructor	○	○	○	○	○

Page 4

Hybrid End of Term Survey Winter 2012

14. Comments:

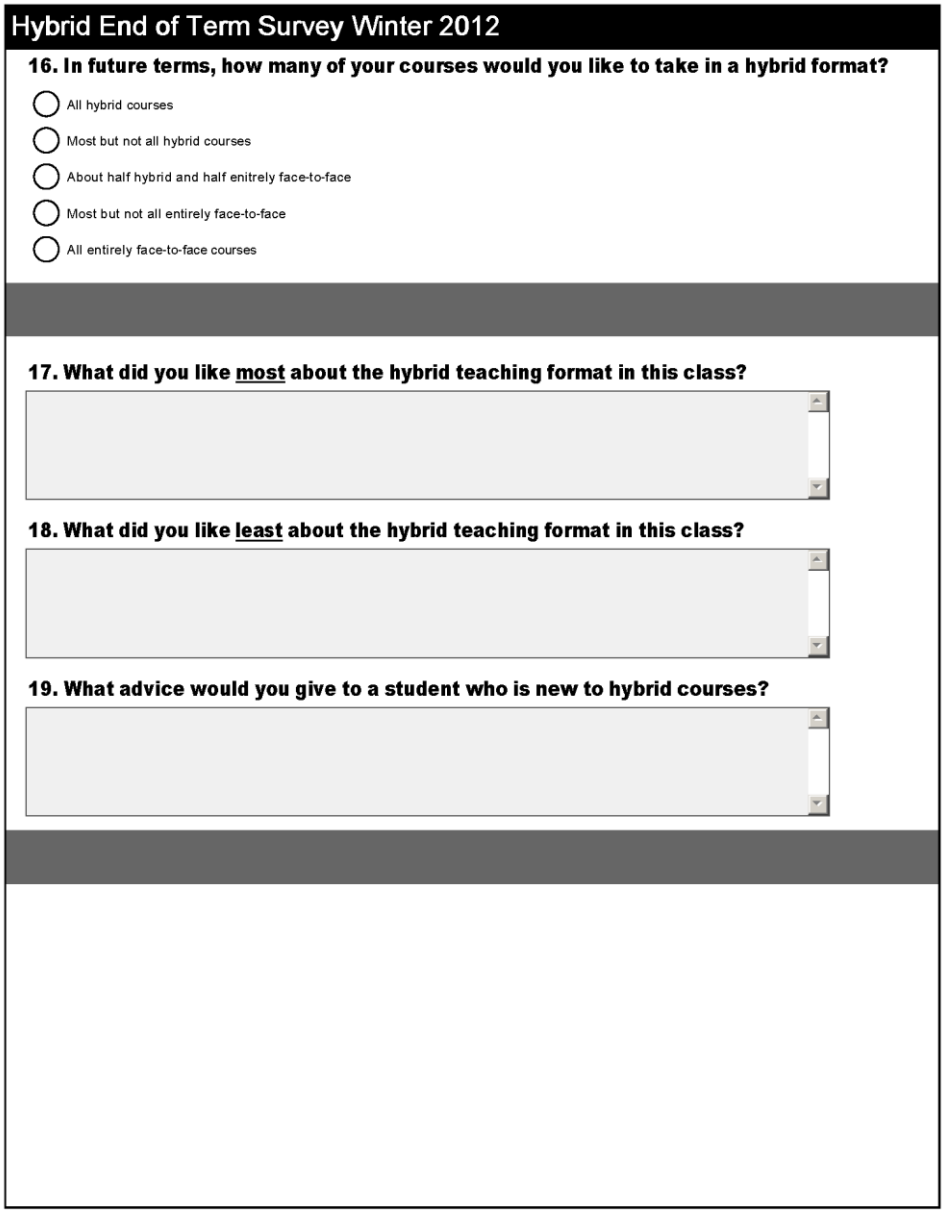
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am more likely to ask questions in a hybrid course	◯	◯	◯	◯	◯
There are more opportunities to collaborate with others in a hybrid course	◯	◯	◯	◯	◯
My online experience has increased my opportunity to access and use information	◯	◯	◯	◯	◯
I have more opportunities to reflect on what I have learned in hybrid courses	◯	◯	◯	◯	◯
Online learning helps me better understand course material	◯	◯	◯	◯	◯
Generally, I understand the course requirements better in a hybrid course	◯	◯	◯	◯	◯
Because of hybrid courses, I am more likely to complete my program	◯	◯	◯	◯	◯
Generally, I am more engaged in hybrid courses	◯	◯	◯	◯	◯
I am a multi-tasker	◯	◯	◯	◯	◯
I have strong time management skills	◯	◯	◯	◯	◯
I am motivated to to succeed	◯	◯	◯	◯	◯
Sheridan provides the resources necessary for students to succeed in hybrid courses	◯	◯	◯	◯	◯
I had many technical issues with the online portion of this class (such as slow response time, website crashes, etc..)	◯	◯	◯	◯	◯

15. Your hybrid class at Sheridan has 1 hour of online instruction and 2 hours of in class instruction per week.

In your opinion, what do you think would be the best online/in-class mix for this class?

- ◯ 3 hours in class, 0 hours online per week
- ◯ 2 hours in class, 1 hour online per week
- ◯ 1.5 hours in class, 1.5 hours online per week
- ◯ 1 hour in class, 2 hours online per week
- ◯ 0 hours in class, 3 hours online per week

Page 5



Hybrid End of Term Survey Winter 2012

16. In future terms, how many of your courses would you like to take in a hybrid format?

- ◯ All hybrid courses
- ◯ Most but not all hybrid courses
- ◯ About half hybrid and half enitrely face-to-face
- ◯ Most but not all entirely face-to-face
- ◯ All entirely face-to-face courses

17. What did you like most about the hybrid teaching format in this class?

18. What did you like least about the hybrid teaching format in this class?

19. What advice would you give to a student who is new to hybrid courses?

Page 6

Hybrid End of Term Survey Winter 2012

20. Please rate your experience (e.g. number of technical problems, ability to navigate and find what you are looking for, look and feel of the site, response time) using the following platforms:

	Very poor	Poor	Neutral	Good	Very Good	N/A
Overall online experience	◯	◯	◯	◯	◯	◯
SLATE	◯	◯	◯	◯	◯	◯
MyITLAB	◯	◯	◯	◯	◯	◯
SAM	◯	◯	◯	◯	◯	◯
Lynda	◯	◯	◯	◯	◯	◯
Other (please describe below)	◯	◯	◯	◯	◯	◯

Other (please specify)

21. Each of the choices below describes people. Please check ONE that most closely fits with how you think of yourself.

◯ I am an independent thinker who has no problems expressing my feelings openly and "telling it like it is". I am action oriented.

◯ I am productive and idealistic. I work hard and like to keep things running smoothly. I value the recognition of others.

◯ I think for myself and once I have made up my mind that is it. I am not overly influenced by what other people think and prefer relying on my own judgment.

◯ I feel that it is important to be supportive of others and enjoy doing so. I am loyal and believe that one should be sensitive to the feelings of others.

22. Each of these choices contains additional descriptions of people. Please select ALL responses that you feel describe you.

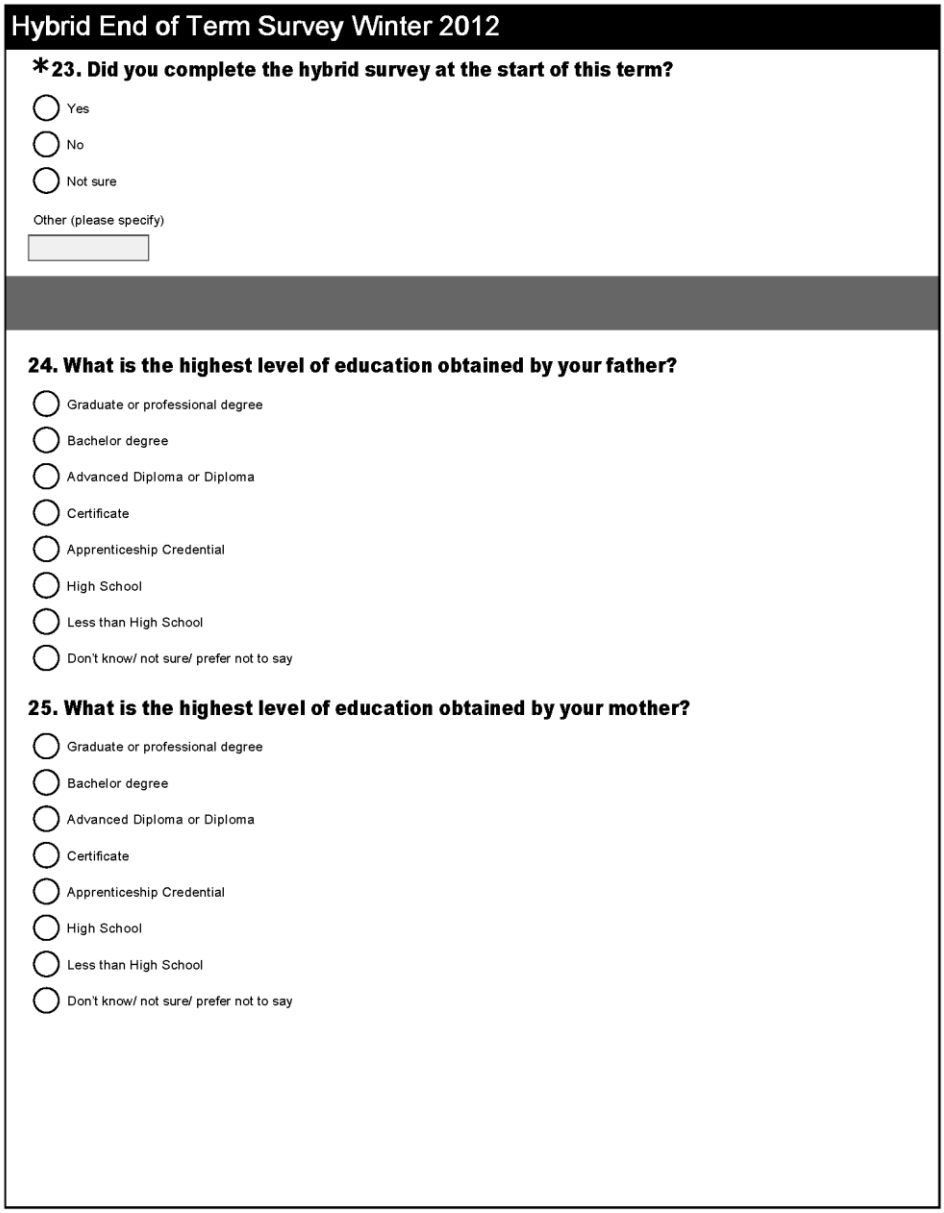
☐ I feel it is important to examine all possibilities. I make sure that I carefully analyse the situation before making a decision.

☐ I don't like to over analyse things, but prefer to make a decision and act when issues arise.

☐ I am extremely organized and diligent in my work habits. I make sure that I think through my tasks and do the job with precision.

☐ I am a creative person. Some people might call me "artistic".

Page 7



Hybrid End of Term Survey Winter 2012

*23. Did you complete the hybrid survey at the start of this term?

- ◯ Yes
- ◯ No
- ◯ Not sure

Other (please specify)

24. What is the highest level of education obtained by your father?

- ◯ Graduate or professional degree
- ◯ Bachelor degree
- ◯ Advanced Diploma or Diploma
- ◯ Certificate
- ◯ Apprenticeship Credential
- ◯ High School
- ◯ Less than High School
- ◯ Don't know/ not sure/ prefer not to say

25. What is the highest level of education obtained by your mother?

- ◯ Graduate or professional degree
- ◯ Bachelor degree
- ◯ Advanced Diploma or Diploma
- ◯ Certificate
- ◯ Apprenticeship Credential
- ◯ High School
- ◯ Less than High School
- ◯ Don't know/ not sure/ prefer not to say

Page 8

Hybrid End of Term Survey Winter 2012

26. Are you the first person in your immediate family (parents and siblings) to attend a college or university?

- ◯ Yes
- ◯ No
- ◯ Don't know/ not sure

27. Are you currently employed?

- ◯ Yes
- ◯ No

28. Approximately how many hours did you spend at work during the last week?

[ ]

29. Do you work primarily during the day, evening or night?

- ◯ Day
- ◯ Evening
- ◯ Night

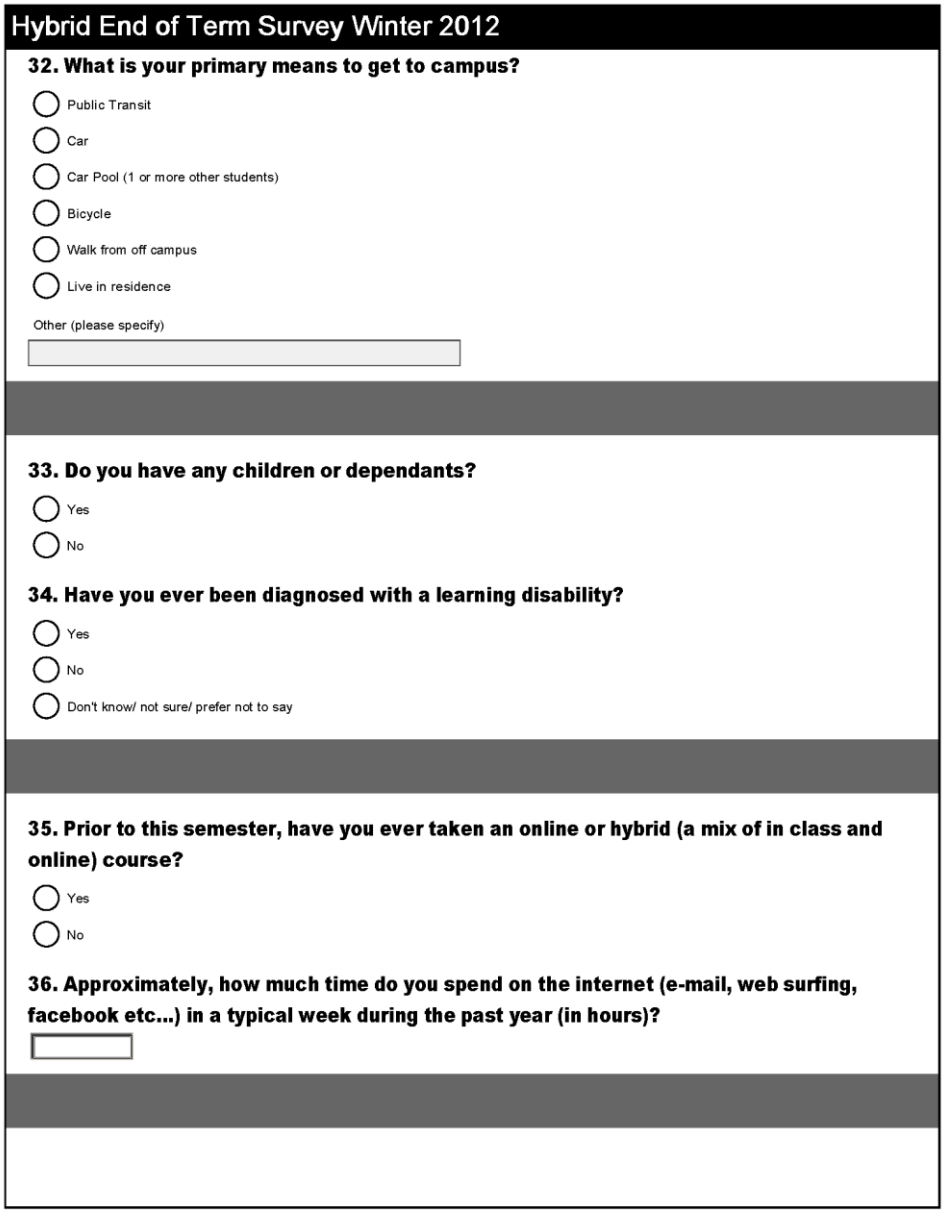
30. Do you work primarily over the weekend or during the week?

- ◯ Always during the week
- ◯ Mostly during the week
- ◯ About equally weekdays and weekends
- ◯ Mostly during the weekend
- ◯ Always during the weekend

31. Approximately how many minutes did you spend getting to and from campus the last time you travelled to campus?

[ ]

Page 9



Hybrid End of Term Survey Winter 2012

32. What is your primary means to get to campus?

- Public Transit
- Car
- Car Pool (1 or more other students)
- Bicycle
- Walk from off campus
- Live in residence

Other (please specify)

33. Do you have any children or dependants?

- Yes
- No

34. Have you ever been diagnosed with a learning disability?

- Yes
- No
- Don't know/ not sure/ prefer not to say

35. Prior to this semester, have you ever taken an online or hybrid (a mix of in class and online) course?

- Yes
- No

36. Approximately, how much time do you spend on the internet (e-mail, web surfing, facebook etc...) in a typical week during the past year (in hours)?

Page 10

Hybrid End of Term Survey Winter 2012

37. What were your main reasons for choosing this hybrid course? (Choose all that apply)

- ☐ This was the class originally assigned to me
- ☐ I had no choice because this class was the only one available
- ☐ I like the flexibility of accessing the online components of this class anytime
- ☐ I like the ability to practice problem sets online
- ☐ I like the ability to review class material online
- ☐ This class best fits my schedule
- ☐ I like the convenience of not having be in class as long
- ☐ I didn't realize that this is a hybrid class

Other (please specify)

38. Please complete the following opinion related to yourself:

	Not like me at all	Not much like	Somewhat like me	Mostly like me	Very much like me
New ideas and projects sometimes distract me from old ones	◯	◯	◯	◯	◯
Setbacks don't discourage me	◯	◯	◯	◯	◯
I have been obsessed with a certain idea or project for a short time but later lost interest	◯	◯	◯	◯	◯
I prefer to spend as much time as possible in class	◯	◯	◯	◯	◯
I am a hard worker	◯	◯	◯	◯	◯
I often set a goal but later choose to pursue a different one	◯	◯	◯	◯	◯
I have difficulty maintaining my focus on projects that take more than a few months to complete	◯	◯	◯	◯	◯
I feel that it is important to attend every class in school	◯	◯	◯	◯	◯
I finish whatever I begin	◯	◯	◯	◯	◯
I am diligent	◯	◯	◯	◯	◯
I like to try new things	◯	◯	◯	◯	◯
I like using computers	◯	◯	◯	◯	◯
I am excited to take a class that incorporates technology into learning	◯	◯	◯	◯	◯

Thank you

Page 11

Appendix C – Focus Group Questions

Engagement Questions

- What is your favourite part about your hybrid course?
- What do you notice about your hybrid course when compared to your other courses?

Exploration Questions

- What and/or who has influenced your learning in your hybrid course?
- What do you feel are the pros and cons about hybrid learning?
- When you participate in the online portion of your course, how do you go about it? When do you attempt it? Do you complete on the first attempt? Have you encountered any problems? If so, how did you resolve these problems? How much time do you spend online for your hybrid course? Who do you rely on for help for your online instruction?
- How do you feel about combining online and traditional class instruction into one course? Do they work well together?
- How do you feel this type of model affects your learning?
- How motivated do you feel in a hybrid course versus a traditional course? What factors influence your motivation?
- What kinds of subjects would you most want to see taught as hybrids?

Exit Question

- Is there anything that you would like to add that you feel will improve the hybrid course?

Appendix D – Model Summary of Student Success (Multilevel Model)

Linear mixed effects model fit by restricted maximum likelihood using the R (V 2.15.1) package Nonlinear Mixed-Effects Models *nlme* (V 3.1-104).

Fully Additive Model

AIC	BIC	logLik
62278	62362	-31127

Random effects:
Formula: ~1 | teacher

	(Intercept)
StdDev:	5.73

Formula: ~1 | course %in% teacher

	(Intercept)	Residual
StdDev:	2.52	10.8

Fixed Effects	Value	Std. Error	DF	t-value	p-value
(Intercept)	28.54	3.41	7757	8.38	<.001
Hybrid (0/1)	**-1.23**	**0.38**	**307**	**-3.19**	**<.001**
Standing GPA	8.03	0.15	7757	55.39	<.001
High School Avg	0.25	0.02	7757	12.67	<.001
Age	0.25	0.13	7757	1.88	0.061
Age^2	0.00	0.00	7757	-0.62	0.534
Domestic (0/1)	-1.02	2.30	7757	-0.44	0.657
Full Time (0/1)	0.33	0.50	7757	0.66	0.508
Gender Female (0/1)	0.83	0.28	7757	2.98	0.003

Number of Observations: 8135
Number of Groups:

teacher	course %in% teacher
63	371

Model with Interactions

AIC	BIC	logLik
62065	62171	-31018

Random effects:
Formula: ~1 | teacher

	(Intercept)
StdDev:	5.6

Formula: ~1 | section %in% teacher

	(Intercept)	Residual
StdDev:	2.4	11

Fixed Effects	Value	Std.Error	DF	t-value	p-value
(Intercept)	40.54	3.50	7754	11.57	<.001
Hybrid (0/1)	**-1.91**	**1.26**	**307**	**-1.52**	**0.130**
GPA	1.39	0.73	7754	1.89	0.058
GPA^2	1.30	0.15	7754	8.73	<.001
High School Avg	0.20	0.02	7754	10.34	<.001
Age	0.06	0.13	7754	0.46	0.646
Age^2	0.00	0.00	7754	0.50	0.618
Domestic (0/1)	0.06	2.27	7754	0.03	0.979
Full Time (0/1)	0.38	0.49	7754	0.77	0.440
Gender Female (0/1)	0.81	0.27	7754	2.94	0.003
Hybrid x GPA	**-1.37**	**1.05**	**7754**	**-1.31**	**0.192**
Hybrid x GPA^2	**0.51**	**0.21**	**7754**	**2.41**	**0.016**

Number of Observations: 8135
Number of Groups:

teacher	sections %in% teacher
63	371

No additional quadratic terms or interactions with Hybrid were significant at α = 0.05 level.

Appendix E – Model Summary of Student Success (Two-Stage Least Squares)

Two-stage least squares analysis was conducted using Stata 12.

The instrumental variable was highly significant in the first stage regression model ($t = 368.5$, $p < 0.001$).

Instrumental variables (2SLS) regression
Number of obs = 8135
Wald $chi^2(185)$ = 7072.74
Prob > chi^2 = 0.0000
R-squared = 0.4651
Root MSE = 10.783

	Value	Std. Error	z	p-value
(Intercept)	22.03	15.26	1.44	0.15
Hybrid (0/1)	**-1.04**	**0.56**	**-1.85**	**0.07**
GPA	7.61	0.32	23.73	0.00
High School Avg	0.30	0.04	7.17	0.00
Age	0.47	0.29	1.61	0.11
Age^2	0.00	0.00	-0.76	0.45
Domestic (0/1)	-8.85	6.28	-1.41	0.16
Full Time (0/1)	-1.62	1.85	-0.88	0.38
Gender Female (0/1)	0.94	0.60	1.58	0.11

The following control variables were included in the model but omitted from the summary table: academic program of study, subject, academic level and a course/teacher factor variable.

Appendix F – Model Summary of Binary Student Success (Multilevel Model)

Linear mixed effects model fit by restricted maximum likelihood using the R (V 2.15.1) package Nonlinear Mixed-Effects Models *nlme* (V 3.1-104).

To conduct this model student final course marks were converted into a binary outcome, with success (A, B or C) coded 1.

Fully Additive Model

Random effects:
Formula: ~1 | teacher

	(Intercept)
StdDev:	0.72

Formula: ~1 | section %in% teacher

	(Intercept)	Residual
StdDev:	0.48	0.92

Fixed Effects	Value	Std.Error	DF	t-value	p-value
(Intercept)	-2.920	0.960	7757	-3.053	0.002
Hybrid (0/1)	**-0.270**	**0.090**	**307**	**-3.114**	**0.002**
Standing GPA	1.140	0.040	7757	31.559	<.001
High School Avg	0.030	0.010	7757	6.286	<.001
Age	-0.080	0.050	7757	-1.695	0.090
Age^2	0.000	0.000	7757	2.295	0.022
Domestic (0/1)	-0.050	0.580	7757	-0.079	0.937
Full Time (0/1)	0.110	0.120	7757	0.975	0.330
Gender Female (0/1)	0.170	0.070	7757	2.359	0.018

Number of Observations: 8135
Number of Groups:

teacher	sections %in% teacher
63	371

The probability of success for average male students (mean GPA, high school average, age, domestic and full time) is 3.03% higher in the non-hybrid control courses. For average female students the probability of success was 2.67% higher in the non-hybrid control courses.

Model with Interactions

Random effects:
Formula: ~1 | teacher

	(Intercept)
StdDev:	0.86

Formula: ~1 | section %in% teacher

	(Intercept)	Residual
StdDev:	0.48	0.91

Fixed Effects	Value	Std.Error	DF	t-value	p-value
(Intercept)	-2.789	0.956	7756	-2.917	0.004
Hybrid (0/1)	**-0.597**	**0.176**	**307**	**-3.389**	**0.001**
GPA	1.078	0.048	7756	22.612	<.001
High School Avg	0.035	0.006	7756	6.309	<.001
Age	-0.077	0.045	7756	-1.721	0.085
Age^2	0.002	0.001	7756	2.332	0.020
Domestic (0/1)	-0.043	0.578	7756	-0.074	0.941
Full Time (0/1)	0.113	0.118	7756	0.965	0.334
Gender Female (0/1)	0.175	0.071	7756	2.469	0.014
Hybrid x GPA	**0.141**	**0.066**	**7756**	**2.141**	**0.032**

Number of Observations: 8135
Number of Groups:

teacher	sections %in% teacher
63	371

No additional quadratic terms or interactions with Hybrid were significant at α = 0.05 level.

Appendix G – Model Summary of Binary Student Success (Two-Stage Least Squares)

Two-stage least squares analysis was conducted using Stata 12.

The instrumental variable was highly significant in the first stage regression model ($z = 373.53$, $p < 0.001$).

Probit model with endogenous regressors
Number of obs = 8121
Wald $chi^2(185)$ = 1572.9
Log likelihood = 3443.2
Prob > chi^2 = 0.0000

	Value	Std. Error	z	p-value
(Intercept)	-1.949	0.568	-3.43	0.001
Hybrid (0/1)	**-0.11**	**0.04**	**-2.72**	**0.007**
GPA	0.665	0.022	30.64	<.001
High School Avg	0.019	0.003	5.85	<.001
Age	-0.053	0.025	-2.16	0.031
Age^2	0.001	0	2.68	0.007
Domestic (0/1)	-0.018	0.348	-0.05	0.960
Full Time (0/1)	0.095	0.07	1.37	0.172
Gender Female (0/1)	0.108	0.043	2.49	0.013

	Value	Std. Error	z	p-value
(Intercept)	0.059	0.036	1.65	0.099
Hybrid (0/1)				
GPA	0.001	0.001	0.9	0.367
High School Avg	0.000	0.000	0.26	0.793
Age	-0.001	0.001	-0.5	0.620
Age^2	0.000	0.000	0.15	0.879
Domestic (0/1)	-0.044	0.023	-1.88	0.060
Full Time (0/1)	0.004	0.005	0.82	0.410
Gender Female (0/1)	0.003	0.003	0.94	0.347

Wald test of exogeneity (/athrho = 0): chi2(1) = 0.55 Prob > chi2 = 0.4580

The following control variables were included in the model but omitted from the summary table: academic program of study, subject, academic level and a course/teacher factor variable.

Average marginal effects (probability of positive outcome) by delta method

	Value	Std. Error	z	p-value	95% CI Lower	95% CI Upper
Hybrid (0/1)	**-0.021**	**0.008**	**-2.72**	**0.007**	**-0.037**	**-0.006**
GPA	0.130	0.004	36.42	0.000	0.123	0.137
High School Avg	0.004	0.001	5.87	0.000	0.002	0.005
Age	-0.010	0.005	-2.16	0.031	-0.020	-0.001
Age^2	0.000	0.000	2.68	0.007	0.000	<.001
Domestic (0/1)	-0.003	0.068	-0.05	0.960	-0.136	0.129
Full Time (0/1)	0.019	0.014	1.37	0.172	-0.008	0.045
Gender Female (0/1)	-0.021	0.008	-2.72	0.007	-0.037	-0.006

dy/dx for factor levels is the discrete change from the base level

Appendix H – Model Summary of Withdrawal (Multilevel Model)

Linear mixed effects model fit by restricted maximum likelihood using the R (V 2.15.1) package Nonlinear Mixed-Effects Models *nlme* (V 3.1-104).

To conduct this model student final course marks were converted into a binary outcome, with success (A, B or C) coded 1.

Random effects:
Formula: ~1 | teacher

	(Intercept)
StdDev:	1.41

Formula: ~1 | section %in% teacher

	(Intercept)	Residual
StdDev:	0.34	0.88

Fixed Effects	Value	Std. Error	DF	t-value	p-value
(Intercept)	-1.517	1.206	7757	-1.258	0.209
Hybrid (0/1)	**0.145**	**0.097**	**307**	**1.498**	**0.135**
Standing GPA	-0.486	0.043	7757	-11.219	<.001
High School Avg	-0.023	0.007	7757	-3.243	0.001
Age	0.152	0.061	7757	2.496	0.013
Age^2	-0.002	0.001	7757	-2.301	0.021
Domestic (0/1)	-0.385	0.659	7757	-0.584	0.559
Full Time (0/1)	-0.238	0.146	7757	-1.624	0.104
Gender Female (0/1)	-0.246	0.100	7757	-2.470	0.014

Number of Observations: 8135
Number of Groups:

teacher	sections %in% teacher
63	371

The probability of success for average male students (mean GPA, high school average, age, domestic and full time) is 3.03% higher in the non-hybrid control courses. For average female students the probability of success was 2.67% higher in the non-hybrid control courses.

Appendix I – Model Summary of Withdrawal (Two-Stage Least Squares)

Two-stage least squares analysis was conducted using Stata 12.

The instrumental variable was highly significant in the first stage regression model ($z = 334.24$, $p < 0.001$).

Probit model with endogenous regressors
Number of obs = 7310
Wald $chi^2(185)$ = 74.17
Log likelihood = 3938.24
Prob > chi^2 = 0.0000

	Value	Std. Error	z	p-value
(Intercept)	-1.949	0.568	-3.43	0.001
Hybrid (0/1)	0.046	0.056	0.82	0.412
GPA	-0.254	0.027	-9.29	<.001
High School Avg	-0.012	0.004	-2.82	0.005
Age	0.083	0.034	2.43	0.015
Age^2	-0.001	0.001	-2.27	0.023
Domestic (0/1)	-0.144	0.421	-0.34	0.731
Full Time (0/1)	-0.143	0.091	-1.58	0.115
Gender Female (0/1)	-0.134	0.059	-2.26	0.024

	Value	Std. Error	z	p-value
(Intercept)	0.065	0.039	1.65	0.100
Hybrid (0/1)				
GPA	0.001	0.002	0.87	0.383
High School Avg	0.000	0.000	0.24	0.809
Age	-0.001	0.002	-0.43	0.668
Age^2	0.000	0.000	0.08	0.935
Domestic (0/1)	-0.049	0.026	-1.89	0.059
Full Time (0/1)	0.004	0.005	0.8	0.422
Gender Female (0/1)	0.003	0.003	0.96	0.338

Wald test of exogeneity (/athrho = 0): chi2(1) = 0.11 Prob > chi2 = 0.736

The following control variables were included in the model but omitted from the summary table: academic program of study, subject, academic level and a course/teacher factor variable.

Average marginal effects (probability of positive outcome) by delta method

	Value	Std. Error	z	p-value	95% CI Lower	95% CI Upper
Hybrid (0/1)	0.005	0.005	0.82	0.412	-0.006	0.015
GPA	-0.025	0.003	-9.07	0.000	-0.030	-0.019
High School Avg	-0.001	0.000	-2.81	0.005	-0.002	<.001
Age	0.008	0.003	2.43	0.015	0.002	0.015
Age^2	0.000	0.000	-2.27	0.023	0.000	<.001
Domestic (0/1)	-0.014	0.041	-0.34	0.731	-0.095	0.067
Full Time (0/1)	-0.014	0.009	-1.57	0.116	-0.031	0.003
Gender Female (0/1)	-0.013	0.006	-2.26	0.024	-0.025	-0.002

dy/dx for factor levels is the discrete change from the base level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