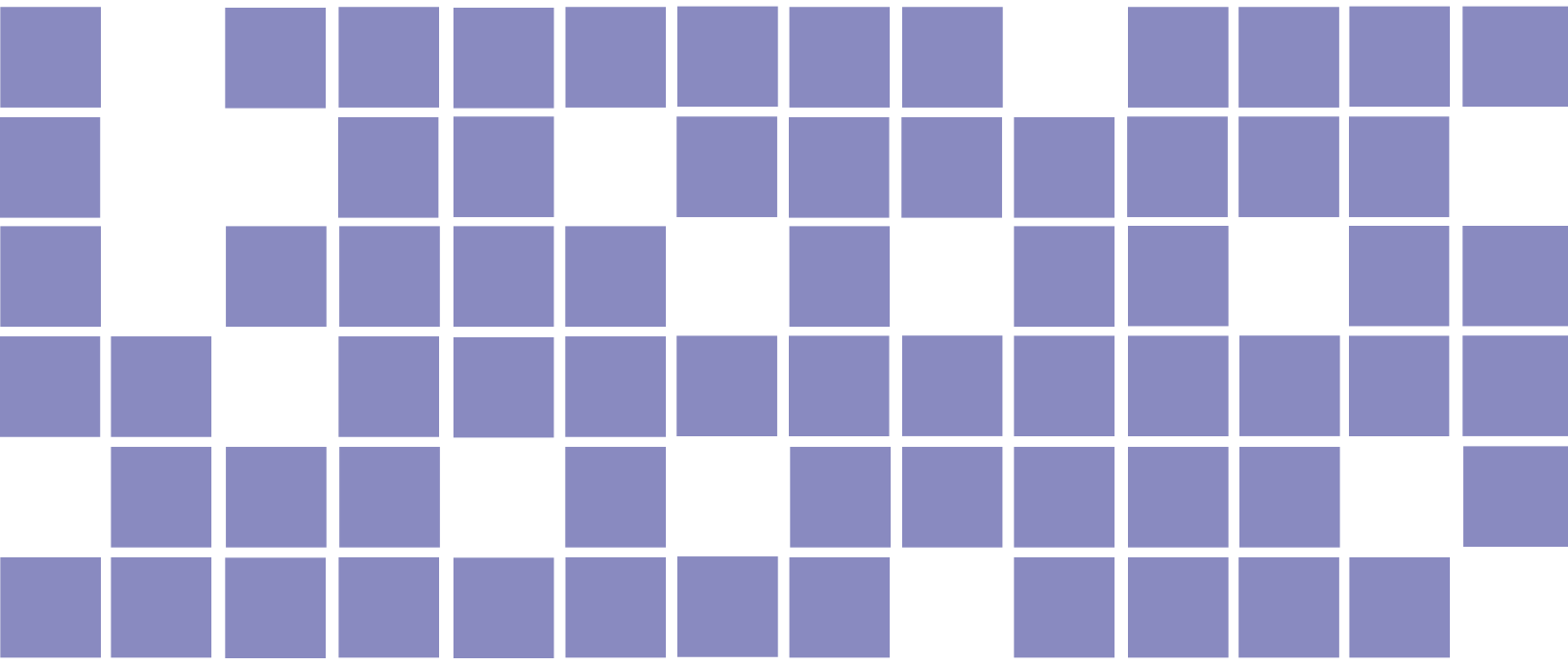
UBC MOOC PILOT

DESIGN AND DELIVERY OVERVIEW



EXECUTIVE SUMMARY

UBC successfully delivered five massive open online courses (MOOCs) in the spring and summer of 2013. Individual MOOCs incorporated different pedagogical design strategies to achieve their desired learning outcomes and course objectives. The pilot MOOCs lasted from five to eleven weeks and provided tens of thousands of learners worldwide, including over 8,100 students who earned certificates for completing the courses, with an opportunity to engage with UBC instructors and learning materials. Development of these courses involved the creation of large amounts of new learning material, including more than 60 hours of video-based lectures, 98 text-based module pages, 1,040 quiz questions, the use of tools outside of the Coursera platform, and multiple innovative learning activities. Learning materials from the MOOCs have been, or will soon be, used by hundreds of UBC students in credit-bearing courses. Additionally, instructors made efforts to facilitate the reuse of their learning materials through the use of Creative Commons licenses and the transferring of content to additional platforms beyond the Coursera platform, such as external YouTube channels.

The MOOC pilot supported UBC's learner-centred focus in the classroom by providing a rich set of resources and strategies to support flexible learning options for students who are registered in UBC courses. These strategies include the processes and best practices for the development of media-rich learning materials, agile approaches to course delivery, and instructional design strategies to better scaffold self-based, peer-based, and open learning efforts.

Key development and delivery lessons learned from the pilot included:

It takes a village to develop a MOOC

Course development and delivery involved teams with a diverse set of roles and expertise. In addition to the course instructor, instructional designers, media producers, web programmers, and student academic assistants were involved in the success of the pilot. Partner relationship management at both strategic and operational levels was also important.

There was inherent tension between scalability and functional capability in MOOC delivery

Instructors in the pilot scaled back the design of their courses as the Coursera platform did not natively support a way to assess or deliver the types of activities they originally envisioned. Formally assessing activities that were conducted using tools external to the Coursera platform was technically challenging and often relied upon using work around strategies based on Coursera's peer assessment functionality.

MOOCs represented a way for instructors to "publish" their teaching

The ability to expose their subject knowledge and expertise, as well as their teaching ability and practices, to a broad audience was a motivating factor for instructors.

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

3 INTRODUCTION

- 3 Table 1: Courses Delivered during MOOC Pilot
- 4 Table 2: Overview of Enagagement with Coursera-based Pilot Offerings

5 COURSE DESIGN AND PRODUCTION

- 5 Table 3: Course Elements
- 6 Table 4: Media Production Strategies

8 COURSE DELIVERY

9 DEVELOPMENT AND DELIVERY COSTS

- 9 Figure 1: Overview of MOOC Pilot Costs by Category

10 DEVELOPMENT AND DELIVERY CHALLENGES

11 DEVELOPMENT AND DELIVERY LESSONS

13 LEARNER DEMOGRAPHICS

- 14-15 Table 5: Comparison of Learner Demographics

16 COURSE ACTIVITY

- 16 Table 6: Aggregate Course Activities
- 17 Figure 2: Number of Students Who Watched Lectures Per Week
- 18 Figure 3: Number of Students Who Submitted Quizzes Per Week

19 MOOCs AS OPEN EDUCATION RESOURCES AND ON-CAMPUS REUSE

20 CONCLUSION

21 APPENDIX A: SPECIFIC COURSE OVERVIEWS

25 APPENDIX B: COURSE EXPENDITURE COMPARISONS

26 APPENDIX C: POSITIVE STUDENT FEEDBACK

30 ACKNOWLEDGEMENTS

In response to requests from UBC faculty members in the early summer of 2012, UBC contracted with Coursera (a US-based platform provider) in September of that year to pilot a limited number of Massive Open Online Courses (MOOCs). MOOCs are non-credit offerings that may be taken by large numbers of learners from around the world for free. UBC's participation in MOOC development represented an opportunity to explore a rapidly evolving on-line teaching and learning space and bring the lessons learned into our on-campus and online courses. UBC's initial announcement about the pilot project is available at open.ubc.ca/coursera.

In total, five courses (Table 1) were developed as part UBC's MOOC pilot; Game Theory I and II courses were developed and delivered in partnership with Stanford University. The first MOOC was offered in January 2013 and all four other initial offerings were completed by September 2013. Four courses leveraged Coursera (www.coursera.org) for delivery, whereas Game Theory II was delivered (by faculty election) on Google's open course platform, Course Builder. For the purposes of this report, we focus on the four Coursera-based courses, where institutional support efforts were concentrated.

Table 1: Courses Delivered during MOOC Pilot

Course Name	Instructor(s) (all from UBC unless specified)	Start Date	Course Length
Game Theory	Dr. Kevin Leyton-Brown, *Dept of Computer Science* Dr. Matt Jackson (Stanford University) Dr. Yoav Shoham (Stanford University)	January 7, 2013	7 Weeks
Useful Genetics	Dr. Rosie Redfield, *Dept of Zoology*	May 1, 2013	11 Weeks
Climate Literacy: Navigating Climate Change Conversations	Dr. Sara Harris, *Dept of Earth, Ocean & Atmospheric Sciences* Dr. Sarah Burch, *UBC Continuing Studies Centre for Sustainability*	May 17, 2013	10 Weeks
Game Theory II: Advanced Application	Dr. Kevin Leyton-Brown, *Dept of Computer Science* Dr. Matt Jackson (Stanford University) Dr. Yoav Shoham (Stanford University)	May 27, 2013	5 Weeks
Introduction to Systematic Program Design 1	Prof. Gregor Kiczales, *Dept of Computer Science*	June 3, 2013	8 Weeks

Basic statistics for the Coursera-based courses are included in Table 2. Approximately 330,150 people signed up for the initial UBC MOOC offerings and, of these total sign-ups, 164,935 learners logged into a course at least once. In aggregate, 5% percent of these learners, 8,174 in total, earned course certificates.

Table 2: Overview of Engagement with Coursera-based Pilot Offerings

Statistics Category	Useful Genetics	Climate Literacy	Systematic Program Design 1	Game Theory 1	**Pilot Total**
Total sign-ups	37,721	24,303	78,704	189,423	330,151
Total active students*	17,411	13,553	49,006	84,965	164,935
Signature Track sign-ups	98	236	601	N/A	935
Number of final exams taken	705	1,161	1,683	8,482	12,031
Number of certificates earned	590	750	1,749	5,085	8,174
Normal	407	435	509	3,016	4,367
Distinction	183	315	1,240	2,069	3,807

**Defined as logging into the course at least once during the delivery phase .*

This pilot project aligned with UBC's value as stated in Place and Promise (2009): "The University supports scholarly pursuits that contribute to knowledge and understanding within and across disciplines, and seeks every opportunity to share them broadly." Furthermore, the pilot served as a rich information source and innovation test bed for UBC's Flexible Learning Initiative (flexible.learning.ubc.ca).

330,150
people signed up for the initial UBC MOOC offerings

164,935
learners logged into a course at least once

8,174
learners earned course certificates

COURSE DESIGN AND PRODUCTION

MOOCs are an emerging delivery model predicated on the provision of free and open access to courses to large numbers of learners. Course design for this pilot was primarily the responsibility of the instructors but took place in a context of course and support teams with a variety of roles and expertise. None of the pilot instructors had taught a fully online distance course before. The UBC Centre for Teaching, Learning & Technology (CTLT), the Faculty of Science, and UBC Continuing Studies provided instructional design and project management support, UBC IT Creative Services provided media development support, the Office of the University Counsel provided contract support, and department-based graduate and undergraduate academic assistants provided in-depth production and delivery assistance.

Coursera-based courses consist of instructor-centric video lectures, text-based html pages, automated or peer calibrated assessments set at regular intervals, and peer supported learning though discussion forum engagement and peer assessment activities. Instructors had different expectations and approaches to the pedagogical design and development of their courses. Course teams worked with instructional design staff to implement different design and delivery strategies based upon their desired learning outcomes, course objectives and platform functionality.

Table 3 provides an overview of some of the primary course elements. Please see Appendix A for specific course level information.

Table 3: Course Elements

Course Elements	Useful Genetics	Climate Literacy	Systematic Program Design 1	Game Theory	Game Theory II	**Pilot Total**
Course Length (weeks)	11	7	8	7	5	38
Total Number of Video Lectures	107	38	86	48	26	305
Total Minutes of Video Produced	1,802	405	857	458	343	3,865
Total Number of Quiz Questions	480	201	175	93	100	1,049
Graded	170	165	95	60	70	560
Un-graded (practice or in-video)	310	36	80	33	30	489
Peer Assessments	1	2	1	-	-	4
HTML Module Pages	29	21	38	4	6	98
Other Exercises	1	-	-	8	n/a	9

Although they were not the only format of learning material, video resources did constitute a major component of the pilot courses. Each of the courses developed different models for their media production. Table 4 provides an overview of the different media development strategies employed by the individual courses.

Table 4: Media Production Strategies

Type	Description	Advantages	Disadvantages
Intensive Studio Production Model (Climate Literacy)	Authors worked with a video director/producer for filming; studio post-production team created animations, graphics, and other dynamic post-production effects.	• Professionally produced videos with little media production expertise needed by the instructors.	• More expensive • Less instructor control over process • Production and post-production processes (including corrections and edits) can be slow.
Hybrid Instructor/Studio Produced Model (Systematic Program Design)	Studio filmed "head shot" introduction and conclusion per lecture; used desktop model to record the lecture material segments, which were voice-over screen captures of a programming environment. Instructor does all editing and post-production, including annotations.	• Flexible, allows spectrum of video types to be produced; • Technical parameters (e.g., lighting, sound) handled by the studio while instructor retains control over aspects of production; • Instructor has complete control over materials and format, enabling strong instructor presence.	• Instructors need time to gain media production expertise. • Overall instructor time and resource needs can be high and challenging to track
Light Studio Production Model (Game Theory I & II)	Instructor filmed lecturing in front of a green screen, slides captured from tablet. Slide and instructor composited in post production. No graphics and animations; minimal post-production editing.	• Professionally filmed videos with no media production expertise needed by the instructors; • Little to no studio pre-production needed; • Full process is fast and minimal time is needed for post-production phase.	• Rigid format with low customization capability. • Production and post-production processes (including corrections and edits) can be slow.
Instructor-Produced Model (Useful Genetics)	Instructor and course team produced all video content using desktop equipment (external HD webcam, Wacom tablet for slide annotation, and lighting and sound equipment). Instructor and course team did all pre- and post-production for the videos using screen capture software (e.g. Camtasia).	• Instructors gain media production expertise and can create videos to fit their specific needs on their own schedule; • Studio costs low • Instructor has complete control over materials and format, enabling strong instructor presence; • Agile process, the videos can be created, edited, and refreshed quickly and in-expensively	• Instructors need time and support to gain media production expertise • Technical details (lighting, sound, etc.) can be very hard to control outside of studio; • Inconsistencies across different devices can make technical support and trouble-shooting difficult; • Overall instructor time and resource needs can be high and challenging to track.

Non-video learning content included text-based module pages, quizzes, peer assessments, external resources, and programming files. Strategies for creating and implementing these materials varied across the courses, with some courses depending upon their instructors and graduate or undergraduate academic assistants to completely manage this process while others relied upon CTLT instructional design and programming support staff. For example, the Climate Literacy instructors and graduate academic assistants developed the content module pages and quizzes in a Word-documents format, which was then sent to the CTLT to be developed on the Coursera platform. After materials were implemented in the course shell, quality assurance testing involving both the CTLT and instructors was performed. Additional quality assurance testing happened when the module opened.

With the exception of Game Theory, instructors chose to structure their courses through the creation of module pages for each week. Although Coursera supported this approach, it was not a default of method of course organization; instead the platform organization default was based on separate auto-generated indexes of video lectures, quizzes, and assignments. The use of module pages allowed instructors to better scaffold learning by providing clear pathways and learning goals for each week. Module pages included information on the amount of time needed to complete the module, learning goals, overview and information about the activities for that module, lecture videos, external readings and exercises, and additional quiz or assignment help.

COURSE DELIVERY

All courses produced approximately two to three weeks of complete course materials by the time the individual courses opened. Thus the course teams continued to be in a development phase during the delivery of the courses, necessitating a "just-in-time" approach to the course development, production, and delivery.

During delivery of the courses, the instructors, academic assistants, and CTLT support staff were involved in the following activities:

- Monitoring course forums
- Responding to student questions and comments in forums
- Hosting live weekly "office hours" using Google Hang-outs
- Revising and refining course materials based on student feedback
- Troubleshooting course material issues reported by learners
- Escalating platform and technical issues to Coursera staff
- Ongoing production and implementation of upcoming course modules

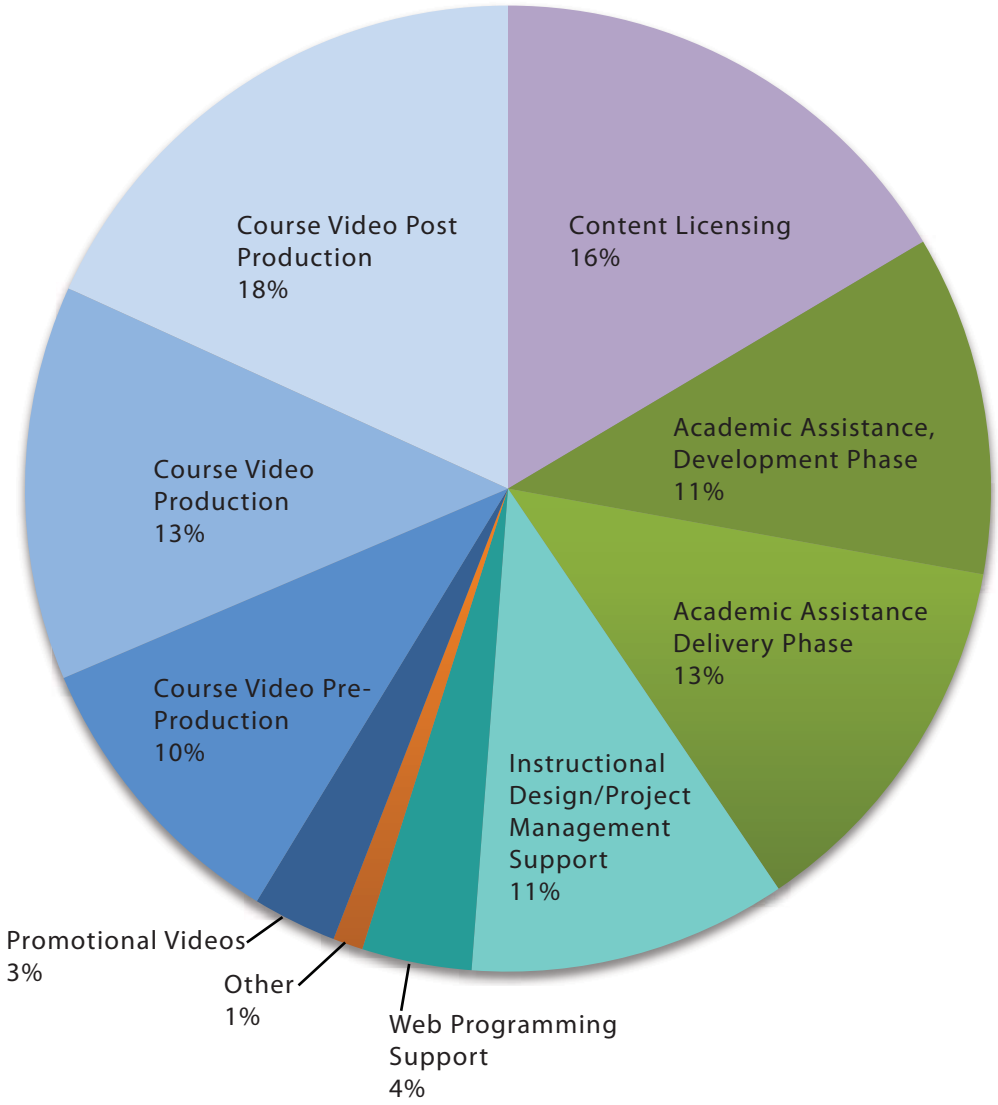
Graduate and undergraduate academic assistants were a crucial component in all courses. The "just in time" production model for these courses created a greater reliance upon the academic assistants in the design, development and delivery phases of all pilot courses. The academic assistants, under the direction of the instructor, supported the teaching of these courses by developing course materials, directly assisting learners, troubleshooting platform settings, performing QA testing, and many other activities.

The scale of the pilot courses allowed for very little one-to-one interaction between instructors and learners; almost all course interaction happened in the course forums. One of the major activities that the academics assistants performed was forum monitoring and moderating. Across the pilot courses, the academic assistants had subject expertise and were generally encouraged to respond directly to learners in the forums or to bring activity to the attention of the instructor.

DEVELOPMENT AND DELIVERY COSTS

Production and delivery costs for these courses fell broadly into the categories of video production (44%), academic assistance (24%), instructional design and web programming (15%), and content licensing (16%). Figure 1 provides an overview of the costs by category for all courses involved in the pilot. Please see Appendix B for the specific costs per course. Please note, we are capturing only the direct costs; faculty time and strategic coordination support are not included.

Figure 1: Overview of MOOC Pilot Costs by Category



DEVELOPMENT AND DELIVERY CHALLENGES

Challenges encountered during the development and delivery of the pilot courses included:

Copyright

Copyright posed a challenge in the development of pilot courses due to an inability to incorporate Library-licensed materials such as links to subscription-based journal articles, the lengthy duration involved in the permission seeking process, and a conservative approach to relying upon fair dealing exceptions. Instructors instead shifted to using self-created materials as well as open-access readings, textbooks, and resources. The process for finding appropriate and useful materials increased production times.

Time Costs and Need for Agility

The pilot involved higher than expected time demands on all people involved. The compressed time frame prompted a need to build out an agile development-support model in order to be able to respond to development needs rapidly.

Academic Assistant Instructional Support

Activity in the MOOCs happened 24 hours a day and it was important for course teams to set clear schedules and expectations on academic assistant time. Additionally, there was a need for scaffolding better academic assistant support through the development of support resources and training on core MOOC activities, such as forum moderation.

Ongoing Platform Learning Curve

Iterative upgrades of the Coursera platform throughout the pilot resulted in shifts in the interface and functionality. Instructors and course teams had different levels of comfort with ambiguity around platform functionality.

Partner Relationship Management

The pilot involved course teams working with various groups both within (e.g. UBC studio, CTLT) and external to UBC (e.g. Coursera, Stanford). There was a need to ensure that external contracts with Coursera and partner institutions protected and supported UBC instructors and the University. Additionally, there were learning curves associated with adapting to partner workflows, which lead to increased development time.

DEVELOPMENT AND DELIVERY LESSONS

Observations from the pilot included:

Students appear to respond positively to instructor engagement

While the scale of the pilot courses did not allow for direct one-to-one communication between instructors and individual learners, learners almost always responded positively to instructor engagement in the discussion forums and course announcements. This engagement, although time consuming when done at scale, created real instructor presence within the course which supported the MOOC's learning community development.

UBC's past experience in developing traditional online courses informed the ability to develop pedagogically well-designed MOOCs

UBC's experience in instructional design for distance and blended learning provided a grounding for designing well structured courses that went beyond default MOOC models. Careful articulation of learning goals, well designed course activities, and structured course modules were especially important for with the diverse range of learners with different motivations, expectations, and learning styles. There are still opportunities to explore and implement instructional design models to better engage learners in the critical first two weeks of a course and beyond. Peer to peer support is also an important aspect of MOOCs and can be scaffolded through learner engagement and community building strategies.

MOOC students were motivated by grades

Even though none of the courses in the pilot could be taken for credit, grades were an important motivating factor for many learners. Ungraded learning activities had lower participation rates than graded activities.

There was an inherent tension between scalability and rich assessment functionality in online course delivery

Almost all instructors in the pilot scaled back the design of their courses as the Coursera platform did not support a way to assess the types of activities they wished to use. Formally assessing activities outside the platform was technically challenging and often relied upon using work around strategies based on Coursera's peer assessment functionality.

MOOC instructors faced open discussion and critiques of their subject knowledge and teaching strategies

Learners in the MOOC pilot felt comfortable critiquing all aspects of course content, learning activities and instructor performance. Additionally, MOOC participant demographics different from those of on-campus students and the pilot MOOCs included learners with subject knowledge and teaching expertise. Critical feedback came from both learners and peers (which could be the same individual).

A motivation for instructors to develop MOOCs was the opportunity for instructors to "publish" their teaching

Instructors in the MOOC pilot were interested in reaching a larger audience on important topics. Additionally, the instructors were deeply engaged in the pedagogical process of teaching. The opportunity to expose their subject knowledge and expertise, as well as their teaching ability and practices, to a greater audience was a motivating factor for instructors.

MOOCs require significant investments

These investments include faculty time, staff expertise, relationship building, and dollars that are difficult to capture. In general, everyone involved with the MOOC pilot contributed significantly greater efforts and time to the project than was anticipated.

MOOC platforms are rapidly evolving

Coursera, as a platform, was in a state of constant, iterative change throughout the pilot, which required a moderately-high threshold for technological ambiguity and agility as features and processes are added or changed.

LEARNER DEMOGRAPHICS

The profile of learners who engaged with the Coursera-based courses in the MOOC pilot mostly matched the overall profile trend for all Coursera users. The learners were generally in their mid-to late 30's, educated (60-70 percent having a bachelors degree or higher), and Caucasian (65-70 percent). Approximately 30 to 40 percent of learners lived in North America, with the rest being from all parts of the world:

Useful Genetics
had learners from
181
countries

Climate Literacy
had learners from
186
countries

Systematic Program Design 1
had learners from
191
countries

Game Theory
had learners from
202
countries

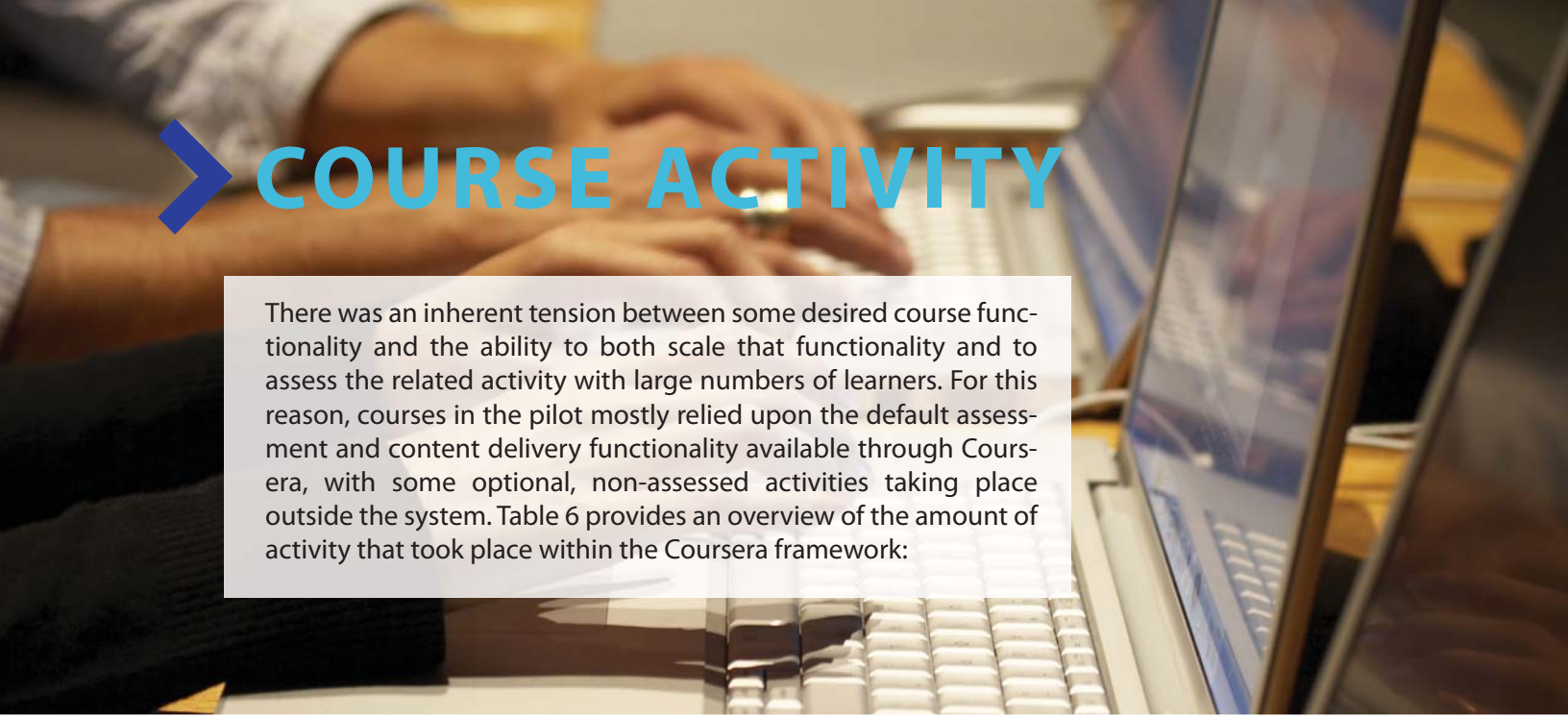
Table 5 provides an in-depth comparison of learner demographics in the Useful Genetics and Climate Literacy courses to Coursera's averages. Please note that in-depth demographic comparisons were not available for all courses due to this Coursera functionality still being in a development phase during the delivery of the courses.

Table 5: Comparison of Learning Demographics

Statistics Category	Useful Genetics Percent	Climate Literacy Percent	Systematic Program Design 1 Percent	Game Theory Percent	Coursera Average Percent
Gender					
Female	55	50	21	22	40
Male	45	50	79	78	60
Age (in years)					
13-19	4	2	3	3	n/a
20-29	42	34	43	48	
30-39	26	26	32	30	
40-49	11	13	14	11	
50-59	8	11	6	5	
60-69	6	9	2	2	
70+	3	3	1	1	
Residence (location currently living)					
United States	33	33	33	29	27
India	7	6	8	11	5
Canada	5	6	4	3	4
United Kingdom	4	5	4	4	4
Spain	3	2	3	2	4
Brazil	3	3	2	4	5
Russian Federation	3	1	3	3	2
Germany	2	3	3	2	2
Race					
White or Caucasian	68	69	n/a	n/a	67
South Asian	11	9			8
East Asian	6	6			7
Decline to State	5	7			8
Other Asian	5	5			5
Black or African American	3	4			5

Table 5: Comparison of Learning Demographics (cont'd)

Statistics Category	Useful Genetics Percent	Climate Literacy Percent	Systematic Program Design 1 Percent	Game Theory Percent	Coursera Average Percent
Education					
Bachelor's Degree	31	35	36	35	34
Master's Degree	29	33	30	35	31
Some College But No Degree	11	9	11	8	9
High School Diploma or Equivalent	8	5	8	8	7
Doctorate Degree	8	7	5	6	7
Professional School Degree	5	4	2	3	5
Some High School	4	2	3	2	2
Student Status					
Not a student	62	69	66	61	68
Full Time Student	28	10	25	29	20
Part Time Student	9	20	10	10	11
Employment Status					
Employed Full Time	41	45	55	55	54
Unemployed and Looking For Work	14	14	15	13	11
Employed Part Time	12	11	8	9	10
Unemployed and Not Looking for Work	11	8	8	10	6
Self Employed Part Time	5	6	4	4	5
Self Employed Full Time	4	5	5	5	6



COURSE ACTIVITY

There was an inherent tension between some desired course functionality and the ability to both scale that functionality and to assess the related activity with large numbers of learners. For this reason, courses in the pilot mostly relied upon the default assessment and content delivery functionality available through Coursera, with some optional, non-assessed activities taking place outside the system. Table 6 provides an overview of the amount of activity that took place within the Coursera framework:

Table 6: Aggregate Course Activities

Course Activities	Useful Genetics	Climate Literacy	Systematic Program Design 1	Game Theory
Total Videos Available	107	38	86	48
Total Video Lectures Streamed	258,666	173,870	689,935	1,169,252
Total Video Lectures Downloaded	438,760	110,071	735,645	1,139,415
Unique Video Lectures Watched	358,980	148,174	685,535	1,292,015
Total Quiz Questions Available	480	201	175	93
Total Module Quiz Submissions	49,537	33,335	56,524	241,558
Total Forum Activity (# of Threads, Posts, and Comments made)	14,078	33,055	21,059	12,403

Activities that took place outside of the Coursera platform included links to open-access readings and online activities, the use of a third-party only mapping platform to create a student produced global map of climate change impacts, the use of a third party tool to support learners in the creation and discussion of new genetics assessment questions, and a UBC hosted online game based environment to illustrate game theory concepts.

Across the pilot course, there were higher levels of engagement with activities that were graded than optional or non-graded activities. For example, Climate Literacy was the only course in the pilot in which forum participation was part of the grading policy, which resulted in a much higher rate of forum activity than the other courses.

All courses in the pilot followed the same general trend for student engagement over time:

- A high percentage (45-60%) of the people who enrolled in a course before it started never logged into or engaged with the course once it launched.
- There were steep declines in engagement with course activities during the first two weeks of the course.
- By the third week of a course, these declines became more gradual and flattened during the final weeks of delivery.

These figures can be seen in Figures 2 and 3, which show the amounts of students who watched lectures and took quizzes per week on the Coursera platform.

Figure 2: Number of Students Who Watched Lectures Per Week

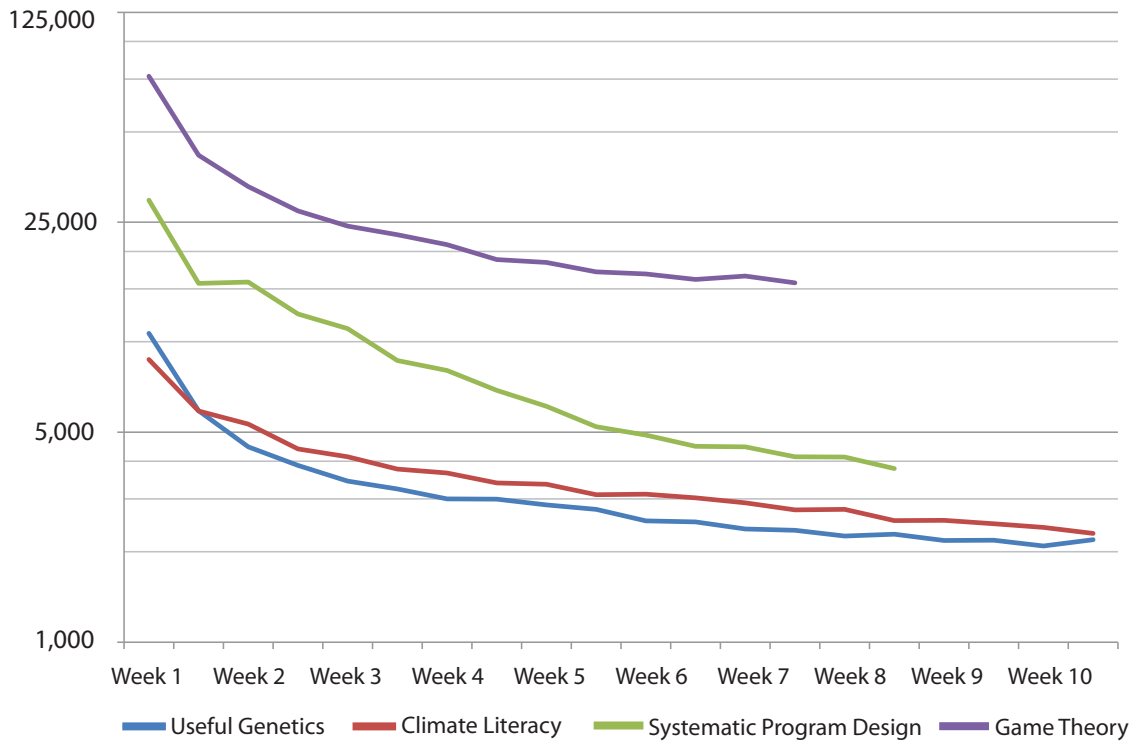
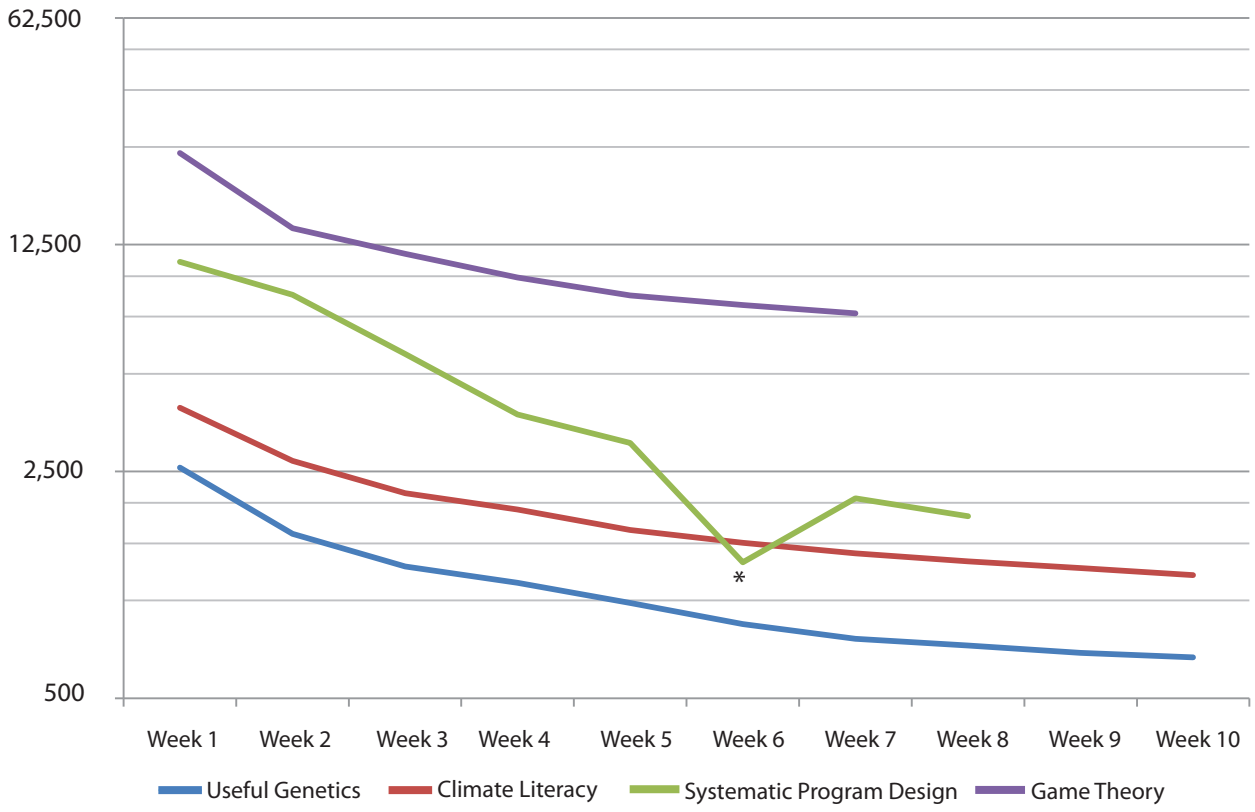


Figure 3: Number of Students Who Submitted Quizzes Per Week



** The week 6 quiz for Systematic Program Design was not formally assessed.*

MOOCs AS OPEN EDUCATION RESOURCES AND ON-CAMPUS REUSE

The instructors in the pilot valued the potential for reuse of their MOOC-based learning materials produced at UBC and beyond. Four of the courses (Game Theory I and II, Systematic Program Design, and Useful Genetics) have already, or will soon, incorporate their MOOC materials into their UBC credit bearing classes in a flipped classroom model. These materials will be, or have already been, used by hundreds of UBC students across multiple sections of the credit-bearing courses.

All instructors incorporated an open access approach to their courses. This was accomplished by:

Leaving their courses active and open for enrollment on Coursera

Even though these courses have ended, the instructors have set their courses to be continually accessible. Individuals, who have signed up for a Coursera account, may still enter the course and engage with the materials and activities. Although they will not be able to earn a certificate, they will still be able to learn from the resources in a self-paced model.

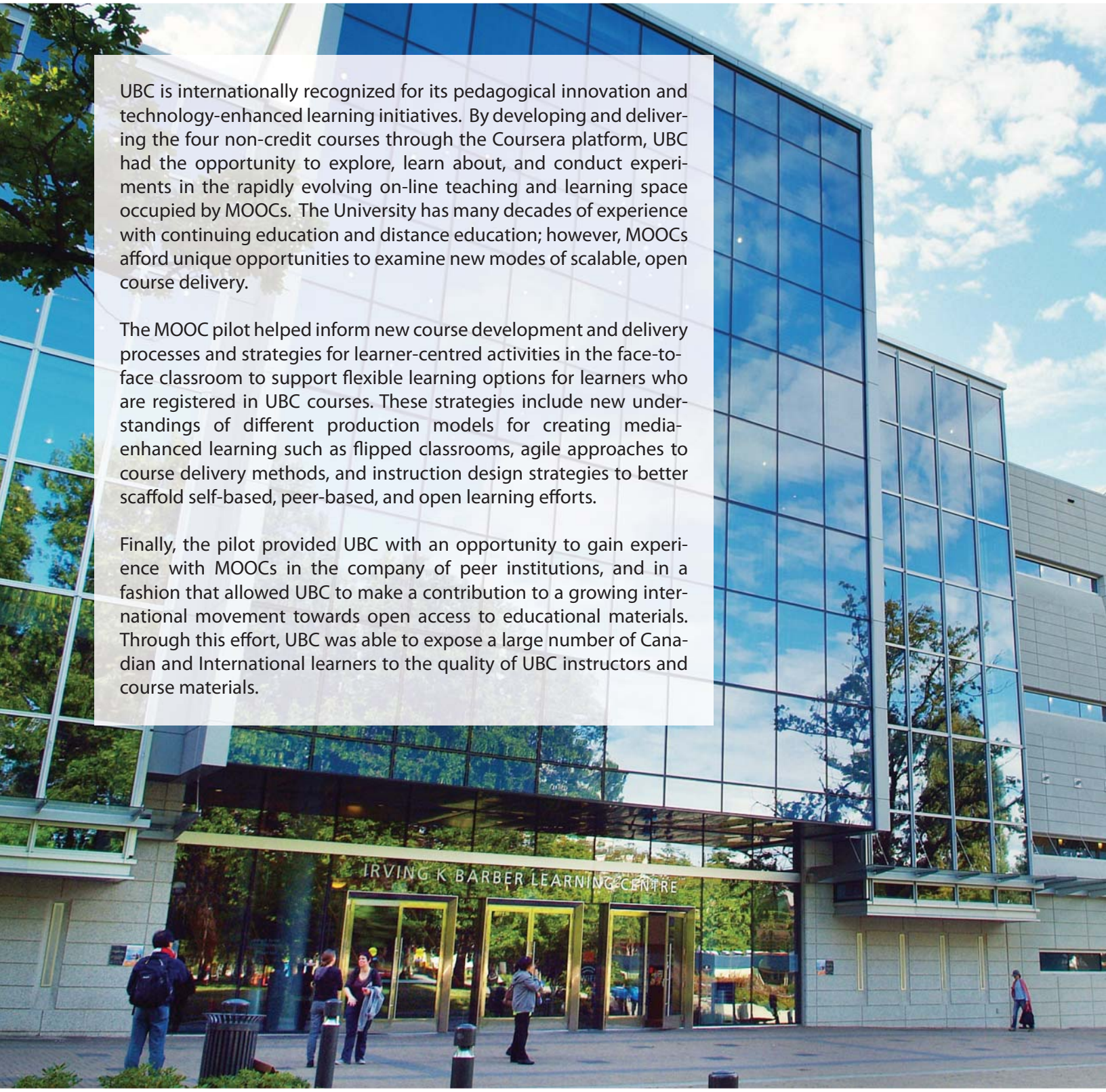
Porting their content outside of the Coursera platform

Course teams provided alternative access to their learning materials by duplicating their content on spaces outside of the Coursera platform. For example, all courses added their lecture videos to YouTube, which allowed learners to both watch their videos without needing to create a Coursera account and to embed their videos in other spaces such as a learning management system or website.

Encouragement of reuse through clear license statement

Two of the courses (Climate Literacy and Useful Genetics) added Creative Commons licenses to their materials, which explicitly allows for the reuse of those materials without the need for advanced permission as long as the terms of the licenses are met (such as non-commercial use only).

CONCLUSION



UBC is internationally recognized for its pedagogical innovation and technology-enhanced learning initiatives. By developing and delivering the four non-credit courses through the Coursera platform, UBC had the opportunity to explore, learn about, and conduct experiments in the rapidly evolving on-line teaching and learning space occupied by MOOCs. The University has many decades of experience with continuing education and distance education; however, MOOCs afford unique opportunities to examine new modes of scalable, open course delivery.

The MOOC pilot helped inform new course development and delivery processes and strategies for learner-centred activities in the face-to-face classroom to support flexible learning options for learners who are registered in UBC courses. These strategies include new understandings of different production models for creating media-enhanced learning such as flipped classrooms, agile approaches to course delivery methods, and instruction design strategies to better scaffold self-based, peer-based, and open learning efforts.

Finally, the pilot provided UBC with an opportunity to gain experience with MOOCs in the company of peer institutions, and in a fashion that allowed UBC to make a contribution to a growing international movement towards open access to educational materials. Through this effort, UBC was able to expose a large number of Canadian and International learners to the quality of UBC instructors and course materials.

APPENDIX A: SPECIFIC COURSE OVERVIEWS

Course Title	Useful Genetics
Instructor	Rosemary Redfield
Course Summary	Useful Genetics aims to teach ordinary people the genetics they will actually use. The course focuses on gene function and inheritance and provides a solid understanding of genetic principles that helps students understand recent issues, but also future challenges.
Start Date	May 1, 2013
Length	12 Weeks
Estimated Workload	6-8 hours/week
Social Media Impacts	Tweets: 181 Google+: 68 Facebook Likes: 989
Recommended Background	No prerequisites Prior knowledge of basic biology helpful
Course Elements	• Videos lectures with in-video quizzes • Open-access readings • Self-test practice problems • Module quizzes • Midterm quiz • Final Exam • Optional online learning activity based in PeerWise
Video Statistics	• Total # of Videos: 107 • Total length of videos: 1,802 min 57 sec • Longest Video: 37 min 49 sec • Average: 16 min 55 sec
Assessment Statistics	• Total # of Questions: 480 • Graded # of Questions: 170 • Ungraded # of Questions: 310
Grading Policy	• 50% - Module quizzes • 20% - Midterm • 30% - Final Exam
Statements of Accomplishment Thresholds	• 50% - Passing • 80% - Distinguished

Course Title	Climate Literacy: Navigating Climate Change Conversations
Instructor	Sarah Burch & Sara Harris
Course Summary	Climate Literacy is an introduction to the basics of the climate system, models and predictions, human and natural impacts, mitigative and adaptive responses, and the evolution of climate policy. In the course students will learn the effect of human fossil emissions and land use changes, be able to explain the evidence attributing to global warming because of humans, and be able to express informed opinions on the work being done to mitigate and adapt to climate change.
Start Date	May 20, 2013
Length	10 Weeks
Estimated Workload	3-5 hours/week
Social Media Impacts	Tweets: 261 Google+: 112 Facebook Likes: 1.3k
Recommended Background	None
Suggested Readings	None
Course Elements	• Videos lectures with in-video quizzes • Open-access readings and activities • Quizzes • Peer Reviewed written assignments • Final exam • Optional online activity: Documenting climate change impacts on Climate Literacy Map
Video Statistics	• Total # of Videos: 38 • Total length of videos: 404 min, 54 sec • Longest Video: 21 min, 31 sec • Average: 10 min, 39 sec
Assessment Statistics	• Total # of Questions: 201 • Graded # of Questions: 165 • Ungraded # of Questions: 36 • Peer Assessments: 2
Grading Policy	• 45% - Quizzes (Top 8 out of 9 quizzes) • 20% - 2 peer assignments • 15% - Participation in the forum • 20% Final Exam
Statements of Accomplishment Thresholds	• 65% - Passing • 85% - Distinguished

Course Title	Game Theory
Instructor	Kevin Leyton-Brown (UBC); Matthew O. Jackson (Stanford University); Yoav Shoham (Stanford University)
Course Summary	Game theory is the strategic interactions among self-interested agents. The essential tool is to understand human interactions from auctions to international conflict. This course is an introduction to the basics of game theory such as representing games and strategies, the extensive form/game trees, Bayesian games, repeated and stochastic games, and more. Classic games and real-world applications are used to reinforce lessons.
Start Date	January 7, 2013
Length	7 Weeks
Estimated Workload	5-7 hours/week
Social Media Impacts	Tweets: 1,540 Google+: 1k Facebook Likes: 10k
Recommended Background	• Comfortable with mathematical thinking and rigorous arguments. • Little specific math. • Lightweight probability theory. • Lightweight calculus
Course Elements	• Videos lectures with in-video quizzes • Module Quizzes • Online Lab Exercises • Problem Sets • Final Exam • Screen-side Chats
Video Statistics	• Total # of Videos: 48 • Total length of videos: 458 min 27 sec • Longest Video: 28 min 44 sec • Average: 9 min 33 sec
Assessment Statistics	• Total # of Questions: 93 • Graded # of Questions: 60 • Ungraded # of Questions: 25 • Online lab exercises: 8
Grading Policy	• 70% - Module Quizzes • 30% - Final Exam
Statements of Accomplishment Thresholds	• 70% - Passing • 90% - Distinguished

Course Title	Introduction to Systematic Program Design 1
Instructor	Gregor Kiczales
Course Summary	Computers appear everywhere in our everyday lives, therefore the ability to design a program or at least communicate effectively with those that do is an important skill to have. This course focuses on a design method that teaches students how to systematically design a program. During the course students will learn how to use program languages and libraries, and design complex program that can be read by not only a computer but also be understood by people.
Start Date	June 3, 2013
Length	8 Weeks
Estimated Workload	7-9 hours/week
Social Media Impacts	Tweets: 335 Google+: 522 Facebook Likes: 1.6k
Recommended Background	None
Course Elements	• Videos • Assigned design problems • Small projects • Final exam
Video Statistics	• Total # of Videos: 86 • Total length of videos: 857 min 7 sec • Longest Video: 29 min 51 sec • Average: 9 min 58 sec
Assessment Statistics	• Total # of Questions: 175 • Graded # of Design Problem-base Questions: 95 • Ungraded # of Questions: 80 • Peer Assessed Project - 1
Grading Policy	• 40% - Homework (Top 7 of 8) • 30% - Peer Graded Project • 30% - Final Exam
Statements of Accomplishment Thresholds	• 50% - Passing • 80% - Distinguished

APPENDIX B: COURSE EXPENDITURE COMPARISONS

Note, direct costs only; estimates do not include faculty time and coordination support.

Cost Category	Useful Genetics	Climate Literacy	Systematic Program Design 1	Game Theory I & II	Pilot Total
Course Length	11 weeks	10 weeks	8 weeks	7 weeks / 5 weeks	
Project Support					
Content Licensing	10,000	10,000	10,000	10,000	40,000
Instructional Support, Development Phase	8,785	2,170	7,470	5,785	24,210
Instructional Support, Delivery Phase	11,570	2,170	7,470	5,785	26,995
Project Manager/ Instructional Designer	14,400	6,480	720	1,080	22,680
Web Programmer	6,120	1700	0	0	7,820
Graphic Design	0	301	301	0	602
Media Production					
Promotional Video	1,500	1,500	1,500	1,500	6,000
Development Meetings	510	0	0	0	510
Location Consulting	1,020	0	0	0	1,020
Course Video Pre-Production	0	20,000	680	340	21,020
Course Video Production	0	20,000	5,100	3,000	28,100
Course Video Post Production	0	20,000	4,975	13,725	38,700
TOTAL	**$53,905**	**$84,321**	**$38,216**	**$41,215**	**$217,657**

APPENDIX C: POSITIVE STUDENT FEEDBACK

The following is a sampling of positive learner comments from the course discussion forums.

> This class has been interesting, informative, stimulating, and a wonderful 10-week journey that has changed / expanded my level of thinking in so many ways.

> It was one of the most interesting, informative, best presented and enjoyable courses I've ever taken (BSEE/MBA). My compliments on the outstanding organization, presentation and technical management of the course materials and the website/forums.

> I really enjoyed the detail and rigor of this course. This was my first college-level science course in 25 years, so much of the material was completely new to me. I found it very engagingly and clearly presented. The experience of the staff, particularly Dr. Redfield, really showed. I also appreciate very much the way you engaged with us in the forums - fair and very reasonable. It seemed clear to me that you were all very much interested in us learning the material. Along the way I found myself understanding more about how to think like a geneticist, and perhaps more importantly where the limits of my knowledge are.

> I want to make note that I believe the quality of the course and the knowledge imparted are on par or superior to the best undergraduate courses I have taken. Already, I feel competent to understand information about genetics -- a field that is increasingly in the public domain and important for the understanding of experiences in my day to day life.

I would dare to say that this is by far the best course I've taken in coursera so far. It's really complete, I've seen great follow up from the teachers and great interaction in the discussion forums. I would be soooo happy if the teachers ever decided to offer more courses to broaden the topic, or on different topics. After this I've even began to consider a master's degree from UBC. I hadn't event thought about UBC, er even Canada, before this.

In this case, I enjoyed learning because both the instructors are really good in their pedagogy techniques and also, they came down to a lay man level to teach that is something tremendously elementary for them. And yet it was done with perfect ease and infinite patience with all our problems.

As a 2nd year teacher … I am so glad I took the time to take this class. I have learned so much and gained valuable resources which I will use this fall with my students. In addition, I teach a blended course... and am very impressed by the depth of your course as well as by the "online course specs". Love how the modules have both textual and video aspects which tie to previous knowledge/modules and prep for future ones. I also liked the variety of additional resources for each model: some videos, some websites, some documents, some simulations etc. Nice variety to keep it interesting (plan on "stealing" some of these aspects to add to my online site....when I get the time).

I was a little skeptical about MOOCs and the quality of the education provided, but I couldn't have proved more wrong! This course was very well organized, the materials (both video and readings) detailed and engaging, and the amount of study time affordable ... I feel I've learned so much after only 10 weeks of studying this completely new subject to me, and now I feel more confident when discussing climate change and policy with others. I think I have all the necessary framework, and I'm sure it's going to be a perfect foundation for more in-depth research and maybe, who knows, even continuing studying this subject at university :)

Your course has given me great insight into this world of math, calculus or whatever you are using in these explanations! AND has shown me that a life long fear-factor called math- really can be interesting and informative if taught in an interesting way

Congrats to the professors. I wish all courses in Coursera would be like this one!

Game Theory was my first course at Coursera and set my standards really high about the next ones!!

This is the first online course I've taken and it's been a great experience...It's not about a simplified version of a topic (we've got plenty of blogs, wikipedia entries and web comics for the pub quiz answer to 'what is game theory') but about applying diligent academic rigour to learn something a bit deeper about a new topic of study.

This is course is very well-done. The content is well structured and gives a broad taste of what game theory is about, lectures are very nice, the exercises although a bit simple are not just copy-paste of the examples given in the lectures so that one can think a little and the timing is excellent.

I have done a few MOOCs here and on Udacity but I'll have to admit this is one of the best in terms of course structure, design, teaching methodology, evaluation strategies, and a whole lot of other stuff.

This course has really helped me to understand how to "Think" like a programmer, and I am certain I will carry what I have learned through to many more courses. The lectures are easy to follow and after finishing the practice problems everything makes perfect sense. It is a very well designed course, even for beginner programmers. By far the best MOOC I have taken!

I have learned more in this class than I have done in any other class for a while - and I'm especially happy because my previous attempts to learn programming in any way have not been successful. Even though I'm putting a lot of time into it I often look forward to working on the problems and I'm gaining a lot of confidence.

I already participated in most of programming course of Coursera and I surely can say that this course is just the best. Now, I know –not exactly not somehow close- how to think like a programmer and how to approach a problem in order to take it apart and make a solution pattern and lots and lots of more.

ACKNOWLEDGEMENTS

Report written by:

Will Engle
Strategist, Open Education Initiatives
Centre for Teaching, Learning & Technology

With support from:

Simon Bates, Wendy Chan, Michelle Lamberson, Jeff Miller, Ido Roll

Academic Teams:

Useful Genetics
Dr. Rosemary Redfield, Alana Schick, Virginia Woloshen

Climate Literacy
Dr. Sarah Burch, Dr. Sara Harris, Justin Ritchie, Kate Le Souef

Systematic Program Design I
Prof. Gregor Kiczales, Ennas Abdussalam, Diana Bulfone, Lynsey Haynes, Thomas Leung, Victoria Loween, JJ Nunez, Thea Simpson, Michael Sun

Game Theory
Dr. Kevin Leyton-Brown, Dr. Mathew O. Jackson, Dr. Yoav Shoham, Eric Huang, Hooyeon Lee, Adrian Marple, David Thompson, James Wright

Project, Instructional, and Development Support:

Simon Bates, Chris Crowley, Saeed Dyanatkar, Will Engle, Bruce Marchfelder, Michelle Lamberson, Jeff Miller, William Kody, Jason Myers, Nicole Ronan, Chelsea Thompson

Except where otherwise noted, this work is licensed under a Creative Commons Attribution 4.0 International License. UBC logos, coat of arms, and related branding elements are copyright of The University of British Columbia and may not be altered in any way or reused separate from the work without permission. For guidelines on the permitted uses of UBC trademarks, please refer to http://universitycounsel.ubc.ca/university-trade-marks/."