

# Digital Lancaster Project Review

DEPARTMENT OF MATHEMATICS AND STATISTICS: SUPPORTING STUDYING ABROAD

DIGITAL AMBASSADOR: ZAK VARTY      SUPERVISING ACADEMIC: DR. JAN GRABOWSKI

## 1: OVERVIEW OF WHAT YOU SET ABOUT DOING

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The department of Mathematics and Statistics has a standing history of sending a sizeable cohort of students to study abroad each year. The Digital Lancaster Project for the department was aimed at helping to further support and guide these students in their studies before, during and after their time overseas. A digital approach naturally provides a solution to many of the problems which are inherent due to the large geographical distances between the students and the department during this period.

Initially, the project aimed to assess the unmet requirements of students from the department who are currently or who have previously studied abroad, this being a primary motivation for a returning student to be the digital ambassador. As well as addressing the requirements put forward by students, the department had the initial objectives of increasing communication with and between students while abroad as well as creating a repository of information on each destination from students and the host universities themselves. The second objective of the department was to develop promotional materials which could be used at open days, encouraging future applicants to apply for the study abroad programme.

The deadline for project completion was set as the end of the 2015/16 academic year so that the project could be put into practice with the student cohort studying abroad during the 2016/17 academic year. It was expected that digital training may be required in the use of Moodle or the university content management system. The project aimed to meet the Digital Lancaster initiative of digital fluency of staff and students by the ICT knowledge of the digital ambassador and expanding the channels of digital communication used by study abroad students. The project also aimed to meet the Digital Lancaster initiative of building digital communities, by creating an online environment, which could bring together students studying across the globe to share in their common experiences, where they could also be supported by both one another and the Mathematics and Statistics Department itself.

## 2: WHAT FEEDBACK DID YOU GET FROM THE STUDENTS?

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In a project targeted at increasing engagement with students who are difficult to contact, one of the largest challenges of the project was in contacting students and ascertaining what they would like from a study abroad page. The issue was caused because students who are studying abroad often do not

check their Lancaster University Email accounts, the only non-emergency contact information held by the university, unless an issue arises. This applies equally to students who have already graduated from Lancaster University, having completed a study abroad year as a part of their degree.

In order to get in touch with these hard to reach students, Lancaster Email addresses of students who were or had studied abroad were supplied by Stephen Power, the departmental study abroad coordinator. For those students who were currently studying abroad, or who had studied abroad in the previous year these Lancaster Email addresses were used as these were likely to still be in use. For students who had already graduated, the Alumni Office could not supply contact details to us directly, but kindly forwarded any messages.

Few people currently abroad or graduated replied to the Emails sent, with contact being made with only one individual from former and two individuals from the latter of each of these groups. The returned students who were completing their final year of study at Lancaster were more successful, contact being made with all five of the students who went abroad in this year, though involvement in the project varied greatly between these students.

From the students who responded there was a positive reaction to the introduction of a page relating specifically to studying abroad as a mathematics or statistics student. The recurring suggestions of the students were for an obvious line of support while studying abroad and for more information related to both course selection and day-to-day life / attractions at each host university. These suggestions were motivated by inaccessible design of some university course guides, not feeling informed about the linking of Lancaster and host course prerequisite structures and the websites of host universities being idealized versions of what it was to live there.

### 3: WHY DID YOU CHOOSE THE PLATFORM?

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To support the information repository and digital support community, Moodle was the most appropriate platform because it supports the storage and easy access of a range of media types. This is ideal for the development of an information repository which could handle both processed word documents for the module overview sheets and also hyperlinks to relevant departmental websites. Moodle also presents a simple online interface, which students can use upload helpful resources regarding their host universities, including picture and video files as well as supporting forums to facilitate student-department and student-student support.

Moodle was chosen to be the best platform for these services because is it already integrated into the systems of the university and of the department. It is important that while setting up a communication channel with students who may already feel disconnected from the university or department that no additional barriers should be raised by unfamiliar interfaces. Moodle is currently used by the Department of Mathematics and Statistics for the distribution of course materials via course pages. This means that all students should have at least a basic familiarity with Moodle interface, though these channels are infrequently used as a means of creating community and fostering communication, which the Digital Lancaster project aims to alter within the study abroad Moodle page.

To support the promotional material aimed at prospective students it was decided that the most effective platform of advertising the programme would be the production of a short video.

In current open day talks, the department usually invites a returning study abroad student to give a ten-minute presentation. This presentation covers a general overview of the study abroad programme, what it entails, and how it differs both in content and in cost to the equivalent third year studying in Lancaster. This is usually supplemented by the highlights of their time abroad, what they have gained from the experience and some information on their particular host university. Unfortunately, it is not always possible for a returning student to be present at these talks and so having a short promotional video to cover the more second more personal section of these talks in the absence of a student would be highly beneficial. Following the success of videos and other multi-media projects being used for promotion on the university's main website, it is also hoped that this video could also be able to be used as part of the Study Abroad section of the department's website, which is being developed parallel to this project, to generate further interest in the study abroad programme.

## 4: OUTCOME

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On completion of the project, there is now a dedicated Moodle page for students studying abroad from the Mathematics and Statistics Department. Within this there is a forum space where students can easily contact one another and the Lancaster department, as well as links to useful study abroad pages outside of the department. In addition to this, each host university has a dedicated section on the website with links to the mathematics and statistics departments of each host university, their course catalogues and general information for each institution. These are accompanied by extensive guide sheets to aid students in module selection, detailing the pre-requisite and following courses for each suitable course at the host university. This is ready to be launched with the 2016/17 study abroad cohort.

Despite having low response rates from current students, the department now also has available a Qualtrics and pdf survey to collect further information from future and returning students to further enrich the content on the Moodle page. In addition to this there is also a short promotional video for use at open days to promote the programme, compiled using the media from those students who did actively engaged with the project.

## 5: LESSONS LEARNED

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The main take-away from this project would have to be how very difficult it is to contact students who are no longer physically located in Lancaster, be that because of study or employment. With Lancaster Email addresses being the only contact information, and not receiving responses from these channels it was very difficult to establish what these students wanted.

Further to this I have learned a great deal about the forward planning that goes into creating a successful platform. Firstly there is the maintenance required for a Moodle page with comment/discussion sections, which Steve Power kindly agreed to handle after the end of this project but was something I had never considered previously. I also learned a great deal about data collection and collation for the construction and good presentation recourses, which takes far more time and effort than I had ever appreciated. As well as these skills from creating the Moodle page, I have developed from scratch a basic knowledge of video editing, and of the associated complications regarding copywriting and the use open source materials.

Finally have vastly improved many 'soft skills' during this project – having had previously limited experience of project work alongside people much more experienced in their respective fields. I now have greater confidence in formal Email communication, which grew as I contacted and worked with people from many departments within Lancaster University and several host universities while trying to contact students and confirm course details. Working independently to structure such a freeform project around my final year studies is something which was difficult for me due to a highly variable workload, but which I improved over the year.

## 6: GUIDANCE FOR OTHER DEPARTMENTS WHO WISH TO DO SOMETHING SIMILAR

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Once again it cannot be reiterated strongly enough that students who are currently abroad are most difficult to contact. Because of this, I would recommend that any future projects based on study abroad or placement students not rely to heavily on direct input from these students, instead focusing on those who have recently returned.

These recently returned students were the best sources of materials for video production, as well as in giving feedback on what they would like to see from the Moodle page. One problem was that because they had already returned not many people had taken video clips while abroad. If future projects wish to produce a video, perhaps run a competition with the students studying abroad in the year before the project commences for the most social media posts / best produced videos of their time abroad. This would provide a better supply of media and undoubtedly would produce a higher quality end product.

For any future projects aiming to gather large amounts of information from host universities in the future I would firstly recommend contacting the host administrators for their advice. In this project for example, I have contacted them regarding module availability in future years, unclear course progression requirements. I have always found the administrators more than happy to help and their advice has saved a lot of time, which could otherwise have been squandered researching the detailed course structure of each host. Secondly, I would stress the importance of spending a good amount of time considering the way the required information is presented in each data source, as this would have saved a great deal of time when trying to create module sheets which are uniform in format across all host universities.

## 7: CLOSING COMMENTS

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At times this year I have found the Digital Lancaster project to be very challenging, trying to balance such a freeform project with a large final year workload that has been heavy in project work in itself. This open structure, however, is also what has made the project so enjoyable throughout the year. I thoroughly enjoyed having the freedom to lead the project in the direction which would most benefit the department and students – and encourage both to use digital methods to fulfill their needs in promoting, organising and experiencing a life changing year abroad.

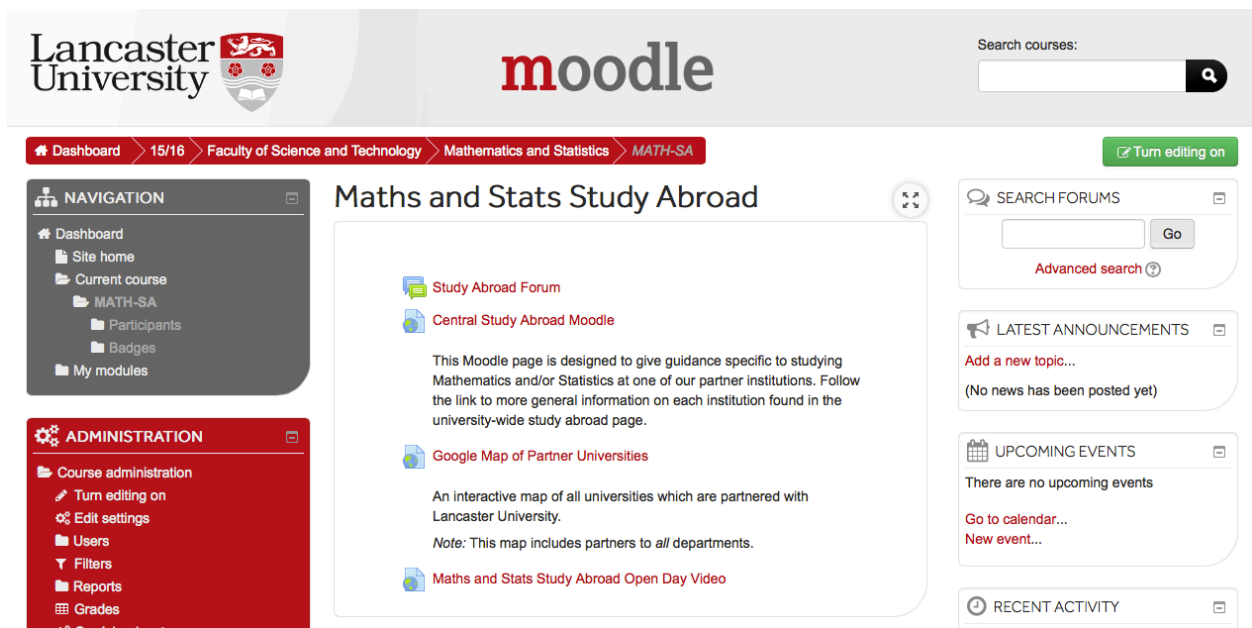
I am thankful to both those in ISS and the Department of Mathematics and Statistics for giving me the opportunity and support necessary to develop my digital literacy while promoting the same in others. If it were not for this project I not have first hand experience of data collection, video editing or interdisciplinary collaboration, and for that I am extremely grateful.

## 8: REPRESENTATION OF FINAL PRODUCT

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### ***Mathematics and Statistics Study Abroad Moodle Page***

<https://modules.lancaster.ac.uk/course/view.php?id=12483>



The screenshot shows the Moodle interface for the 'Maths and Stats Study Abroad' course. The top header includes the Lancaster University logo and the Moodle logo. A search bar is located in the top right corner. The breadcrumb trail indicates the user is on the 'Mathematics and Statistics' course page. The main content area is titled 'Maths and Stats Study Abroad' and contains several links and text blocks:

- Study Abroad Forum**: A link to a discussion forum.
- Central Study Abroad Moodle**: A link to a central Moodle page. Below this link is a text block: "This Moodle page is designed to give guidance specific to studying Mathematics and/or Statistics at one of our partner institutions. Follow the link to more general information on each institution found in the university-wide study abroad page."
- Google Map of Partner Universities**: A link to an interactive map. Below this link is a text block: "An interactive map of all universities which are partnered with Lancaster University. Note: This map includes partners to all departments."
- Maths and Stats Study Abroad Open Day Video**: A link to a video resource.

The right-hand sidebar contains several widgets:

- SEARCH FORUMS**: A search bar with a 'Go' button and an 'Advanced search' link.
- LATEST ANNOUNCEMENTS**: A section with a 'Add a new topic...' link and a note: "(No news has been posted yet)".
- UPCOMING EVENTS**: A section with a 'Go to calendar...' link and a 'New event...' link.
- RECENT ACTIVITY**: A section for recent activity.

Fig 1: Links to external Lancaster based resources and discussion forum.

The screenshot shows a user interface with a red sidebar on the left containing navigation options: Gradebook setup, Badges, Backup, Restore, Import, Reset, Question bank, Repositories, and Switch role to... The main content area is divided into two sections: 'Purdue' and 'Texas A&M'. Each section contains a list of links to university resources, including Modules Sheet, Wikipedia Page, Math Department, Statistics Department, Math Courses, and Statistics Courses. On the right, there is a box titled 'Activity since Tuesday, 27 September 2016, 11:46' with a link to a 'Full report of recent activity...' and the text 'No recent activity'.

Fig 2: Example host university sections with links to host departments and module matching guides.

***Mathematics and Statistics Study Abroad Promotional Video***

<https://www.youtube.com/watch?v=pr33i0ueY60>

The screenshot shows a YouTube video player. The video title is 'Lancaster University Mathematics and Statistics Study Abroad'. The video content displays the logos for 'Mathematics & Statistics' and 'Lancaster University'. The video player includes standard controls like play/pause, volume, and a progress bar showing 0:01 / 2:57. On the right side, there is a 'Up next' section with an 'Autoplay' toggle. The recommended videos include: 'Lancaster University Virtual Tour' (4,310 views), 'My First Year University Experience UK' (61,102 views), 'I've Got Bad News | Evan Edinger' (Evan Edinger, Recommended for you), 'Welcome to Lancaster University Ghana!' (3,526 views), and another 'Lancaster University' video (79 views).

Fig 3: Promotional video for mathematics and statistics study abroad degree schemes.

**Study Abroad Module Selection Sheet Example: Purdue Univeristy.**

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**Purdue Modules: Correct as of June 2016**

These resources have been put together as a guide and to help you link with courses you wish to take in future based on the 2015-16 academic year. This does not guarantee these courses will continue to run so the relevant departmental website should be used to confirm the semester and availability of modules you may wish to take.

**Pure Mathematics**

Module	Contents\Description	Follows	Precedes
<b>MA 35300 - Linear Algebra II With Applications.</b> Fall, Spring	Factoring matrices, orthogonal projections (with application to least squares estimation), diagonalization and Jordan canonical form (with applications to Markov chains and systems of differential equations), Hermitian matrices, convexity (with application to linear programming).	220	432, 454
<b>MA 36000 - Advance Calculus Differential Equations Honors.</b> Fall, Spring	Elementary ordinary differential equations. Special functions defined by power series and by integrals, Fourier series.	115, 210	416, 417
<b>MA 36200 - Topics In Vector Calculus.</b> Fall, Spring	Multivariate calculus; partial differentiation; implicit function theorems and transformations; line and surface integrals; vector fields; theorems of Gauss, Green, and Stokes.	210	412
<b>MA 36600 - Ordinary Differential Equations.</b> Fall, Spring	An introduction to ordinary differential equations with emphasis on problem solving and applications. The one-hour computer lab will give students an opportunity for hands-on experience with both the theory and applications of the subject.	115, 210, Labs	412
<b>MA 37300 - Financial Mathematics.</b> Fall, Spring	Includes discussions of valuing investments, capital budgeting, valuing contingent cash flows, yield curves, spot rates, forward rates, short sales, Macaulay duration, modified duration, convexity, and immunization, financial derivatives, and their use in risk	210, 230	482

	management. Provides preparation for the SOA/CAS Actuarial Exam FM/2.		
<b>MA 37500 - Introduction To Discrete Mathematics.</b> Fall, Spring	Induction, permutations, combinations, finite probability, relations, graphs, trees, graph algorithms, recurrence relations, generating functions. Problem solving in all these areas.	112	-
<b>MA 38500 - Introduction To Logic.</b> Spring	Propositional calculus and predicate calculus with applications to mathematical proofs, valid arguments, switching theory, and formal languages.	-	-
<b>MA 42100 - Linear Programming And Optimization Techniques.</b> Fall, Spring	Solution of linear programming problems by the simplex method, duality theory, transportation problems, assignment problems, network analysis, dynamic programming.	112	-
<b>MA 42800 - Introduction To Fourier Analysis.</b> Fall, Spring	Topics include: Fourier series, convolutions, kernels, summation methods, Fourier transforms, applications to the wave, heat, and Laplace equations.	210	414
<b>MA 44200 - Multivariate Analysis I Honors.</b> Spring	Topics covered may include a unified modern treatment of functions of several variables. Topics covered include the topology of Euclidean spaces, mappings of Euclidean spaces, exterior algebra, Lebesgue integration, and integration on manifolds.	210	412, 414
<b>MA 45000 - Algebra Honors.</b> Fall	Topics include the elements of number theory and group theory; unique factorization in polynomial rings and in principal ideal domains.	210	425
<b>MA 45400 - Galois Theory.</b> Spring	An introduction to Galois theory, covering both its origins in the theory of roots of polynomial equations and its modern formulation in terms of abstract algebra. Topics include finite extension fields and their symmetries, ruler and compass constructions, complex roots of unity, solvable groups, and the solvability of polynomial equations by arithmetic and radical operations. Typically offered Spring.	225	416,417, 424
<b>MA 46000 – Geometry.</b> Fall, Spring	This is a course in Euclidean geometry. It begins at the high-school level and then moves quickly to intermediate and advanced topics. Emphasis on proofs.	210	412, 423



<b>MA 46200 - Elementary Differential Geometry.</b> Fall, Spring	The geometry of curves and surfaces based on familiar parts of calculus and linear algebra. An introduction to the study of differentiable manifolds and Riemannian geometry.	210	412, 423
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## Statistics

Module	Contents\Description	Follows	Precedes
<b>STAT 41700 - Statistical Theory.</b> Fall, Spring	An introduction to the mathematical theory of statistical inference, emphasizing inference for standard parametric families of distributions. Properties of estimators. Bayes and maximum likelihood estimation. Sufficient statistics. Properties of test of hypotheses. Most powerful and likelihood-ratio tests. Distribution theory for common statistics based on normal distributions.	230	451, 452
<b>STAT 42000 - Introduction To Time Series.</b> Fall, Spring	An introduction to time series analysis suitable for actuarial science, engineering, and sciences. Model building and forecasting with ARMA and ARIMA models. Resampling methods for confidence intervals. Multivariate, state-space, and nonlinear models. Volatility models (ARCH and GARCH). Smoothing in time series.	230, 235	465, 466
<b>STAT 47201 - Actuarial Models- Life Contingencies.</b> Fall	Mathematical foundation of actuarial science, emphasizing probability models for life contingencies as the basis for analyzing life insurance and life annuities and determining premiums and reserves. This course provides the background for Course MLC of the Society of Actuaries and Course 3L of the Casualty Actuarial Society.	230	482
<b>STAT 52800 - Introduction To Mathematical Statistics.</b> Fall, Spring.	Distribution of mean and $s^2$ in normal samples, sampling distributions derived from the normal distribution, Chi square, t and F. Distribution of statistics based on ordered samples. Asymptotic sampling distributions. Introduction to multivariate normal distribution and linear models.	230	413, 432, 451, 452

	Sufficient statistics, maximum likelihood, least squares, linear estimation, other methods of point estimation, and discussion of their properties, Cramer-Rao inequality and Rao-Blackwell theorem. Tests of statistical hypotheses, simple and composite hypotheses, likelihood ratio tests, power of tests.		
<b>STAT 53200 - Elements Of Stochastic Processes.</b> Fall, Spring	A basic course in stochastic models, including discrete and continuous time Markov chains and Brownian motion, as well as an introduction to topics such as Gaussian processes, queues, epidemic models, branching processes, renewal processes, replacement, and reliability problems.	230	432, 465
<b>STAT 53800 - Probability Theory I.</b> Spring	Mathematically rigorous, measure-theoretic introduction to probability spaces, random variables, expectation, independence, weak and strong laws of large numbers, conditional expectations, and martingales.	210, 230	413
<b>STAT 54500 - Introduction To Computational Statistics.</b> Fall	This introductory course covers the fundamentals of computing for statistics and data analysis. It starts with a brief overview of programming using a general purpose compiled language (C) and a statistics-oriented interpreted language (R). The course proceeds to cover data structures and algorithms that are directly relevant to statistics and data analysis and concludes with a computing-oriented introduction to selected statistical methods. A significant part of the course involves programming and hands-on experimentation demonstrating the covered techniques, rasion, and Markov chain Monte Carlo methods.	230, Labs	454