Programme Information & PLOs

Title of the new programme – including any year abroad/ in industry variants

Mathematics and Philosophy, from 2017-18

Level of qualification

Please select:	Level 6

Please indicate if the programme is offered with any year abroad / in industry variants	Year in Industry Please select Y/N	No
	Year AbroadPlease select Y/N	No

Department(s): Where more than one department is involved, indicate the lead department

Lead Department	Mathematics
Other contributing Departments:	Philosophy

Programme Leader

David Efird

Purpose and learning outcomes of the programme

Statement of purpose for applicants to the programme

Mathematics and Philosophy have substantial areas of overlap. In mathematics and philosophy alike, significant emphasis is placed on building arguments to deduce conclusions from assumed premises. In the case of mathematics, those assumptions are called axioms, and are not questioned. By contrast, in philosophy the assumptions on which we build our arguments, as well as the argument step themselves, are open to critical scrutiny, leading to a greater degree of uncertainty in philosophy than in mathematics. Nevertheless, in both mathematics and philosophy the development of creative and compelling arguments for conclusions is a key aim. This combined honours degree involves the study of mathematics and philosophy in parallel, with particular attention to their overlap in the formal study of deductive arguments (logic), and the philosophy of mathematics. This is the particular value of studying mathematics and philosophy together. The distinctive nature of the programme as offered at York is that students have the opportunity to study with world-leading experts not only in mathematics and in philosophy, singly, but also with experts in the overlap in these disciplines, such as the philosophy of logic and of mathematics. Mathematics and Philosophy students at York graduate with a firm command of critical thinking and argumentation, both in formal (mathematical) and informal contexts, and the ability to articulate their ideas and present them in a range of formats. Thus, students have particular skills which are relevant to employability, such as analytical thinking, logical reasoning, and problem solving. These skills then afford graduates opportunities in a wide range of industries, such as teaching, research, the public sector, including the civil and diplomatic services, and management, and financial services.

Programme Learning OutcomesPlease provide six to eight statements of what a graduate of the programme can be expected to do.
Taken together, these outcomes should capture the distinctive features of the programme. They should also be outcomes for which progressive achievement through the course of the programme can be articulated, and which will therefore be reflected in the design of the whole programme.

PLO	On successful completion of the programme, graduates will be able to:
1	use logical reasoning to build arguments, and to critically analyse statements, arguments, or conjectures made by others, justifying the principles chosen for such a critique;
2	to analyse and solve problems for which techniques including calculus, algebra, and formal logic, were developed;

3	investigate unfamiliar problems in mathematics by adapting and/or synthesising a range of mathematical approaches (including abstraction or numerical approximation);
4	make a measured judgement about what is the best view on a particular problem and present a sustained line of argument in defence of this judgement based on careful consideration of what
5	critically engage in ongoing scholarly and philosophical debate concerning mathematical truth, knowledge and our use of mathematics in science and modern life
6	gain research skills in an area of mathematical or philosophical specialisation;
7	work effectively, imaginatively, and productively as a thinker and learner;
8	communicate complex and difficult mathematical and philosophical ideas in clear, precise, and accessible terms in a variety of formats.

Programme Learning Outcome for year in industry (where applicable)
For programmes which lead to the title 'with a Year in Industry' – typically involving an additional year – please provide either a) amended versions of some (at least one, but not necessarily all) of the standard PLOs listed above, showing how these are changed and enhanced by the additional year in industry b) an additional PLO, if and only if it is not possible to capture a key ability developed by the year in industry by alteration of the standard PLOs.

N/A

Programme Learning Outcome for year abroad programmes (where applicable)
For programmes which lead to the title 'with a Year Abroad' – typically involving an additional year – please provide either a) amended versions of some (at least one, but not necessarily all) of the standard PLOs listed above, showing how these are changed and enhanced by the additional year abroad or b) an additional PLO, if and only if it is not possible to capture a key ability developed by the year abroad by alteration of the standard PLOs.

N/A

Explanation of the choice of Programme Learning OutcomesPlease explain your rationale for choosing these PLOs in a statement that can be used for students (such as in a student handbook). Please include brief reference to:

i) Why the PLOs are considered ambitious or stretching?

The PLOs include the development of substantial subject specific knowledge and techniques across two subjects, as well as significant attention to their overlap in formal logic and the philosophy of mathematics. The course provides a distinct intellectual challenge in being able to learn, relate, and combine the complementary methods of mathematics with the methods of philosophy and apply them to a range of problems across both disciplines, particularly in regard to debates concerning mathematical truth, mathematical knowledge, and our use of mathematics in science and modern life.

ii) The ways in which these outcomes are distinctive or particularly advantageous to the student:

As per the statement of purpose, the first PLO emphasizes logical reasoning as the common core to both mathematics and philosophy. It is a distinctive feature of Mathematics and Philosophy as a degree that there is this close overlap in the key role of deductive argument. Students will have the advantage of studying two subject areas that provide valuable subject-specific knowledge in their own right, as well as reflecting on the shared techniques of both, and specifically on the nature of mathematical reasoning.

iii) How the programme learning outcomes develop students' digital literacy and will make appropriate use of technology-enhanced learning (such as lecture recordings, online resources, simulations, online assessment, 'flipped classrooms' etc)?

In the process of meeting these outcomes, students will be exposed to a range of digital and technology-enhanced resources in the individual modules that make up the programme. They will learn to handle electronic files and have experience of mathematical programming.

iv) How the PLOs support and enhance the students' employability (for example, opportunities for students to apply their learning in a real world setting)?
The programme's employablity objectives should be informed by the University's Employability Strategy:

http://www.york.ac.uk/about/departments/support-and-admin/careers/staff/

The PLOs support development of a range of transferrable skills. In particular, graduates will be flexible-thinking problem solvers, with the ability to deal with both formal/technical material and to communicate clearly verbally and in writing. In addition, students will teamworking skills in collaborative work in seminars and problem solving.

vi) How will students who need additional support for academic and transferable skills be identified and supported by the Department?

Primarily via supervisors in the two supporting departments, who monitor progress and meet regularly with their supervisees to discuss their development throughout their degree. Students are allocated a primary supervisor in one of the two Departments, but all are given a contact person in their second Department who they can speak to if they have any subject specific concerns that their own supervisor cannot help with. Additionally, in the Philosophy Department the Director of First Year Programme helps to monitor performance in first year and support students who need it (in close collaboration with our first year seminar tutors). Our first year Beginning Philosophy module highlights basic skills and its online component emphasizes key points. Students are warmly encouraged to make use of module tutors' office hours where they are struggling with material. In addition, there is support available from the Maths Skills Centre and the Writing Centre. Where there are specific learning difficulties, these are identified and supported via the disability/student support services procedures and statements of needs.

vii) How is teaching informed and led by research in the department / centre / University

The vast majority of teaching staff are active in research, which informs their teaching at all levels. In the Philosophy Department the third year modules are particularly research led, focussing on topics in which the module tutor is active in research. Students are introduced to research methods in Mathematics via project work in Maths Skills 1 (also Maths Skills 2 if they choose this option), and can develop their research skills in a mathematical setting if they choose to complete a third year Project in Mathematics. In Philosophy 'Beginning Philosophy' provides an introduction to research methods. Students who do not take the Maths project in third year instead display their independent research skills in philosophy via one or more Advanced Module. In Philosophy, departmental teaching skills workshops for staff feature participation by staff from ASO who ensure our discussions and work take contemporary pedagogical research into account.

Stage-level progression

Please complete the table below, to summarise students' progressive development towards the achievement of PLOs, in terms of the characteristics that you expect students to demonstrate at the end of each year. This summary may be particularly helpful to students and the programme team where there is a high proportion of option modules.

Note: it is not expected that a position statement is written for each PLO, but this can be done if preferred (please add information in the 'individual statement' boxes). For a statement that applies across all PLOs in the stage fill in the 'Global statement' box.

Stage 0 (if your programme has a Foundation year, use the toggles to the left to show the hidden rows)

Stage 1

On progression from the first year (Stage 1), students will be able to:			*Global statement*				
PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
recognise and use logical symbols and terminology to formalise simple arguments and discuss their validity.	competently use foundational mathematical and logical techniques appropriately.	adapt some foundational techniques in mathematics to unfamiliar situations.	appreciate some problems and puzzles in some central areas of philosophy and its history, and begin to consider how these problems may be solved.	appreciate and critically engage with some core issues concerning the nature of knowledge.	grasp some basic mathematical and philosophical research skills.	engage in productive collaborative inquiry (e.g. in seminars) and work independently on problems set by lecturers.	communicate basic ideas in seminars and written work.
Stage 2							
On progression from the second year (Stage 2), students will be able to:			*Global statement*				
PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
recognise and use logical symbols and terminology to formalise simple arguments and discuss their validity. Provide logical derivations and countermodels to answer questions concerning the validity of arguments in formal logic.	competently use foundational mathematical and logical techniques appropriately. Confidently perform calculations, or use methods, which require the combination of several foundational techniques, and identify which of those techniques is appropriate.	adapt some foundational techniquest to unfamiliar situations. Recognize when some foundational techniques can be applied outside their standard context, and put together two or more techniquest to analyse a problem.	Appreciate a range of problems and puzzles across core areas of philosophy and its history, and understand and critically evaluate available solutions.	appreciate, and critically engage with, metaphysical issues relevant to mathematics, via discussions of metaphysics and/or the philosophy of science.	develop use of mathematical and philosophical research skills through independent study in support of taught modules.	engage in productive collaborative inquiry (e.g. in seminars) and work independently on problems set by lecturers and arising out of individual and group reflection.	Communicate basic and more complex ideas clearly, concisely, and accurately in seminars and written work.
Stage 3							
(For Integrated Masters) On progression from the third year (Stage 3), students will be able to:			*Global statement*				
PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
Individual statements							

Programme Structure

Module Structure and Summative Assessment Map

Please complete the summary table below which shows the module structure and the pattern of summative assessment through the programme.

'Option module' can be used in place of a specific named option. If the programme requires students to select option modules from specific lists these lists should be provided in the next section.

From the drop-down select 'S' to indicate the start of the module, 'A' to indicate the timing of each distinct summative assessment point (eg. essay submission/ exam), and 'E' to indicate the end of the module (if the end of the module coincides with the summative assessment select 'EA') . It is not expected that each summative task will be listed where an overall module might be assessed cumulatively (for example weekly problem sheets).

If summative assessment by exams will be scheduled in the summer Common Assessment period (weeks 5-7) a single 'A' can be used within the shaded cells as it is understood that you will not know in which week of the CAP the examination will take place.

Stage 0 (if you have modules for Stage 0, use the toggles to the left to show the hidden rows)

Stage 1

Credits	Module		Autumn Term										Spring Term										Summer Term									
	Code	Title	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
10	PHI00001C	Beginning Philosophy		S																	A	EA										
20	PHI00005C	Reason and Argument A	S									EA	A																			
20	PHI00008C	Knowledge and Perception												S								E	A									
10	PHI00003C	Metaphysics																					S			E		A				
30	MAT00001C	Calculus		S									A													E	A					
20	MAT00010C	Algebra		S									A													E	A					
10	MAT00011C	Mathematical Skills 1: Reasoning and Communication		S									A									EA		A								

Stage 2

Credits	Module		Autumn Term										Spring Term										Summer Term									
	Code	Title	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

Students take 60 credits of Philosophy including Key Ideas: Intermediate Logic and at least one of Key Ideas in Metaphysics and Key Ideas in Philosophy of Science. They may opt for a further 20 credit Key Ideas module or Tutorial Module, or two 10 credit option modules.

Students take the 40 credit PURE stream in Mathematics, plus Linear Algebra (10 cr) and one of Mathematical Skills 2 and Vector Calculus.

20	Various PHI	Key Ideas (Autumn modules) - includes Intermediate Logic		S								E	A																				
20	Various PHI	Key Ideas (Spring Modules) - Includes Metaphysics, Philosophy of Science												S								E	A					A					
10	Various PHI	Tutorial Module (O		S								EA	A																				
10	Various PHI	Tutorial Module (Optional) - Spring												S								EA	A										
10	Various PHI	Option Module (Autumn)		S								E	A																				
10	Various PHI	Option Module (Spring, Reading Group, Essay Assessed)												S								E	A										
10	Various PHI	Option Module (Spring, Lecture based, Exam Assessed)												S								E						A					
10	Various PHI	Option Module (Summer)																					S			E		A					
40	MAT00032I	Pure Mathematics		S									A													E	A						
10	MAT00026I	Linear Algebra		S								E	A																				
10	MAT00030I	Vector Calculus		S								E	A																				
Stage 3																																	
Credits	**Module**		**Autumn Term**											**Spring Term**										**Summer Term**									
	Code	**Title**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
Students can choose to weight their degree 80/40 or 60/60. The 20 credit bridge module (Foundations of Mathematics) in Philosophy is compulsory for all students. For 80/40 Maths/Philosophy, students take the Maths Project (40 cr), plus 40 additional credits of Mathematics from the PURE stream, and 40 credits from Philosophy including Foundations of Mathematics. For 60/60 Split, students take 60 credits of Mathematics from the PURE stream, plus Foundations of Mathematics, plus an additional 20 credit Philosophy module and the corresponding two 10 credit Advanced Modules. For 80/40 Philosophy/Mathematics, students take 40 credits from the PURE stream in Mathematics, plus the Foundations of Mathematics bridge module and an additional 60 credits of Philosophy modules including two Advanced Modules.																																	
20 each	Various PHI	Research-led Taug		S								E		A																			
20 each	Various PHI	Research-led Taug												S								E		A									
10 each	Various PHI	Advanced Module																					S					EA					
40	MAT00004H	BSc Final Year Project		S								A														EA				A			
10		Autumn - List A		S								E	A																				
10		Spring - List B												S								E					A						

Stage 4

Credits	Module		Autumn Term										Spring Term										Summer Term									
	Code	Title	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

Optional module listsIf the programme requires students to select option modules from specific lists these lists should be provided below. If you need more space, use the toggles on the left to reveal ten further hidden rows.

Option List A	Option List B	Option List C	Option List D	Option List E	Option List F	Option List G	Option List H
Introduction to Dynamical Systems MAT00011H	Formal Languages and Automata MAT00002H		Note: Key Ideas Value Modules (examples only—modules offered may vary from year to year)	Note: Key Ideas Theoretical Philosophy Modules (examples only—modules offered may vary from year to year)	Note: Key Ideas History of Philosophy Modules (examples only—modules offered may vary from year to year)	Note: 10-credit Options Modules (examples only—modules offered may vary from year to year)	Note: Year 3 Research-Led Taught Modules (example selection only—modules offered may vary from year to year)
Number Theory MAT00023H	Differential Geometry MAT00006H		Applied Ethics	Intermediate Logic	Hume	Darwin and Human Nature (	Contemporary Moral Th
Algebraic Number Theory MAT00029H	Galois Theory MAT00008H		Ethical Theory	Metaphysics	Kant	Paradoxes (L)	German Idealism: Mora
Metric Spaces MAT00037H	Lebesgue Integration MAT00013H		History of Ethics	Philosophy of Language	Spinoza and Leibniz	Philosophy in the Muslim W	Metaphysics of Mind
Partial Differential Equations (H Level) MAT00040H	Cryptography MAT00034H		Religious Ethics	Philosophy of Mind	Aristotle	Philosophy of Time (L)	Personal Identity
Character Theory MAT00046H	Applications of Nonlinear Dynamics MAT00036H		Aesthetics	Philosophy of Science	Nietzsche	Chinese Philosophy (R)	Philosophy of Art from H
	Topology MAT00044H					Effective Altruism (R)	Philosophy of Christiani
						God and Morality (R)	Philosophy of Physics
						Reading Kierkegaard (R)	Topics in Indian Philoso
						Seeing Dark Things (R)	Consciousness
						Social and Political Epistem	Contemporary Issues in
							Foundations of Mathem
							Heidegger
							Philosophy of Action

							Philosophy of Emotions
							Philosophy of Film
							Pragmatism
							The Value and Meaning
							[Special Subject (indepe

Management and Admissions Information

This document applies to students who commenced the programme(s) in:	2017/18

Interim awards available Interim awards available on undergraduate programmes (subject to programme regulations) will normally be: Certificate of Higher Education (Level 4/Certificate), Diploma of Higher Education (Level 5/Intermediate), Ordinary Degree and in the case of Integrated Masters the Bachelors with honours. Please specify any proposed exceptions to this norm.

Certificate of Higher Education (Level 4/Certificate) Generic
Diploma of Higher Education (Level 5/Intermediate) Generic

Admissions Criteria

TYPICAL OFFERS
A levels AAA/AAB
IB Diploma Programme
36/35 points including HL 6
in essential subjects
BTEC Extended Diploma
DDD (may vary for
combined programmes)

Length and status of the programme(s) and mode(s) of study

Programme	Length (years)	Status (full-time/part-time) Please select	Start dates/months (if applicable – for programmes that have multiple intakes or start dates that differ from the usual academic year)	Mode				
				Face-to-face, campus-based		Distance learning		Other
BA Mathematics and Philosophy	3	Full-time	n/a	Please select Y/N	Yes	Please select Y/N	No	n/a

Language(s) of study

English.

Language(s) of assessment

English.

Programme accreditation by Professional, Statutory or Regulatory Bodies (PSRB)

Is the programme recognised or accredited by a PSRB

Please Select Y/N:	No	if No move to next Section if Yes complete the following questions

Name of PSRB

Are there any conditions on the approval/ accreditation of the programme(s)/ graduates (for example accreditation only for the full award and not any interim award)

Additional Professional or Vocational Standards

Are there any additional requirements of accrediting bodies or PSRB or pre-requisite professional experience needed to study this programme?

Please Select Y/N:		if Yes, provide details

(max 200 words)

University award regulations

The University's award and assessment regulations apply to all programmes: any exceptions that relate to this programme are approved by University Teaching Committee and are recorded at the end of this document.

Are students on the programme permitted to take elective modules?

(See: https://www.york.ac.uk/media/staffhome/learningandteaching/documents/policies/Framework%20for%20Programme%20Design%20-%20UG.pdf)

Please Select Y/N:		

Careers & Placements - 'With Placement Year' programmes

Students on all undergraduate and integrated masters programmes may apply to spend their third year on a work-based placement facilitated by Careers & Placements. Such students would return to their studies at Stage 3 in the following year, thus lengthening their programme by a year. Successful completion of the placement year and associated assessment allows this to be recognised in programme title, which is amended to include 'with Placement Year' (e.g. BA in XYZ with Placement Year'). The Placement Year also adds a Programme Learning Outcome, concerning employability. (See Careers & Placements for details).

In exceptional circumstances, UTC may approve an exemption from the 'Placement Year' initiative. This is usually granted only for compelling reasons concerning accreditation; if the Department already has a Year in Industry with criteria sufficiently generic so as to allow the same range of placements; or if the programme is less than three years in length.

Programme excluded from Placement Year?	No	If yes, what are the reasons for this exemption:

Study Abroad (including Year Abroad as an additional year and replacement year)

Students on all programmes may apply to spend Stage 2 on the University-wide North America/ Asia/ Australia student exchange programme. Acceptance onto the programme is on a competitive basis. Marks from modules taken on replacement years count toward progression and classification.

Does the programme include the opportunity to undertake other formally agreed study abroad activities? All such programmes must comply with the Policy on Study Abroad

https://www.york.ac.uk/staff/teaching/procedure/programmes/design/__

Please Select Y/N:	Yes	

Additional information

Transfers out of or into the programme

ii) Transfers into the programme will be possible? (please select Y/N)	Yes	

Additional details:

Transfers into the programme are permitted during Term 1, subject to approval by the Joint Board of Studies, but become increasingly difficult thereafter (Stage 1 Mathematics modules are full-stage).
Transfers out of the programme are permitted subject to the approval of the incoming Board of Studies.

ii) Transfers out of the programme will be possible? (please select Y/N)	Yes	

Additional details:

Transfers into the programme are permitted during Term 1, subject to approval by the Joint Board of Studies, but become increasingly difficult thereafter (Stage 1 Mathematics modules are full-stage).
Transfers out of the programme are permitted subject to the approval of the incoming Board of Studies.

Exceptions to University Award Regulations approved by University Teaching Committee

Exception Please detail any exceptions to University Award Regulations approved by UTC	**Date approved**

Date on which this programme information was updated:

28/02/2017

Please note:

The information above provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if they take full advantage of the learning opportunities that are provided.

Detailed information on the learning outcomes, content, delivery and assessment of modules can be found in the module descriptions.

The University reserves the right to modify this overview in unforeseen circumstances, or where the process of academic development, based on feedback from staff, students, external examiners or professional bodies, requires a change to be made. Students will be notified of any substantive changes at the first available opportunity.

Programme Map

Please note: the programme map below is in interim format pending the development of a University Programme Catalogue.

Programme Map: Module Contribution to Programme Learning Outcomes

This table maps the contribution to programme learning outcomes made by each module, in terms of the advance in understanding/ expertise acquired or reinforced in the module, the work by which students achieve this advance and the assessments that test it. This enables the programme rationale to be understood:

· Reading the table vertically illustrates how the programme has been designed to deepen knowledge, concepts and skills progressively. It shows how the progressive achievement of PLOs is supported by formative work and evaluated by summative assessment. In turn this should help students to understand and articulate their development of transferable skills and to relate this to other resources, such as the Employability Tutorial and York Award;

· Reading the table horizontally explains how the experience of a student at a particular time includes a balance of activities appropriate to that stage, through the design of modules.

Stage	Module		Programme Learning Outcomes							
			PLO1	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**	**PLO7**	**PLO8**
			use logical reasoning to build arguments, and to critically analyse statements, arguments, or conjectures made by others, justifying the principles chosen for such a critique;	**to analyse and solve problems for which techniques including calculus, algebra, and formal logic, were developed;**	**investigate unfamiliar problems in mathematics by adapting and/or synthesising a range of mathematical approaches (including abstraction or numerical approximation);**		**critically engage in ongoing scholarly and philosophical debate concerning mathematical truth, knowledge and our use of mathematics in science and modern life**	**gain research skills in an area of mathematical or philosophical specialisation;**	**work effectively, imaginatively, and productively as a thinker and learner;**	**communicate complex and difficult mathematical and philosophical ideas in clear, precise, and accessible terms in a variety of formats.**
Stage 1	Beginning Philosophy PHI1000C 10 Credits	Progress towards PLO	beginning to apply basic logical techniques.	N/A	N/A	develop a basic understanding of a range of problems and puzzles from 'applied' and 'theoretical' philosophy and its history	N/A	Become familiarized with some basic techniques of philosophical research.	**KEY: students will develop their ability to work effectively by prioritising and self-motivating**	Begin the process of communicating philosophical ideas.

		By working on (and if applicable, assessed through)	critically engaging in an argument or arguments presented in the lecture course. Assessed by essay.			attending and engaging with 'taster' lectures on a wide variety of philosophical topics,		working independently through online resources. Assessed through online quizzes.	working independently on the online elements of the module, fitting in their work around other commitments to complete it not only by the deadline but also to ensure that relevant elements are completed at appropriate times (e.g. completing Writing Skills before submitting their first essays). Assessed through online quizzes.	writing an essay on one of the lecture topics. Assessed by essay.
Stage 1	Reason and Argument A PHI00005C 20 Credits	Progress towards PLO	**KEY: acquire the basic logical literacy (abilities with concepts, terminology, and notation of logic) required for understanding philosophical texts and discussions in the remainder of the programme**	**KEY: apply the concepts and techniques of formal logic to clarify, articulate, and evaluate arguments in a systematic way**	N/A	tackling puzzles and problems concerning the meaning of and logical relations between claims.	**KEY: students will be introduced to the initial resources needed to appreciate the problem of mathematical truth.**	begin to develop independent study techniques.	Begin to develop imaginative problem solving techniques.	Begin the process of communicating philosophical ideas.

		By working on (and if applicable, assessed through)	expressing claims and arguments expressed in natural language in logical terms. Assessed in exam.	puzzles and problems concerning the meaning of and logical relations between claims. Assessed in exam and essay.		Attending lectures, engaging in seminar discussions, completing a weekly problem sheet (with support from lectures),and completing an essay.	being introduced to, and critically examining, the notions of truth values, truth conditions, and logical form. Assessed in exam and essay.	working independently on weekly problem sets and on their final essay.	Working on weekly problem sets.	writing an essay considering the cases for and against one theory of the logical form of a particular kind of phrase. Assessed in essay.
	Knowledge and Perception PHI00008C 20 Credits	Progress towards PLO	be introduced to the application of logical techniques and terminology in the development and evaluation of arguments.	N/A	N/A	tackle some key problems, issues, and debates in Epistemology and Philosophy of Perception	**KEY: students will be introduced to the initial resources needed to appreciate the problem of mathematical knowledge.**	begin to develop independent study techniques.	work collaboratively to approach philosophical problems and consider their solutions.	Begin the process of communicating philosophical ideas.
		By working on (and if applicable, assessed through)	Attending and preparing for lectures and seminars.			Attending lectures, engaging in seminar discussions, answering study questions on set readings (with support from lectures),and completing an essay.	being introduced to, and critically examining, the notion of knowledge and our methods of acquiring knowledge. Assessed in essay.	Working independently on study questions and on their final essay.	participating in seminar discussions with peers.	Writing an essay on epistemology and/or perception. Assessed in essay.
	Metaphysics PHI00003C 10 Credits	Progress towards PLO	be introduced to the application of logical techniques and terminology in the development and evaluation of arguments.	N/A	N/A	tackle some key problems, issues, and debates in metaphysics.	**KEY: students will be introduced to the initial resources needed to appreciate metaphysical issues relating to mathematics.**	begin to develop independent study techniques.	work collaboratively to approach philosophical problems and consider their solutions.	Begin the process of communicating philosophical ideas.

		By working on (and if applicable, assessed through)	Attending and preparing for lectures and seminars.			Attending lectures, engaging in seminar discussions, answering study questions on set readings (with support from lectures),and completing an essay.	being introduced to, and critically examining, some basic ideas and arguments in metaphysics. Assessed in exam.	Working independently on study questions and preparing for final exam.	participating in seminar discussions with peers.	Answering philosophical questions clearly and concisely in an exam setting.
Stage 1	Calculus	Progress towards PLO	justify the steps in the solution of calculus problems, or their application	**KEY: competently use the standard methods of differential and integral calculus**	**KEY: adapt standard calculus tools to problems slightly outside the standard format**	N/A	understand how calculus has developed to enable the solution of a variety of mathematical problems	begin to develop independent study techniques.	Begin to develop imaginative problem solving techniques.	present clear and concise solutions to exercises
		By working on (and if applicable, assessed through)	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	exercises and with formative feedback through marked work and the seminars, and assessed by examination		lecture material, exercises and with the support of seminars.	Working on exercises.	Working on exercises.	exercises, with the support of seminars and formative feedback through marked work
Stage 1	Algebra	Progress towards PLO	justify the steps and methods used in algebraic arguments	**KEY: competently use the standard algebra of vectors, matrices and related objects**	**KEY: adapt the standard algebraic tools to problems slightly outside the standard format**	N/A	understand how algebraic methods allow the solution of a variety of mathematical problems	begin to develop independent study techniques.	Begin to develop imaginative problem solving techniques.	present clear and concise solutions to exercises

		By working on (and if applicable, assessed through)	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	exercises and with formative feedback through marked work and the seminars, and assessed by examination		lecture material, exercises and with the support of seminars	Working on exercises.	Working on exercises.	exercises, with the support of seminars and formative feedback through marked work
Stage 1	Mathematical Skills 1	Progress towards PLO	practice different methods of mathematical reasoning	**KEY: achieve competence in working with sets, functions, logic and methods of proof in a mathematical setting**	**KEY: adapt the standard concepts of set theory and logic to problems slightly outside the standard format**	N/A	**KEY: gain familiarity with the tools used by philosophers working in the 'foundations' of mathematics.**	begin to develop independent study techniques.	Begin to develop imaginative problem solving techniques.	present clear and concise solutions to exercises
		By working on (and if applicable, assessed through)	lecture material and exercises, with formative feedback through marked work and the tutorials, and assessed by examination	lecture material and exercises, with formative feedback through marked work and the tutorials, and assessed by examination	exercises and with formative feedback through marked work and the tutorials, and assessed by examination		lecture material.	exercises, with the support of seminars and formative feedback through marked work	exercises, with the support of seminars and formative feedback through marked work	exercises, with the support of seminars and formative feedback through marked work
Stage 2	Key Ideas: Intermediate Logic	Progress towards PLO	**KEY: consolidate understanding of the concepts and techniques of formal logic and their use in the evaluation of arguments.**	**KEY: apply the tools of formal logic to test arguments for validity.**	N/A	Develop an understanding of some issues concerning logical form.	**KEY: develop familiarity with the tools used by philosophers work ing in the 'foundations' of mathematics.**	consolidate independent study techniques.	Further develop imaginative problem solving techniques.	present clear and concise solutions to exercises
		By working on (and if applicable, assessed through)	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination		lecture material.	lecture material.	exercises, with the support of seminars and formative feedback through marked work	exercises, with the support of seminars and formative feedback through marked work	exercises, with the support of seminars and formative feedback through marked work

	Key ideas: Philosophy of Science	Progress towards PLO	continue to apply logical techniques in the construction and evaluation of arguments.	N/A	N/A	Develop an understanding of key issues in the philosophy of science, and begin to articulate solutions to some of these.	be introduced to some key issues concerning the confirmation of scientific theories relevant to considering the question of whether mathematics is confirmed by itse use in science.	consolidate independent study techniques.	work collaboratively to approach philosophical problems and consider their solutions.	communicate more complex philosophical ideas and arguments in written form.
		By working on (and if applicable, assessed through)	Lecture material and seminar discussion, and preparing an essay addressing a specific question in the area of philosophy of science.			Lecture material and seminar discussion, and preparing an essay addressing a specific question in the area of philosophy of science.	Lecture material and seminar discussion.	Seminar preparation.	participating in seminar discussions with peers.	preparing an essay addressing a specific question in the area of philosophy of science.
	Key ideas: Metaphysics	Progress towards PLO	continue to apply logical techniques in the construction and evaluation of arguments.	N/A	N/A	Develop an understanding of key issues in metaphysics, and begin to articulate solutions to some of these.	be introduced to some key issues concerning ontology relevant to approaching the question of the nature of mathematical objects.	consolidate independent study techniques.	work collaboratively to approach philosophical problems and consider their solutions.	communicate more complex philosophical ideas and arguments in written form.
		By working on (and if applicable, assessed through)	Lecture material and seminar discussion, and preparing an essay addressing a specific question in the area of philosophy of science.			Lecture material and seminar discussion, and preparing an essay addressing a specific question in the area of metaphysics.	Lecture material and seminar discussion.	Seminar preparation.	participating in seminar discussions with peers.	preparing an essay addressing a specific question in the area of metaphysics.

Stage 2	Key ideas: general	Progress towards PLO	continue to apply logical techniques in the construction and evaluation of arguments.	N/A	N/A	Develop an understanding of key issues in the module area, and begin to articulate solutions to some of these.	N/A	consolidate independent study techniques.	work collaboratively to approach philosophical problems and consider their solutions.	communicate more complex philosophical ideas and arguments in written form.
		By working on (and if applicable, assessed through)	Lecture material and seminar discussion, and preparing an essay addressing a specific question in the area of philosophy of science.			Lecture material and seminar discussion, and preparing an essay addressing a specific question in the module area.		Seminar preparation.	participating in seminar discussions with peers.	preparing an essay addressing a specific question in the area of metaphysics.
Stage 2	Tutorial Module (Option)	Progress towards PLO	continue to apply logical techniques in the construction and evaluation of arguments.	N/A	N/A	work intensively on understanding and articulating solutions to particular problems relating to the tutorial topic.	N/A	develop ability to initiate and pursue a novel project	develop ability to work collaboratively to develop effective and imaginative solutions to problems.	communicate sophisticated ideas and arguments orally as well as in written form.
		By working on (and if applicable, assessed through)	Tutorial preparation, including preparing a tutorial essay.			preparing an extended essay plan on a substantive question, presenting this to their tutorial group, and discussing it.		selecting a topic for their main assessed essay, and producing a detailed plan for this.	working with a small group of students (4) and a tutor to get to grips with a specific issue, and by giving constructive criticism on the written work of other students.	presenting a tutorial essay to the tutorial group.
Stage 2	10 credit option (Lecture based)	Progress towards PLO	continue to apply logical techniques in the construction and evaluation of arguments.	N/A	N/A	Develop an understanding of key issues in the module area, appreciating a range of proposed solutions.	N/A	consolidate independent study techniques.	work collaboratively to approach philosophical problems and consider their solutions.	present clear and concise discussions answering focussed questions in an exam format.

		By working on (and if applicable, assessed through)	lecture material with the support of seminars and formative feedback through marked work, and assessed by examination			Lecture material, seminar discussion, and exam preparaton. Assessed by exam.		seminar and exam preparation.	participating in seminar discussions with peers.	Lecture material, seminar discussion, and exam preparaton. Assessed by exam.
Stage 2	10 credit option (Reading group based)	Progress towards PLO	continue to apply logical techniques in the construction and evaluation of arguments.	N/A	N/A	Develop an in depth understanding of a key text.	N/A	consolidate independent study techniques.	work collaboratively to approach philosophical problems and consider their solutions.	communicate more complex philosophical ideas and arguments in written form.
		By working on (and if applicable, assessed through)	seminar preparation with the support of seminars and formative feedback through marked work, and assessed by essay.			interrogating a text or texts through close reading and group discussion. Assessed by essay.		seminar and essay prepartation.	participating in seminar discussions with peers.	preparing an essay addressing a specific question in the area of the module.
Stage 2	Pure Mathematics	Progress towards PLO	reproduce, with understanding, central arguments used in algebra, number theory and geometry, and be able to adapt these to similar situations	understand the language of abstract mathematics and work confidently with the ideas which form the basis of abstract algebra, number theory and geometry	recognize and be able to put into practice the principles of abstract mathematics in unfamiliar settings	N/A	appreciate, and be able to explain, how the fundamental ideas of algebra, number theory and geometry have arisen from , and enabled the solution of, some important problems in science	consolidate independent study techniques.	Further develop imaginative problem solving techniques.	present coherent, clear and concise solutions to exercises

		By working on (and if applicable, assessed through)	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	exercises and with formative feedback through marked work and the seminars, and assessed by examination		lecture material, exercises and with the support of seminars	exercises, with the support of seminars	exercises, with the support of seminars	exercises, with the support of seminars
Stage 2	Linear Algebra	Progress towards PLO	prove standard results in abstract linear algebra	use the standard methods of basic linear algebra and matrix theory, and their theoretical justification through abstract algebra	apply basic linear algebra and matrix theory to a range of unfamiliar situations	N/A	appreciate the power of the abstract approach to linear algebra and the variety of uses of linear algebra	consolidate independent study techniques.	Further develop imaginative problem solving techniques.	present coherent, clear and concise solutions to exercises
		By working on (and if applicable, assessed through)	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	exercises and with formative feedback through marked work and the seminars, and assessed by examination		lecture material, exercises and with the support of seminars	exercises, with the support of seminars	exercises, with the support of seminars	exercises, with the support of seminars
Stage 2	Vector Calculus	Progress towards PLO		use the standard methods of multi-variable differential and integral calculus to work with functions of many variables and vector fields	apply these standard methods to problems which require a level of interpretation to set up the application	N/A	see how the methods of vector calculus arise from important problems in the study of the physical world	consolidate independent study techniques.	Further develop imaginative problem solving techniques.	present clear and concise solutions to exercises
		By working on (and if applicable, assessed through)		lecture material and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination	exercises and with formative feedback through marked work and the seminars, and assessed by examination		lecture material, exercises and with the support of seminars	exercises, with the support of seminars	exercises, with the support of seminars	exercises, with the support of seminars

Stage 3	Foundations of Mathematics	Progress towards PLO	use logical reasoning to build arguments, and to critically analyse statements, arguments, or conjectures made by others, justifying the principles chosen for such a critique	N/A	N/A	develop an understanding of, and articulate a solution to, a key problem or puzzle in the philosophy of mathematics.	**KEY: appreciate, and critically engage with, the philosophical issues raised by mathematical truth and knowledge, and by our use of mathematics in empirical science**	consolidate independent study techniques.	work effectively, imaginatively, and productively as a thinker and learner, individually and in collaboration with others.	communicate complex and difficult philosophical ideas in clear, precise, and accessible terms orally in seminar discussion, and in writing in the form of an in depth essay.
		By working on (and if applicable, assessed through)	An in depth essay on a topic from the module.			An in depth essay on a topic from the module.	lecture material, seminar discussion, and preparing an in depth essay on a topic from the module.	Seminar and essay preparation.	Seminar discussions, essay preparation.	Seminar discussions; an in depth essay on a topic from the module.
Stage 3	20 credit research led modules in Philosophy	Progress towards PLO	use logical reasoning to build arguments, and to critically analyse statements, arguments, or conjectures made by others, justifying the principles chosen for such a critique	N/A	N/A	develop an understanding of, and articulate a solution to, a key problem or puzzle in the module topic.	N/A	consolidate independent study techniques.	work effectively, imaginatively, and productively as a thinker and learner, individually and in collaboration with others.	communicate complex and difficult philosophical ideas in clear, precise, and accessible terms orally in seminar discussion, and in writing in the form of an in depth essay.
		By working on (and if applicable, assessed through)	An in depth essay on a topic from the module.			An in depth essay on a topic from the module.		Seminar and essay preparation.	Seminar discussions, essay preparation.	Seminar discussions; an in depth essay on a topic from the module.

Stage 3	10 credit Advanced Modules in PHilosophy	Progress towards PLO	use logical reasoning to build arguments, and to critically analyse statements, arguments, or conjectures made by others, justifying the principles chosen for such a critique	N/A	N/A	develop an understanding of, and articulate a solution to, a key problem or puzzle in the module topic.	N/A	**KEY: conduct independent study and research into an area of philosophical specialisation.**	work effectively, imaginatively, and productively as a thinker and learner, individually and in collaboration with others	communicate complex and difficult philosophical ideas in clear, precise, and accessible terms in writing in the form of a short, focussed essay.
		By working on (and if applicable, assessed through)	An essay on a topic of their choosing (agreed with supervisor).			An essay on a topic of their choosing (agreed with supervisor).			Independent study, discussions with supervisor, and essay preparation.	An essay on a topic of their choosing (agreed with supervisor).
Stage 3	BSc Final Year Project in Mathematics	Progress towards PLO	justify the reasoning and/or choice of methods used in the mathematics relevant to the project topic		adapt and apply the mathematics learned during the degree to some challenging topic outside the BSc degree syllabus	N/A	understand and be able to explain the context and/or role of the mathematics presented in the dissertation, both in mathematics and more widely in the sciences to which the project topic is relevant	**KEY: conduct independent study and research into an area of mathematical specialisation.**	work effectively, imaginatively, and productively as a thinker and learner, individually and in collaboration with others	communicate complex mathematical ideas clearly in writing at the final year BSc level, and also be able to present an effective summary of these ideas for non-experts
		By working on (and if applicable, assessed through)	the project dissertation, with the support of the project supervisor and as assessed by the dissertation		material found in the literature, with the support of the project supervisor and as assessed by the dissertation		the introduction and conclusion of the dissertation and the writing assignment which addresses that aspect.	the project dissertation, with the support of the project supervisor and as assessed by the dissertation	the project dissertation, with the support of the project supervisor and as assessed by the dissertation	the project dissertation and the poster, with the support of the project supervisor and the lectures on writing mathematics, as assessed by the writing assignments and the dissertation

Stage 3	Mathematics modules	Progress towards PLO	justify reasoning and/or choice of methods used in the relevant mathematical subject areas.	apply standard techniques from the relevant mathematical subject area to analyse the types of problems for which those techniques were developed and provide solutions	investigate unfamiliar problems in mathematics by adapting and/or synthesising a mathematical approaches relevant to the module topic.	N/A	appreciate the power of the mathematics covered in the module subject area, including the uses to which it can be put.	consolidate independent study techniques.	work effectively, imaginatively, and productively as a thinker and learner, individually and in collaboration with others	present clear and concise solutions to exercises
		By working on (and if applicable, assessed through)	lecture material and exercises, with the guidance and support of seminars, and through feedback on marked work, and as assessed through examination	lecture material and exercises, with the guidance and support of seminars, and through feedback on marked work, and as assessed through examination	exercises, with the guidance and support of seminars, and through feedback on marked work, and as assessed through examination.		lecture material and exercises, with the guidance and support of seminars, and as assessed through examination	exercises, with the support of seminars and formative feedback through marked work	lecture material, exercises, and seminar discussion.	exercises, with the support of seminars and formative feedback through marked work