Programme Information & PLOs				
This document forms part of the Programme Design Document and is for us	e in the roll-out of the York Pedagogy to de	sign and capture ne	ew programme statement of purpose (for appli	cants to the programme), programme
learning outcomes, programme map and enhancement plan. Please provide	information required on all three tabs of th	nis document.		
Title of the new programme - including any year abroad/ in industry variate	nts			
MSci & BSc Natural Sciences specialising in Chemistry				
Level of qualification				
Please select: Level 7				
			Year in Industry	
Please indicate if the programme is offered with any year abroad / in indu	stry variants		Please select Y/N	Yes
r lease multate in the programme is offered with any year abroad 7 milliou.	stry variants		Year Abroad	
			Please select Y/N	Yes
Department(s):				
Where more than one department is involved, indicate the lead department	t			
Lead Department Natural Sciences				
Other contributing				
Departments: Archaeology, Biology, Chemistry, Environment, Mathematic	s, Physics			
Programme leadership and programme team				
Please name the programme leader and any key members of staff respons	ible for designing, maintaining and oversed	eing the programn	ne.	
Jason Levesley (Ch. BoS), Roddy Vann (Prog. Director), Camilla Speller (Arch)	), Bryce Beukers-Stewart (Env), Gareth Evans	s (Bio), Andy Parso	ns & Glenn Hurst (Chem), Eric Dykeman (Maths)	), Laurence Wilson (Phys)
Particular information that the UTC working group should be aware of whe	en considering the programme documenta	tion (e.g. challe	nges faced, status of the implementation of the	e pedagogy, need to incorporate PSRB or
employer expectations)				
With few exceptions the modules which make up any of the Nat Sci programmes and	re drawn from the corresponding contributing s	ingle subject degree	programmes. Local pedagogical practices and mod	les of assessment are honoured in Nat Sci unless
there is evidence that such practices would not be pedagogically sound. Therefore,	given the nature of the Nat Sci programmes pa	rts of this document	t draw liberally from, or make reference to, the corr	responding documentation from the contributing
departments. This documentation should therefore be considered in parallel with t	ne corresponding proforma for the single subje	ct degree programm	hes of the contributing departments.	
Who has been involved in producing the programme map and enhancement	t plan? (please include confirmation of the e	extent to which col	leagues from the programme team /BoS have b	been involved; whether student views have
yet been incorporated, and also any external input, such as employer liaison	board)			
The people listed in 14 item have primarily being responsible for the programme m	ap and enhancement plan. At all stages the Bos	has had free access	to and being invited to comment on the document	tation. Student input has been fed into the YP process
in a focus group, through the SSLC and via the BoS.				
Purpose and learning outcomes of the programme				
Statement of purpose for applicants to the programme				
Please express succinctly the overall aims of the programme as an applicat	nt facing statement for a prospectus or wel	osite. This should c	larify to a prospective student why they should	choose this programme, what it will provide

to them and what benefits they will gain from completing it.

All Natural Science programmes at the University of York aim to produce leaders in science, technology and industry who will have the interdisciplinary knowledge and skills to succeed in complex research and business environments. You will learn how science is conducted in different disciplines, how to operate within different methodological communities, and how to apply techniques and ideas across multiple disciplines.

As a Natural Science student specialising in Chemistry you will spend the vast majority of your time studying in the Department of Chemistry where you will be trained to become a highly skilled chemist. Your degree programme has been constructed to take students on a journey of exploration deep into the subject and up to the forefront of cutting-edge chemical research whilst building an awareness of the links that exist between Chemistry and other scientific disciplines. This will give you a perspective beyond the boundaries of a more traditional degree in Chemistry. You will be provided with practical training in a state-of-the-art facility and develop a range of skills, from communication and team-working to scientific literacy and problem solving, in a clear chemistry context. The course is delivered with a strong focus on small group teaching to further facilitate your understanding of subject matter.

A four-year M.Sci degree will take you to the research frontier of modern, interdisciplinary chemistry, which is ideally suited for those who are interested in pursuing an academic or commercial career related to Chemistry. Alternatively, the three-year BSc degree, offers a more even balance of Chemistry-specific content and general training in transferable skills. Either way, you will experience a first class education in Chemistry, taught in modern facilities, all underpinned by your early exposure to different scientific disciplines.

#### Programme Learning Outcomes

Please 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 BSc	
	demonstrate learning and problem solving skills through the acquisition and application of a broad range of fundamental chemical principles and knowledge as appropriate to the interdisciplinary ethos of a Natural Scientist.
1 MSci	
	demonstrate learning and problem solving skills through the acquisition and application of a broad range of fundamental and advanced chemical principles and knowledge as appropriate to the interdisciplinary ethos of a Natural Scientist
2 BSc	
	apply fundamental chemical principles and knowledge as appropriate to the interdisciplinary ethos of a Natural Scientist, to the in-depth study of chemical science specialisms and the solution of problems therein.
2 MSci	apply fundamental and advanced chemical scientific principles and knowledge with a strong emphasis on chemistry to the in-depth study of chemical science specialisms and the solution of problems at the forefront of the science and chemistry in particular.
3 BSc	
	design and safely conduct experiments. Accurately document and record experiments including analysis of physical measurements, of both a quantitative and qualitative nature.
3 MSci	design and safely conduct chemical experiments. Accurately document and record experiments to enable the effective synthesis of complex chemical compounds and advanced analysis of physical measurements, of both a quantitative and qualitative nature.
4 BSc	
	interpret experimental data by using mathematical skills, discipline based knowledge, information technology and scientific conventions.
4 MSci	
	interpret experimental data by using mathematical skills, advanced scientific knowledge, information technology and scientific conventions.
5 BSc	
	effectively articulate scientific principles, experimental results and research findings in a way that is accessible to a variety of audiences through written, oral and other formats.
5 MSci	
	effectively articulate scientific principles, experimental results and research findings in a way that is accessible to a variety of audiences through written, oral and other formats.
6 BSc	
	independently, or as part of a group, plan, design and conduct an open-ended investigative research project to consolidate and extend knowledge and understanding of science with particular emphasis on chemistry.
6 MSci	
7.00	independently plan, design and conduct an extended, open-ended investigative research project to extend knowledge and understanding at the forefront of the chemical sciences.
7 BSC	
	demonstrate employability skills such as teamworking, commercial awareness, self-management and creativity and be equipped to work in a professional manner in their future careers in a range of areas.

7 MSci	demonstrate employability skills such as teamworking, commercial awareness, self-management and creativity and be equipped to work in a professional manner in their future careers consistent with the expectations of a research chemist in academic, governmental or commercial positions.
8 BSc	Use chemistry principles, themes, concepts and methodologies as appropriate to a Natural Scientist with a view to exploit the synergies between chemistry and other science based disciplines underpinned by experience and exposure to different scientific disciplines.
8 MSci	Use advanced chemistry based principles, themes, concepts and methodologies as appropriate to a Natural Scientist with a view to exploit the synergies between expert level chemistry skill sets and other science based disciplines all underpinned by experience and exposure to different scientific disciplines.
Program	nme Learning Outcome for year in industry (where applicable)
For prog	grammes 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,
MSci only sciences	y: For the Year in Industry PLO 6 is modified to independently plan, design and conduct an extended, open-ended investigative research project in an industrial environment to extend knowledge and understanding at the forefront of the chemical
Program	nme Learning Outcome for year abroad programmes (where applicable)
For prog	grammes 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	g 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.
MSci only	y: For the Year Abroad PLO 6 is modified to independently plan, design and conduct an extended, open-ended investigative research project at an overseas university to extend knowledge and understanding at the forefront of the chemical sciences.
Explanat	tion of the choice of Programme Learning Outcomes
Please e	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 th	ne PLOs are considered ambitious or stretching?
The PLOs in lecture presenta	s describe a journey from consolidating basic chemical and related principles at the start of the course through to contributing to cutting-edge research in core and interdisciplinary chemistry at the end. The range of formative learning experiences e, laboratory, workshop and tutorial, allied to independent work in individual and group settings, provide a structured training to meet the aspiration of the PLOs. The summative assessment points, including formal examinations, assessed tions and extended research projects, allow the achievement of the knowledge, skills and attributes of the PLOs to be demonstrated.
ii) The wa	ays in which these outcomes are distinctive or particularly advantageous to the student:
The outco the a stud course pr	comes are advantageous as they ensure that teaching and learning of research-led teaching of interdisciplinary chemical science is integrated with laboratory skills, the development of problem solving and employability skills. This will ensure that ident specialising in Chemistry for Natural Sciences has all the technical and employability skills needed in his/her future career regardless of whether this career lies inside or outside the chemical sciences. The PLOs remind students that the rovides an education through the subjects as well as an education in the subjecs. The year 4 experience in particular (PLO6) makes the MSci ideal preparation for those thinking of careers in chemical and related areas of science whether in or further study in academia.
industry	
industry iii) How t	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)?
industry of iii) How t Students specialist Year 3 fo applicatio Participal	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)? develop effective communication and related skills through regular application of digital literacy skills. In Year 2, students will give an oral presentation and prepare a team poster on a practical project involving presentation software and t molecular drawing packages including the use of molecular graphics with the Protein Data Bank (PDB). Students have the opportunity to use specialist software and databases used to visualise proteins and calculate properties of small molecules. Success on scientific report-writing and develops the ability to write in a way consistent with research publications with effective use of search tools and databases to access reserach literature. Computational approaches continue to include ons of quantum chemistry. Data manipulation and analysis in laboratory work frequently involve the use of scientific software, with appropriate training. In Year 4, distance (blended) learning is supported by technology-enhanced learning tools. ting departments encourage the use of lecture recording, which has very high uptake, and all modules are supported by material on the VLE including screencasts, external links and quizzes, with pockets of use of 'licker' technology.
industry of iii) How t Students specialist Year 3 fo applicatio Participat iv) How t The prog	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)? develop effective communication and related skills through regular application of digital literacy skills. In Year 2, students will give an oral presentation and prepare a team poster on a practical project involving presentation software and t molecular drawing packages including the use of molecular graphics with the Protein Data Bank (PDB). Students have the opportunity to use specialist software and databases used to visualise proteins and calculate properties of small molecules. occuses on scientific report-writing and develops the ability to write in a way consistent with research publications with effective use of search tools and databases to access research literature. Computational approaches continue to include ons of quantum chemistry. Data manipulation and analysis in laboratory work frequently involve the use of scientific software, with appropriate training. In Year 4, distance (blended) learning is supported by technology-enhanced learning tools. ting departments encourage the use of lecture recording, which has very high uptake, and all modules are supported by material on the VLE including screencasts, external links and quizzes, with pockets of use of 'clicker' technology. the PLOs support and enhance the students' employability (for example, opportunities for students to apply their learning in a real world setting)? gramme's employability objectives should be informed by the University's Employability Strategy:

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

All the Nat. Sci. programmes have been designed with employability in mind. This is not only as a factor of the design of the programmes themselves, which have had engagement with the University's employability strategy as a given since the early design phases of the programme. But also as a factor of the embedded skills that the contributing departments have built into their modules. Modules which form the bulk of the teaching on this degree programme. Many of the skills listed in the PLOs are generic and will equip the student with a highly transferrable skill set. As an example: PLOs 4 & 5 revolve around such transferrable skills as programming, communication skills and data analysis techniques which are applicable beyond the problems addressed in the programme.

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

Students who need support will generally self identify at admission or early in the Stage 1 and standard University protocols will then be followed. If this isn't the case and a student is identified as needing extra support later in the programme then the student will discuss the matter with their personal supervisor who will advise in accordance with University guidance. Students are assigned a supervisor in one of the contributing departments and have access to a subject facilitator in both contributing departments. The student can approach their supervisor for advice in accordance with University guidelines and seek more specialist advice on a particular discipline from the subject facilitator. Module level issues are handled with the department to which the module belongs and a student can avail themselves off all feedback and quality control mechanisms that the department offers.

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

The programme has a research-led teaching philosophy. Although most of the core material in Years 1 and 2 is building foundation knowledge, in Year 3 material aligns with the research specialisms in the contributing departments. Furthermore, the option module structure has been specifically designed to reflect the research expertise in the Chemistry with courses on environmental, analytical and medicinal chemistry as well as options on mechanistic chemistry and advanced spectroscopy.

#### **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), st	udents will be able to:	Developed core learning st disciplines. Be familiar with	ratergies for each of the disciplines h the foundational material and pro	studied in Stage 1. Have been intr actices of each of the disciplines.	oduced to and worked with the co	re concepts that underpin all three
PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
Individual statements Stage 2 On progression from	the second year (Stage 2)	, students will be able to:	The more focussed Stage 2	? will have further developed the kn	owledge base of the student, givin	g them more sophisticated tools w	ith which to addess more
PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
Individual statements							
Stage 3							

(For Inte able to:	grated Masters)	On progression from t	he thir	d year (	Stage 3	3), stud	ents wil	l be	A sta	ge 3 st irch foi	udent cussed	will now final sta	be a ful ge.	lly fledg	ed spe	cialist (	and wi	ll have	satisfi	ed all t	he PL(	Ds for the	BSc pi	rogram	nme. T	hey wil	ll be equ	ipped to	) progr	ess ont	o a mo	re
PLO 1		PLO 2	PLO 3					PLO 4				<u>,</u>	PLO 5					PLO	6				PLO :	7				PLO 8	5			
Individual	l statements																															
Progra	mme Structi	ıre																			-											
Module	Structure and	Summative Assessn	nent M	lap																										_		
Please c	complete the su	ummary table below	which	shows	the m	odule	structu	re and	the p	atterr	n of su	mmativ	e asses	sment	throug	gh the	progr	amme														
'Option	modue' can be	e used in place of a sp	oecific	named	l optio	n. If th	e progr	amme	e requ	ires st	udent	s to sele	ect opti	on moo	dules f	rom s	pecific	: lists t	hese l	ists sh	ould	be provi	ded in	the n	ext se	ction.						
From th module If summ the exar	e drop-down s coincides with native assessme mination will ta	elect 'S' to indicate th the summative asse ent by exams will be such as the place.	ne star ssmen schedu	t of the t select	e mod t 'EA') the su	ule, 'A' . It is n mmer	to indi ot expe Commo	cate the cted the cte	ne tim hat ea essme	ing of ach su ent pei	each ( mmati riod (w	distinct ive task veeks 5	summa will be -7) a sin	itive as listed v igle 'A'	sessm where can be	ent po an ov e used	oint (e erall n I withi	g. essa nodule n the s	iy subi e migh shadeo	missio t be a: d cells	n/ ex ssesse as it i	am), and ed cumu s unders	l 'E' to lativel stood f	indica y (for that yo	examı examı ou wil	e end o ble we I not k	of the n ekly pro now in	odule oblem which	(if the sheets) week (	end of ). of the (	CAP	
Stage 0 (	if you have mo	ules for Stage 0, use t	he tog	gles to t	the left	to sho	w the h	idden	rows)																							
Stage 1																																
Credits		Module					Autum	n Term	1								Spring	g Term									Summ	er Tern	1			
	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
20	MAT00007C	Maths for Sciences I	s									E	A																			
20	MAT00008C	Maths for Sciences II												s												E	A	А	А			
20	CHE00010C	Chemistry for Natural Sciences	S					A		A	A		EA																			
20	CHE00012C	Chemistry for Natural Sciences II												s			A	A	A							EA	A	A	A			
20	PHY00022C	Introduction to Thermal & Quantum Physics		s									A									E					A	A	A			
20	PHY00020C	Electromagnetism												s												E	A	А	A			
10	PHY00026C	Introduction to Quantum Physics																														
10	BIO00007C	Genetics	s									EA																				1
10	BIO00009C	Genetics & Evolution											s														EA	A	A			
20	BIO00004C	Molecular Biology & Biochemistry	s										A														EA	A	А			
20	ARC00006C	Introduction to Archaeological Science												s							E		A									

		Ecological Principles for the																														
20	ENV00002C	Environment	S							A								A				E					A	A	A			
Credits	Mo	dule		_	_	_	Autum	n Term	_	_	_	_	[	_	_		Snring	Term	_	_	_	_	1	_	_	_	Summe	or Torm	_	_	_	
cicuits	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	MAT00041I	Linear Algebra for	s																			E	A				A	A	А			
10	MAT00030I	Vector Calculus	s										EA																		1	
10	MAT00024I	Functions of a Complex Variable											s									E				A	А	A				
30	MAT00036I	Applied Maths Option I	s										А													E	А	А	A			
30	MAT00037I	Applied Maths Option II	s										A													E	А	А	A			
20	PHY000021	& Optics												s												E	А	A	A			
20	PHY00039I	& Quantum Physics																														
10	PHY00033I	Thermodynamics	s										EA																			
10	PHY00036I	Quantum & Atomic Physics II	s										EA																			
10	PHY00020I	Experimental Laboratory I	s									A										EA										
10	PHY00037I	Particle & Nuclear Physics (option)																														
10	PHY00040I	Solid State Physics I (option)																														
10	PHY00035I	Sci	s										EA																			
20	CHE00014I	3	s						A			A	EA																			
20	CHE00015I	Chem for Nat Sci 4												s						А			A	A			EA	A	A			
20	CHE00025I	Chem for Nat Sci 5												s													EA	А	A			
20	BIO00051I	Molecular Biology, Biotechnology & Bioinformatics	s																								EA					
20	BIO00011I	Cell Biology	s																								EA					
	DI0000541	Biochemical Reactions and																														
20	ARC000541 ARC00018I, ARC00050I, ARC00055I, ARC000201	World Archaeology I	3	9							F						A															
20	ARC00005I, ARC00028I, ARC00004I	Practical Skills (Option list E)									_			s								EA										
20	ARC00009I, ARC00029I, ARC00013I	Team Project (Option list E)																					s			E			A			

20	ENV00019I	Environmental Geochemistry	s									A										E					A	A	А			
20	ENV00013I	Energy & the Environment	s												А							E					A	A	А			
10	ENI/000021	Climate Change	-										9								Δ	F										
10		Environment	_										3								~											
10	ENV00016I	Systems Project	s				A					EA																				
Stage 3		_	_	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	_		-	-	-	-	-			-	-
Credits	Moo	dule					Autumi	1 Term		-				. <u> </u>			Spring	Term		1						:	Summe	er 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	CHE00022H	Chemistry for Natural Sciences 8																														
20		Option List A											S												A			EA				
10	CHE00023H	Chemistry for Natural Sciences 11: Electronic states and statistical thermodynamics																														
20	CHE00002H	Core 8: Advanced Core Chemistry II	s													A												EA				
20	CHE00003H	Core 9: Advanced Core Chemistry III	s																									EA				
20		Advanced Practical Research	6					^			^	٨											٨								E	
20			3					<u> </u>			^	^	~										~					<b>E A</b>	<b>├</b> ──┤			
10		Option List B											5							A				^					$\vdash$			
10		BSc Research											3											A								
40	CHE00021H	Project	S																									EA				
Stage 4																																
Credits	Moo	dule				1	Autumi	n Term									Spring	Term									Summe	er 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
90	CHE00013M/15M /28M	Chemistry for Natural Sciences 14: MChem Advanced Research Project	s																					A				EA				
10	CHE00011M	Chemistry for Natural Sciences 15: Literature Review	s																					EA								
20	[new]	Chemistry for Natural Sciences 16: Advanced Chemistry	s																									EA				
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<b>Optiona</b> If the pr	ogramme req	<b>s</b> juires students to selec	ct optio	on mod	dules f	rom spe	ecific li	sts the	se lists	s shou	ld be prov	ided l	below. If	you nee	ed mo	e spa	ce, use	e the t	oggles	on th	e left to	reveal	ten fu	urther	hidder	n rows.			
Option L	ist A	Option List B	Option	n List C				Optior	n List D			Op	ption List	E			Optio	on List	F			Option	n List G	ì			Option	n List H	
Reaction Intermed Mechani Catalysis Technold Atmosph Chemisti	iates & sms s with Green ogies eric y y y & Disease	Synthesis - from Nature to the Lab Chemical Biology & Molecular Interactions Chemical Theory & Computation	Analyt Bioins Lasers	tical & F pired C s in Che	Forensi Chemist emistry	c Chemi ry	istry	World Mumm World Archae World Emerg civilisa new m they a	Archae ificatio Archae Archae eology Archae ence o tions re dev	eology n eology eology of Sou eology f Medi s will I eloped	I & II: I & II: Confl I & II: The th America I & II: The terranean De added a	Pr Bid Pr Hu Pr Er s Pr Ex ne th	ractical Sł iomolecula ractical Sł inmal Bon ractical Sł uman Bor ractical Sł nvironmer ractical Sł xperiment ew modu wey are de	kills and <sup>2</sup> ar Archa es kills and <sup>2</sup> es kills and <sup>2</sup> tal Archa al Archa les will t eveloped	Team p eology Team p Team p Team p aeology Team p eology De addo	project project project Project project ed as													
Please n You are i	ote: you need to	to complete information	on all	three ta	abs of t uate pr	his shee ogramm	et befor ne by th	re subm ie 31 Ju	iitting t ly 2016	to the 5.	UTC Strateg	y Woi	rking Gro	up.															

Programme I	Map: Module	Contribution	to Programm	e Learning Ou	itcomes						
Please complet	e the summary	able below whic	ch shows how in	idividual module	es contribute to	the achievemen	t of programme	learning outcom	ies.		
Core modules s statement that accounted for i	should be mappe articulates how n the map.	ed individually. If all of these cont	the programme ribute to the ac	e offers multiple hievement of th	options that co e programme le	ntribute to exac earning outcome	tly the same PLC s. All modules, b	os you can group oth core and op	these, providin tional, should b	g a e	
The table maps the module, the · Reading the t achievement of development o · Reading the t of modules.	s the contributic e work by which able vertically ill f PLOs is support f transferable sk able horizontally expected that ev	on to programme students achiev ustrates how the red by formative ills and to relate explains how the rery module cont	e learning outco e this advance a e programme ha work and evalu this to other re ne experience or tributes directly	mes made by ea and the assessmo as been designed lated by summat sources, such as f a student at a p	ch module, in te ents that test it. I to deepen kno tive assessment the Employabil particular time in every module si	erms of the adva This enables the wledge, concept . In turn this sho ity Tutorial and ` ncludes a balanc	nce in understar e programme rat is and skills prog uld help student York Award; e of activities ap ome of them.	nding/ expertise ionale to be und ressively. It show s to understand propriate to tha	acquired or reir derstood: ws how the prog and articulate t t stage, through	nforced in gressive heir hthe design	
	•										
(Add additional ro	ws as required)										
Stage	Module					MSci Programme I	Learning Outcomes			-	
			PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	

			-			· · · · · · · · · · · · · · · · · · ·
demonstrate learning and problem solving skills through the acquisition and application of a broad range of fundamental and advanced chemical principles and knowledge as appropriate to the interdisciplinary ethos of a Natural Scientist	apply fundamental and advanced chemical scientific the knowledge with a strong emphasis and of chemical specialisms and d the solution of s problems at the particular. design and safely conduct chemical experiments document and experiments to enable the effective synthesis of complex chemical compounds and advanced experiments to enable the effective synthesis of complex chemical compounds and advanced experiments to enable the effective synthesis of complex chemical compounds and advanced advanced experiments to enable the effective synthesis of analysis of physical publication of the in-depth study and chemistry in particular.	interpret experimental data by using mathematical skills, advanced chemical knowledge, information technology and scientific conventions. BSc Programme Le	effectively articulate scientific principles, experimental results and research findings in a way that is accessible to a variety of audiences through written, oral and other formats. earning Outcomes	independently plan, design and conduct an extended, open- ended investigative research project to extend knowledge and understanding at the forefront of the chemical sciences.	demonstrate employability skills such as teamworking, commercial awareness, self- management and creativity and be equipped to work in a professional manner in their future careers consistent with the expectations of a research chemist in academic, governmental or commercial positions.	Use advanced chemistry based principles, themes, concepts and methodologies as appropriate to a Natural Scientist with a view to exploit the synergies between expert level chemistry skill sets and other science based disciplines all underpinned by experience and exposure to different scientific disciplines.
PLO1 demonstrate learning and problem solving skills through the acquisition and application of a broad range of fundamental	PLO2         PLO3           design and safely conduct chemical experiments through an effective risk assessment. Accurately document and record enhical chemical principles and knowledge as of appropriate to the interdisciplinary ethos of a Natural         design and safely conduct chemical experiments document and record enable the effective synthesis of chemical chemical effective enable the effective enable the effective enable the effective enable the effective chemical chemical chemical effective enable the effective effective enable the effective chemical chemical chemical effective enable the effective effective enable the effective enable the effective chemical chemical ethos of a Natural	BSc Programme Le PLO4 interpret experimental data by using mathematical skills, chemical	effectively articulate scientific principles, experimental results and research findings in a way that is	PLO6 independently, or as part of a group, plan, design and conduct an open- ended investigative research project to consolidate and extend	PLO7 demonstrate employability skills such as teamworking, commercial awareness, self- management and creativity and be equipped to work	PLO8 Use chemistry principles, themes, concepts and methodologies as appropriate to a Natural Scientist with a view to exploit the synergies between chemistry and other science based disciplines underpinned by

										-
Stage 1	Maths for Sciences I	Progress towards PLO	competently use relevant standard mathematical methods	adapt the standard tools to problems slightly outside the standard format			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			exercises, with the support of seminars and formative feedback through marked work			
Stage 1	Maths for Sciences II	Progress towards PLO	competently use relevant standard mathematical methods	adapt the standard tools to problems slightly outside the standard format			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			exercises, with the support of seminars and formative feedback through marked work			
Stage 1	Chemistry for Natural Sciences I	Progress towards PLO	Developing an understanding of core chemical principles of atomic structure, thermodynamics, periodicity, acids & bases, separations science & mass spectrometry and reactivity.	Developing an understanding of core chemical principles of atomic structure, thermodynamics, periodicity, acids & bases, separations science & mass spectrometry and reactivity.	Development of core laboratory skills and understanding of key safety practices. Aspects of planning and experimental design and commnunication of results.	Development of core laboratory skills and understanding of key safety practices. Aspects of planning and experimental design and commnunication of results.	Development of core laboratory skills and understanding of key safety practices. Aspects of planning and experimental design and commnunication of results.		Developing an understanding of core chemical principles of atomic structure, thermodynamics, periodicity, acids & bases, separations science & mass spectrometry and reactivity.	

		By working on (and if applicable, assessed through)	Examination and assessed workshop	Examination and assessed workshop	Lab report	Lab report	Lab report		Examination and assessed workshop	
Stage 1	Chemistry for Natural Sciences II	Progress towards PLO	Developing an understanding of core chemical principles of kinetics, thermodynamics, spectroscopy, transition metals and reactivity.	Developing an understanding of core chemical principles of kinetics, thermodynamics, spectroscopy, transition metals and reactivity.	Development of core laboratory skills and understanding of key safety practices. Aspects of planning and experimental design and commnunication of results.	Development of core laboratory skills and understanding of key safety practices. Aspects of planning and experimental design and commnunication of results.	Development of core laboratory skills and understanding of key safety practices. Aspects of planning and experimental design and commnunication of results.		Developing an understanding of core chemical principles of kinetics, thermodynamics, spectroscopy, transition metals and reactivity.	
		By working on (and if applicable, assessed through)	Examination and assessed workshop	Examination and assessed workshop	Lab report	Lab report	Lab report		Examination and assessed workshop	
Stage 1	Introduction to Thermal & Quantum Physics	Progress towards PLO	Gain an understanding of the core importance of quantum mechnics to the science of measurement.	Solve foundational numerical problems by application of relevant mathematical and physical principles						
		By working on (and if applicable, assessed through)	Engaging with teaching materials and links to other modules.	Regular independent assignments (PPQs), small- group problem solving in problem classes, tailored small- group sessions (tutorials), formal examination.						

Stage 1	Electromagnetis m, Waves & Optics	Progress towards PLO	Apply problem solving techniques and apply them to weekly problems in an independent way.	Understand that wave mechanics can be used to understand parts of other larger problems beyond those taught explicitly in the course.				
		By working on (and if applicable, assessed through)	Regular independent assignments (PPQs), small- group problem solving in problem classes, examples given in lectures, tailored small- group sessions (tutorials) formal examination.	Engaging with teaching materials.				
Stage 1	Introduction to Quantum Physics	Progress towards PLO	Gain an understanding of the core importance of quantum mechnics to the science of measurement.	Solve foundational numerical problems by application of relevant mathematical and physical principles				
		By working on (and if applicable, assessed through)	Engaging with teaching materials and links to other modules.	Regular independent assignments (PPQs), small- group problem solving in problem classes, tailored small-group sessions (tutorials), formal examination.				

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Stage 1	Genetics	Progress towards	Problem solving	By engaging with	Gain experience				
		PLO	exercises to	core prinicipals of	of core				
			develop	classical and	techniques such				
			understanding of	molecular	as gel				
			genetics.	genetics that will	electrophoresis				
			Students can	be built upon in	and microscopy				
			work individually	future modules					
			or in groups.	and Stages.					
		By working on	By multiple pen +	Lectures, pre-	Three x 3 hr				
		(and if applicable	naner workshon	recorded	practicals				
		assessed	sessions shread	material on the					
		through)	throughout the						
		tinougn)	throughout the	VLE, WURSHEELS					
			denni. I nour	and set reading.					
			closed exam	1 nour closed					
				exam					
Stage 1	Genetics &	Progress towards	By practising the	Learning and		Practising the			
	Evolution	PLO	principles of	developing an		principles of			
			genetic analysis,	understanding		genetic analysis			
			and evolutionary	about the		in experimental			
			and population	principles of		design and			
			genetics in	genetic analysis,		hypothesis			
			problem solving	the evolution of		testing			
			exercises.	genes and		U U			
				genomes, and an					
				introduction to					
				evolutionary and					
				nonulation					
				gonotics					
		Du working on	Douticipating in	Listoning and		Drasticing			
		By WOrking On	Participating in	Listening and		Practising			
		(and if applicable,	problem solving	engaging with		teachniques and			
		assessed	workshops and	lectures and		approaches in			
		through)	practiciing the	reading slected		genetic analysis			
			skills required by	chapters in		in problem			
			a Geneticist in	textbooks.		solving sessions			
			lateral thinking	Completing a					
			and problem	number of VLE					
			solving. 1 hour	based exercises					
			closed exam	and quizzes that					
				test and direct					
				student learning					
				1 hour closed					
				exam					
					I				

Stage 1	Molecular Biology & Biochemistry	Progress towards PLO	Practising problem-solving and basic chemistry-based calculations together with hands-on practicals in enzymes kinetics and separation of macromolecules.	Gaining an understanding of detailed chemistry and molecular aspects of biology starting from basic chemical building blocks of life to macromolecules and complex biological processes such as metabolism and photosynthesis.	Exposure to several basic biochemical techniques (column chromatography, enzyme kinetics).				
		By working on (and if applicable, assessed through)	Worksheets and practical protocols. An open assessment of problems, graphs, calculations, and conclusions relating to the practical work on enzyme kinetics.	2x 1.5-hour long exams (Start of Spring term and mid-Summer term)	Lectures and practicals.				
Stage 1	Intro to Arch Sci	Progress towards PLO				by being introduced to a range of scientific techniques used in lectures (including chemistry), learning to read scientific articles in seminar workshops		students will begin to understand the role that various chemical scientific techniques play in archaeological research	

		By working on (and if applicable, assessed through)					writing a scientific journal article critique for the formative and summative assessment		by being introduced to a range of scientific techniques used in (bio) archaeology in lectures and learning to read scientific articles in seminar workshops	
Stage 1	Eco Principles for the Environment	Progress towards PLO	Develops knowledge, understanding and awareness			Practice in primary data collection			Develops awareness of the importance of interdisciplinarit y	
		By working on (and if applicable, assessed through)	Lectures and practicals on ecological theories and skills (assessed by exam)			Lecturer- defined practicals: primary data are collected on ecology-based field studies			Lectures and practicals on ecological problems and how society can manage and affect these (assessed by scientific reports)	
Stage 2	Linear Algebra	Progress towards PLO	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	prove standard results in abstract linear algebra		present clear and concise solutions to exercises			
	Tor Natural Sciences	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 and exercises, with the support of seminars and formative feedback through marked work, and assessed by examination		exercises, with the support of seminars and formative feedback through marked work			

Stage 2		Progress towards	use the standard	apply these		present clear and		
		PLO	methods of	standard		concise solutions		
			multi-variable	methods to		to exercises		
			differential and	problems which				
			integral calculus	require a level of				
			to work with	interpretation to				
			functions of	set up the				
			many variables	application				
	Voctor Calculus		and vector fields					
		By working on	lecture material	exercises and		exercises, with		
		(and if applicable,	and exercises,	with formative		the support of		
		assessed	with the support	feedback through		seminars and		
		through)	of seminars and	marked work and		formative		
		<b>U U U</b>	formative	the seminars.		feedback through		
			feedback through	and assessed by		marked work		
			marked work.	examination				
			and assessed by					
			examination					
Stage 2		Progress towards	understand and	apply complex	decide when	present clear and		
		PLO	use the standard	analysis to solve	certain methods	concise solutions		
			methods of	problems in	from complex	to exercises		
			complex analysis	applied real	analysis can, or			
			for functions of	analysis, where	cannot, be			
			one complex	their use	applied and give			
			variable	provides quick	a justification for			
				and powerful	this decision			
	Functions of a			solutions				
	Complex Variable	By working on	lecture material	exercises and	lecture material	exercises, with		
		(and if applicable,	and exercises,	with formative	and exercises,	the support of		
		assessed	with the support	feedback through	with the support	seminars and		
		through)	of seminars and	marked work and	of seminars and	formative		
		_	formative	the seminars,	formative	feedback through		
			feedback through	and assessed by	feedback through	marked work		
			marked work,	examination	marked work,			
			and assessed by		and assessed by			
			, examination		examination.			
Stage 2	Applied Maths	Progress towards	competently	adapt		present clear		
	Option I	PLO	use relevant	mathematical		and concise		
			mathematical	tools to solve		solutions to		
			methods in an	specific		exercises		
			applied area of	problems in an				
			science	applied area of				
				science				

		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		exercises, with the support of seminars and formative feedback through marked work		
Stage 2	Applied Maths Option II	Progress towards PLO	competently use relevant mathematical methods in an applied area of science	adapt mathematical tools to solve specific problems in an applied area of science		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		exercises, with the support of seminars and formative feedback through marked work		
Stage 2	Electromagnetis m & Optics	Progress towards PLO	Use a range of mathematical tools and physical principles to evaluate physics problems of increasing complexity. Understand the wide-ranging applicability of electromagnetis m to solving problems from a variety of other fields of physics and beyond.					

		1		1			1	1
		By working on (and if applicable, assessed through)	Regular independent assignments (PPQs), small- group problem solving in problem classes, engaging with lecture material, formal examination.					
Stage 2	Thermodynamics & Quantum Physics	Progress towards PLO	Apply and adapt a range of basic tools, models, and physical principles to evaluate physics problems of increasing complexity					
		By working on (and if applicable, assessed through)	Regular independent assignments (PPQs), small- group problem solving in problem classes, engaging with lecture material, formal examination.					

Stage 2	Experimental Laboratory I	Progress towards PLO	Apply content from lectures modules to conceptually challenging practical situations, while understanding how the choice of methodology and tools governs the reliability of the scientific data collected.	Execute longer and more nuanced experimental investigations	Keep lab book to an accepted and well- defined standard capturing an accurate and comprehensive account of methodologies and results, and effectively communicate results and ideas via formal reports. This is good preparation for the more extended and independent work in Stage 3, in BSc projects (BSc students) or in advanced		
		By working on (and if applicable, assessed through)	Engaging with the underlying theory of experiments carried out. Working in pairs on experiments with pre-defined outputs. Independently writing formal reports for assessment	Conducting lab experiments, writing a formal report; practicals	(BSC students) or in advanced experimental laboratory (MSci students). Writing a formal scientific report, lab book record- keeping for assessment.		

Stage 2	Particle & Nuclear Physics	Progress towards PLO	Apply and adapt a range of basic tools, models, and physical principles to evaluate physics problems of increasing complexity				Appreciate and be aware of the wider applications of particle & nuclear physics as topics which underpin much of modern physics.	
		By working on (and if applicable, assessed through)	Regular independent assignments (PPQs), small- group problem solving in problem classes, engaging with lecture material, formal examination.				Engaging with teaching materials	
Stage 2	Solid State Physics I	Progress towards PLO	Apply and adapt a range of basic tools, models, and physical principles to evaluate physics problems of increasing complexity				Appreciate and be aware of the wider applications of solid state physics as a topic which underpin much of modern physics.	
		By working on (and if applicable, assessed through)	Regular independent assignments (PPQs), small- group problem solving in problem classes, engaging with lecture material, formal examination.				Engaging with teaching materials	

Stage 2	Maths II for Nat Sci	Progress towards PLO	Be able to select and apply a range of mathematical tools to evaluate suitable physics problems. Understand the foundational importance of mathematics in the study of physics and physical systems. Vector calculus component feeds very strongly into Stage 2 Electromagnetis m and Optics (EMO).		present clear and concise solutions to exercises		
		By working on (and if applicable, assessed through)	Regular independent assessed assignments (PPQs), engaging with lecture material, independent suported problem-solving sessions (maths practicals), formal examination.		exercises, with the support of seminars and formative feedback through marked work		

Stage 2	Chem for Nat Sci	Progress towards	Developing an	Developing an	Develop	Develop	Develop		Developing an	
Stuge 2	3	PIO	understanding of	understanding of	intermediate	intermediate	intermediate		understanding of	
		0	advanced	advanced	skills required for	skills required for	skills required for		advanced	
			chemical	chemical	synthetic	synthetic	synthetic		chemical	
			principles of	principles of	inorganic and	inorganic and	inorganic and		principles of	
			retrosynthetic	retrosynthetic	organic	organic	organic		retrosynthetic	
			analysis.	analysis.	chemistry	chemistry	chemistry		analysis.	
			solutions and	solutions and	including	including	including		solutions and	
			mixtures.	mixtures.	handling air and	handling air and	handling air and		mixtures.	
			symmetry and	symmetry and	water-sensitive	water-sensitive	water-sensitive		symmetry and	
			group theory.	group theory.	materials and	materials and	materials and		group theory.	
			organic synthesis	organic synthesis	pyrophorics.	pyrophorics.	pyrophorics.		organic synthesis	
			with enolate	with enolate	Working safely in	Working safely in	Working safely in		with enolate	
			equivalents.	equivalents.	the laboratory	the laboratory	the laboratory		equivalents.	
			metal-ligand and	metal-ligand and	· · · · · · · ,	,	,		metal-ligand and	
			metal-metal	metal-metal					metal-metal	
			bonding,	bonding,					bonding,	
			coordination	coordination					coordination	
			chemistry and	chemistry and					chemistry and	
			quantum	quantum					quantum	
			mechanics.	mechanics.					mechanics.	
		By working on	Examination	Examination	Experiments	Experiments	Experiments		Examination	
		(and if applicable,			within the	within the	within the			
		assessed			Advanced	Advanced	Advanced			
		through)			synthesis	synthesis	synthesis			
					practical. Safety	practical. Safety	practical. Safety			
					lecture course	lecture course	lecture course			
					and assessment	and assessment	and assessment			
					highlights good	highlights good	highlights good			
					working practice.	working practice.	working practice.			
					Core and	Core and	Core and			
					advanced	advanced	advanced			
					laboratory skills	laboratory skills	laboratory skills			
					are formatively	are formatively	are formatively			
					assessed during	assessed during	assessed during			
					the Skills exercise	the Skills exercise	the Skills exercise			
					then	then	then			
					summatively	summatively	summatively			
					assessed on a	assessed on a	assessed on a			
					weekly basis	weekly basis	weekly basis			
					principally	principally	principally			
					through in-lab	through in-lab	through in-lab			
					assessments	assessments	assessments			
					during the first	during the first	during the first			
					half of term.	half of term.	half of term.			

Stage 2	Chem for Nat Sci	Progress towards	Developing an	Developing an	Design and	Design and	Design and			Developing an	
	4	PLO	understanding of	understanding of	perform	perform	perform			understanding of	
			advanced	advanced	experiments	experiments	experiments			advanced	
			chemical	chemical						chemical	
			principles of the	principles of the						principles of	
			synthesis of	synthesis of						vibrational	
			biological	biological						specroscopy,	
			molecules,	molecules,						excited states	
			physical organic	physical organic						and	
			chemistry,	chemistry,						photochemistry,	
			organometallic	organometallic						physical organic	
			chemistry,	chemistry,						chemistry,	
			electrochemistry	electrochemistry						organometallic	
			and	and						chemistry.	
			heteroaromatic	heteroaromatic						photoelectron	
			chemistry.	chemistry.						spectroscopy and	
										molecular orbital	
										theory and	
										heteroaromatic	
										chemistry.	
		By working on	Examination	Examination	Physcial	Physcial	Physcial			Examination	
		(and if applicable.			organic	organic	organic				
		assessed			chemistry lab /	chemistry lab /	chemistry lab /				
		through)			physical	physical	physical				
					chemistry labs	chemistry labs	chemistry labs				
Stage 2	Chem for Nat Sci	Progress towards	Developing an	Developing an	Development of	Development of	Development of	Development of	Developing	Developing an	
	5	PLO	understanding of	understanding of	core laboratory	core laboratory	core laboratory	core laboratory	professional	understanding of	
			fundamental	fundamental	skills and	skills and	skills and	skills and	modes of	fundamental	
			chemical	chemical	understanding of	understanding of	understanding of	understanding of	behaviour, with	chemical	
			principles of solid	principles of solid	key safety	key safety	key safety	key safety	respect to	principles of solid	
			state chemistry,	state chemistry,	practices.	practices.	practices.	practices.	sharing	state chemistry,	
			alkenes and	alkenes and	Aspects of	Aspects of	Aspects of	Aspects of	resources,	substitution and	
			alkynes, catalysis,	alkynes, catalysis,	planning and	planning and	planning and	planning and	learning and	elimination and	
			vibrational	vibrational	experimental	experimental	experimental	experimental	adhering to	alkenes and	
			spectroscopy and	spectroscopy and	design.	design.	design.	design.	standard	alkynes.	
			excited states	excited states					laboratory		
			and	and					practice, and		
			photochemistry.	photochemistry.					working well with		
									others		

		By working on	Examination	Examination	Team project	Team project	Team project	Team project	Group	Examination	
		(and if applicable	Examination		work through	work through	work through	work through	experiments in	Examination	
		assessed			Integrated	Integrated	Integrated	Integrated	the integrated		
		through)			Chemistry	Chemistry	Chemistry	Chemistry	chemistry		
		through)			Practical (ICP) A	Practical (ICP) A	Practical (ICP) A	Practical (ICP) A	practicals and by		
					mixture of mainly	mixture of mainly	mixture of mainly	mixture of mainly	practicals and by		
					formative	formative	formative	formative	working on		
					formative .	formative .	formative .	formative .	practical		
					assessments	assessments	assessments	assessments	experiments		
					(training) and	(training) and	(training) and	(training) and	individually, in		
					selected	selected	selected	selected	pairs, and in		
					summative	summative	summative	summative	small groups;		
					assessments	assessments	assessments	assessments	creative		
					(proof of	(proof of	(proof of	(proof of	approaches to		
					competence)	competence)	competence)	competence)	research		
					drive the learning	drive the learning	drive the learning	drive the learning	strategy;		
					of key laboratory	of key laboratory	of key laboratory	of key laboratory	summative		
					skills. Design of	skills. Design of	skills. Design of	skills. Design of	assessment (ICP)		
					an experimental	an experimental	an experimental	an experimental	involves team		
					investigation	investigation	investigation	investigation	presentations.		
					applying	applying	applying	applying			
					analytical	analytical	analytical	analytical			
					chemistry	chemistry	chemistry	chemistry			
					techniques is	techniques is	techniques is	techniques is			
					guided by	guided by	guided by	guided by			
					laboratory staff	laboratory staff	laboratory staff	laboratory staff			
					and summatively	and summatively	and summatively	and summatively			
					accessed at the	and summatively	assessed at the	accessed at the			
					conclusion of ICP	conclusion of ICP	conclusion of ICP	conclusion of ICP			
Stago 2		Brogross towards	Integration of		Docign and	conclusion of icr.	CONClusion of ICF.	Group work in			
Stage 2					Design and						
	[new]	PLO	acquired		periorm						
					experiments to			practicals and			
			of cell blology		Investigate			workshops to			
			principles and		mechanisms			understand cell			
			pathophysiologie		underlying cell			biology.			
			s. Logical		motility.						
			thinking/crtitical								
			analyses/								
			problem solving								
			skills.								
		By working on	Lectures,		Workshops and			Workshops and			
		(and if applicable,	workshops and		practicals.			practicals.			
		assessed	practicals.		Assessed through			Assessed through			
		through)	Assessed through		a closed			a closed			
			a closed		assessment.			assessment.			
			assessment.								

Stage 2	Biochemical	Progress towards	Evaluate key	Design		Group work in	Select an	
-	Reactions and	PLO	analytical and	experiments		problem-solving	appropriate set	
	Interactions (20c)		quantitative	applying		workshops to	of techniques to	
	[new]		techniques used	advanced		understand key	address a	
			in a modern	analytical and		concepts	research	
			biochemistry lab	quantitative		underlying	question, then	
			by focusing on	techniques to		techniques, their	analyse and	
			the	address		limitations and	interpret the	
			appropriateness	biological		their applications	data acquired	
			of the technique	questions.		in biochemical	using these	
			(s) to the	Analyse multi-		research.	techniques. Gain	
			biochemical	parameter data			an appreciation	
			question being	sets generated by			of the wider	
			addressed.	these techniques			applicability of	
				and interpret in			core biochemical	
				the context of a			and biophysical	
				research			techniques in	
				hypothesis.			cross-disciplinary	
				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			research through	
							engagement with	
							the nublished	
							literature.	
		By working on	By applying	Design		Formative	By applying	
		(and if applicable.	concepts to	experiments to		problem-solving	numerical and	
		assessed	biochemical and	address		activities in	quantitative skills	
		through)	hiophysical	biochemical and		workshons and	in biochemical	
		cin oughly	problems in	hiophysical		structured	and biophysical	
			formative	nrohlems in		independent	nrohlem-solving	
			workshons	formative		learning	activities in	
			Assessed by 1.5	workshons		(engagement	formative	
			hr closed (open	Critical analysis		with 'flinned'	workshops with	
			note) workshop	of research		lecture material)	opportunities to	
			in middle of	articles in			apply R Critical	
			Spring term	workshops			apply it. critical	
			Spring term.	Assessed by 1.5			research articles	
				hr closed (open			in workshops	
				note) workshop			Numerical and	
				in middle of				
				Snring term			accessed by	
							cummativo	
							workshop based	
							workshop-based	
			1	1			exaill.	1

Stage 2	Molecular	Progress towards	Biological		First hand	Understanding					
	Biology,	PLO	problems		execution of	methods					
	Biotechnology &		presented in a		practical and	associated with					
	Bioinformatics 20		range of		analysis of	transciptomics,					
	c [new]		workshops with		quantitative	manipulating and					
			different formats		transcriptomics	interpreting this					
			where students		data.	type of data					
			will work alone			using					
			or in different			bioinformatics					
			sized groups			skills					
		Py working on	Bracticals and		Bracticals	All workshops					
		by working on			FIACLICAIS	All WOLKSHUps					
		(and it applicable,	, workshops.			and or practicals					
		assessed	Understanding			which involve					
		through)	and problem			some of the					
			solving ability			transferable skills					
			assessed in			listed above					
			workshops. All								
			blocks								
Stage 2	World Arch I	Progress towards					students will				
		PLO					practise the				
							principles of				
							communicating				
							complex issues				
							to a non-				
							specialist				
		Decementation					by being				
		By working on					by being				
		(and if applicable,	,				provided with				
		assessed									
		through)					and producing				
							and producing				
							chosen case				
							study for a				
							nonular				
							magazine for				
							the summative				
							assessment				
Stage 2	Practical Skills	Progress towards					Students will				
		PLO					further build on				
							criticality in their				
							written work				
							and recognise				
							and recognise				
							pi olessioliai				
							stanuarus in				
				1	1		preport writing	1	1	1	1

		By working on (and if applicable, assessed through)				by completing written critiques of professional reports in formative and summative assessment			
Stage 2	Team Project	Progress towards PLO					students will build on their knowledge of archaeological research design using specialist methodologies relevant to their chosen option	students will significantly enhance their understanding and experience of teamwork	
		By working on (and if applicable, assessed through)					by matching recording and analytical methods to research aims and objectives and writing a specialist report on a dataset for the summative assessment	by working as a team to produce a professional report for the summative assessment. Students are required to allocate and coordinate tasks, communicate effectively and keep adequate records of meetings. managing their time effectively to complete a substantial piece of collaborative work to a deadline,	
Stage 2	Environmental Geochemistry	Progress towards PLO	Develops skills in performing scientific calculations		Develops skills in data collection and handling			Develops team- working skills	

		By working on (and if applicable, assessed through)	Calculations: A range of laboratory and paper based practicals in which environmental science data is analysed to gain insight and information about various topics relevant to environmental science. Assessed by summative coursework and exam.		Lecturer-led laboratory practicals: A range of laboratory practicals and calculation methods that students may choose to apply in their 3rd / 4th year projects		Groupwork: Working in groups to carry out laboratory practicals		
Stage 2	Energy & the Environment	Progress towards PLO	Develops knowledge, understanding and awareness	Develops awareness of environmental problems and critically evaluating their solutions	Develops data handling and analysis skills	Develops skills in written comunication	Develops team- working skills	Develops awareness of the importance of interdisciplinarit y	

		By working on (and if applicable, assessed through)	Gaining knowledge on technical, social and spatial dimensions of energy systems and how these interact with environmental parameters; students also gain knowledge and experience of some of the key methodologies used in managing and protecting the environment. (assessed by exam)	Undertaking problem-based tasks in groups across five practical sessions exploring EIA, SEA, carbon policy, energy futures, community engagement. Assessed by summative essay and exam.	Secondary data handling: The summative coursework essay requires analysis of country-specific energy issues and policies to determine the extent to which environmental problems influence energy policy.	Written: Preparation of argument- based summative essay		Groupwork: Working as a group on problem-based tasks across five practical sessions (EIA, SEA, carbon policy, energy futures, community engagement)	Studying energy as a socio- technical system. The summative coursework essay in particular requires understanding and expression of energy as a socio-technical system.	
Stage 2	Climate Change	Progress towards PLO	Develops knowledge, understanding and awareness	Develops awareness of environmental problems and their solutions, and provides experience in designing sustainable solutions	Develops skills in data collection and handling, and research project design		Develops awareness of environmental problems and their solutions, and provides experience in designing sustainable solutions	Practice in working as a group	Develops awareness of the importance of interdisciplinarit y	

		By working on (and if applicable, assessed through)	Studying the public perception, best evidence of impacts, mitigation and adaptations to climate change including recommendatio ns for future emissions reductions in carbon.	A report recommending sustainable solutions to climate change considering the broader social, political and environmental contexts, and the ethical implications of their application by applying knowledge, theories and approaches from the module and wider degree	Student-led research projects, groups: For a scientific report, students plan, design and execute research as an individual to address climate change using modelling software	A report recommending sustainable solutions to climate change considering the broader social, political and environmental contexts, and the ethical implications of their application by applying knowledge, theories and approaches from the module and wider degree	Groupwork: Work responsibly as part of a team or as a team- leader to design and write an eye catching yet scientifically informing newspaper article on climate change	Media seminar which involves students thinking about something other than the science of climate change and how the need to sell papers affects reporting. The scientific report involves working across disciplinary boundaries. As well as considering the scientific aspects behind climate change, students also consider the social, political and economic aspects.	
Stage 2	Environment Systems Project	Progress towards PLO	Develops knowledge, understanding and awareness	Develops awareness of environmental problems and provides experience in critically evaluating sustainable solutions	Develops data handling and analysis skills	Develops skills in data collection and handling, and research project design	Devlops skills in oral and written comunication		

		By working on (and if applicable.	Undertaking research for	Students are asked to	Statistics: Analysis of		Student-led research	Oral: Individual presentation of	
		assessed	group project on	propose	field/lab data.		projects.	a research plan;	
		through)	the impacts of	sustainable	Use of SPSS.		groups:	Written:	
		through	development on	solutions to	Independent		Designing a	Individual	
			the environment	mitigating the	design of data		field/ lab project	project write-up	
			(assessed in a	impacts of	analysis.		as part of a	as a scientific	
			summative	development on	Assessed in		group. Defining	report on data	
			verbal	the	summative		a research	collected in	
			assessment	environment.	assessments:		question, aim	group project.	
			and scientific	Assessed in a	verbal		and objectives,	Reportincludes	
			report)	summatively	presentation of		sampling	a technical	
				assessed	a research plan		strategy,	summary for a	
				scientific report.	and scientific		collecting data	non-specialist	
					report.		in the field/ lab,	audience	
							analysing the	(University of	
							data and	York Estates).	
							communicating		
							the findings.		
							Assessed in		
							verbal		
							presentation of		
							a research plan.		
Stage 3	Chemistry for	Progress towards	Understanding			Development of		Commercial	
	Natural Sciences	PLO	high-level			written and oral		applications of	
	11: Atmospheric,		chemical			presentation		cutting-edge	
	electronic states		principles across			skills		chemistry;	
	and statistical		physical and					creativity in	
	thermodynamics		theoretical					research and	
			chemistry.					applications	

		By working on	Engaging with		Preparation of	Introduction to	
		(and if applicable,	lectures and		written workshop	research topics	
		assessed	learning support		exercises.	through lectures	
		through)	activities on		Engagement in	and formative	
		_	Atmospheric		workshops.	case studies and	
			Chemistry,			workshop	
			Statistical			activities.	
			Thermodynamics				
			and Electronic				
			States of Atoms				
			& Molecules.				
			Applications to				
			unseen problems				
			in tutorial and				
			workshops.				
			Formative				
			assessment is				
			through a				
			workshop in each				
			topic and				
			summative				
			assessment				
			through a closed-				
			book				
			examination.				
Stage 3	Core 8: Advanced	Progress towards	Understanding		Development of	Commercial	
	Core Chemistry II	PLO	high-level		written and oral	applications of	
			chemical		presentation	cutting-edge	
			principles across		skills	chemistry;	
			the organic-			creativity in	
			inorganic			research and	
			chemistry			applications	
			interface.				

By working on	Engaging with		Preparation of	Application of	
(and if applicable,	lectures and		written tutorial	Supramolecular	
assessed	learning support		and workshop	& Nanoscale	
through)	activities on		exercises.	Chemistry to	
	Supramolecular		Engagement in	modern	
	& Nanoscale		tutorials and	commercial	
	Chemistry,		workshops.	materials	
	Synthetic		Formative	through	
	, Frontiers of		assessment of	formative case	
	Inorganic		articulation of	studies and	
	Chemistry &		complex	workshop	
	Ligand Design,		scientific	activities.	
	Metal-Mediated		concepts in	Introduction to	
	Synthesis,		writing and oral	research topics	
	Asymmetric		presentation.	through lectures	
	Synthesis,			and formative	
	Radicals in			case studies and	
	Synthesis and			workshop	
	Advanced			activities.	
	Separations &				
	Mass				
	Spectrometry.				
	Applications to				
	unseen problems				
	in tutorial and				
	workshops.				
	Formative				
	assessment is				
	through small-				
	group				
	tutorial/worksho				
	p assignments in				
	each topic and				
	summative				
	assessment				
	through an open-				
	book assessed				
	workshop activity				
	(Advanced				
	Separations &				
	Mass				
	Spectrometry)				
	and a closed-				
	book				
	examination				
	(Summer). The				
	content is				
	delivered across				
	the whole of Year				
	3 and examined				
	at the end to				

Stage 3	Core 9: Advanced	Progress towards	Understanding		Development of	Commercial	
	Core Chemistry III	PLO	high-level		written and oral	applications of	
			chemical		presentation	cutting-edge	
			principles across		skills	chemistry;	
			physical and			creativity in	
			materials			research and	
			chemistry.			applications	

By working on	Engaging with		Preparation of	Application of	
(and if applicable,	lectures and		written tutorial	materials and	
assessed	learning support		and workshop	nanochemistry to	
through)	activities on		exercises.	commercial	
	Applications of		Engagement in	activities in	
	Quantum		tutorials and	device and	
	Chemistry,		workshops.	advanced	
	Electronic		Formative	materials	
	Properties of		assessment of	technology	
	Materials,		articulation of	through	
	Fundamentals of		complex	formative case	
	Magnetic		scientific	studies and	
	Resonance.		concepts in	workshop	
	Dvnamic		writing and oral	activities.	
	Electrochemistry.		presentation.	Introduction to	
	f-block			research topics	
	chemistry.			through lectures	
	Materials &			and formative	
	Nanonarticles			case studies and	
	and Electronic			workshon	
	Spectra &			activities	
	Photochemistry			detivities.	
	of Transition				
	Metals				
	Applications to				
	unseen problems				
	in tutorial and				
	workshops				
	Formative				
	assessment is				
	through small-				
	group				
	tutorial/worksho				
	n assignments in				
	p assignments in				
	cummativo				
	accoccmont				
	through a closed				
	hook				
	ovamination				
	(Summor) Tho				
	(Summer). The				
	delivered across				
	the whole of Veer				
	and eventined				
	s and examined				
	at the end to				
	reinforce the				
	importance of				
	synoptic learning				
	as the teaching				
	engages				

Stage 3	Chemistry for	Progress towards	Understanding		Development of		
	Natural Sciences	PLO	high-level		written and oral		
	8		chemical		presentation		
			principles		skills		
			regarding				
			spectroscopic				
			characterisation				
			of unknown				
			structures.				

By working on	Engaging in			Preparation of			
(and if applicable.	lectures and			written tutorial			
accessed	learning support			and workshop			
through)	activities on			and workshop			
tillough)	integrated			Exercises.			
	spectroscopy.			Engagement in			
	applications of			tutorials and			
	NMR in organic			workshops.			
	chemistry			Formative			
	nhysical			assessment of			
	methods for			articulation of			
	atructure			complex			
	determination			scientific			
				concents in			
				writing and oral			
	Spectrometry.			procentation			
	Applications to			presentation.			
	unseen						
	problems in						
	tutorial and						
	workshops.						
	Formative						
	assessment is						
	through small-						
	group						
	tutorial/worksho						
	p assignments						
	in each topic						
	and summative						
	assessment						
	through a						
	closed-book						
	examination						
	(Summer). The						
	content is						
	delivered						
	across the						
	whole of Year 3						
	and examined						
	at the end to						
	reinforce the						
	importance of						
	synoptic						
	learning as the						
	teaching						
	engages						
	increasingly						
	with the						
	interdisciplinary						
	forofront of						
	modorn						
	cnemistry.			1		1	

Stage 3	Chemistry for	Progress towards			Experimental	Data	Written scientific	Design and	Team working		
	Natural Sciences	PLO			design and	interpretation	project reports	implement a	towards a		
	6: Advanced				implementation	and analysis	and posters	research project	research goal.		
	Practical								creative solutions		
	Research Training								in research		
		By working on			Advanced	Advanced	Lab reports for	Team miniproject	Team miniproject		
		(and if applicable.			experiments and	experiments in	four advanced	- groups of 3-6	involving		
		assessed			miniprojects	inorganic.	experiments and	students tackle	teamwork in a		
		through)			, .,	physical and	the group	an open-ended	research setting		
		0,				organic	miniproject; the	problem with	including		
						chemistry. Data	latter also	scope to design	planning,		
						obtained from	includes	their own	prioritisation,		
						the miniprojects.	production of a	investigation on	sharing of		
						Summative	research poster	the basis of	workload and		
						assessment	by the group. All	literature and	interpersonal		
						through	are summatively	their own ideas	communication.		
						extended reports	assessed.	and in	Outcomes are		
						building on Stage		collaboration	implicitly		
						2 report writing.		with a supervisor.	assessed through		
								Students take the	the summative		
								lead with	assessment of		
								planning, risk	overall		
								assessing and	productivity		
								evolving the	(report) and		
								project.	team		
								Summative	presentation		
								assessment	(group poster).		
								through	Implicit		
								individual reports	summative		
								(covering the	assessment of		
								whole group's	creative strategy		
								work) and a	in research and		
								group poster.	presentation		
									thereof.		
Stage 3	BSc Research	Progress towards	Fundamental	Fundamental	Design laboratory	Experimental	Written	Plan, design and	Problem solving,	Fundamental	
	Project	PLO	investigation of	investigation of	experiments and	data	presentation	conduct	time	investigation of	
			specific chemical	specific chemical	carrying out risk	interpretation	skills	independent (or	management and	specific chemical	
			principles;	principles;	assessments.	and analysis		group) open-	team working	principles;	
			researching	researching	Documenting			ended	during research	researching	
			project-related	project-related	work through a			investigative	projects.	project-related	
			literature topic	literature topic	lab book.			research project	Creativity in	literature topic	
									research.		

By working on	Research project	Research project	Research Project.	Research Project.	Research project	Research Project.	Research Project.	Research project
(and if applicable,	including	including	Collaboration	Collaboration	report with prior	Students	Students	including
assessed	literature review	literature review	with project	with project	formative draft	experience an	experience	literature review
through)	and	and	supervisor and	supervisor and	stage. Summative	independent	anindependent	and
	comprehension.	comprehension.	research group	research group	assessment of	project	project	comprehension.
	Formative	Formative	encourages	encourages	essay writing	experience	experience	Formative
	research/laborat	research/laborat	development of	development of	through Sci Lit	within a research	within a research	research/laborat
	ory experiences	ory experiences	increasingly	skills in data	exam with	group or as a	group or as a	ory experiences
	are guided by the	are guided by the	independent	analysis.	formative	small group	small group	are guided by the
	supervisor and	supervisor and	approaches to	Summatively	Scientific Writing	working on	working on	supervisor and
	other research	other research	safe working and	assessed though	session and	related topics.	related topics	other research
	group members.	group members.	the design and	the written	workshop.	Formative	involving	group members.
	Formative	Formative	interpretation of	report.		experience is	engagement with	Formative
	assessment of a	assessment of a	experiments.			provided through	planning, time	assessment of a
	project report/lit	project report/lit	Summatively			introductory	management,	project report/lit
	review draft.	review draft.	assessed though			courses	teamwork and	review draft.
	Summative	Summative	the written			(literature,	interpersonal	Summative
	assessment by	assessment by	report and the			safety, etc.) and	communication	assessment by
	final project	final project	supervisor's			through support	with a range of	final project
	report,	report,	project execution			within research	Departmental	report,
	supervisor's	supervisor's	mark.			groups and	staff and co-	supervisor's
	project execution	project execution				supervision.	workers.	project execution
	mark, and	mark, and				Summative	Formative	mark and
	literature review.	literature review.				assessment is	feedback	literature review.
	Summative	Summative				achieved through	available through	Summative
	literature	literature				assessment of	academic	literature
	comprehension	comprehension				the project by	supervision with	comprehension
	exam &	exam &				report and	summative	exam. A
	presentation.	presentation.				through the	assessment of	presentational
						supervisor's	outcomes	aspect will be
						assessment of	implicitly	built in on a
						student research	assessed through	project day,
						skills.	overall	where students
							productivity and	will be tasked to
							execution.	present the
								indings of their
							assessment of	research to their
							creativity in	peers across their
							stratogy	conort. To enable
							strategy.	different
								disciplines to
								understand their
								nresentation a
								student will need
								to appreciate th
								inter-disciplinary
								aspects of their
								subject.
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Stage 3	Reaction	Progress towards	Applying learning	Development of	Commercial	
	Intermediates &	PLO	skills and core	written and	applications of	
	Mechanisms		chemical	problem-solving	cutting-edge	
			principles to	skills	chemistry;	
			gaining a detailed		creativity in	
			knowledge of a		research and	
			chemical science		applications	
			specialism and			
			applications in			
			problem solving			

J			Encoding 11	1	Laguation ( ) ( ) (	Amultanticorf	1
	By workin	gon	Engaging with		Learning support	Application of	
	(and if ap	plicable,	lectures and		workshops;	organometallic	
	assessed		learning support		formative	chemistry and	
	through)		activities on		assessment	spectroscopy to	
			Organic		through	commercial	
			Intermediates in		supported	production	
			Synthesis &		workshop	routes through	
			Biology,		activities with	formative case	
			Interrogation of		summative	studies and	
			Mechanism in		assessment of	workshop	
			Organometallic		written work	activities.	
			Chemistry, NMR		covering	Introduction to	
			Studies of		complex,	research topics	
			Reaction		specialised	through lectures	
			Intermediates &		chemical topics	and formative	
			Mechanism,		through an	case studies and	
			Mechanistic		assessed	workshop	
			Studies with EPR		workshop and	activities.	
			Spectroscopy,		examination.		
			and Time-				
			Resolved				
			Spectroscopy for				
			the Study of Fast				
			Reactions.				
			Applications to				
			unseen problems				
			and case studies				
			in workshops.				
			Formative				
			assessment is				
			through				
			workshop				
			assignments and				
			summative				
			assessment is				
			through an open-				
			hook assessed				
			workshon (NMR)				
			and a closed-				
			hook				
			evamination				
			Liannarà).				

Stage 3	Catalysis wth	Progress towards	Applying learning	Development of	Commercial	
	Green	PLO	skills and core	written and	applications of	
	Technologies		chemical	problem-solving	cutting-edge	
			principles to	skills	green chemistry	
			gaining a detailed		and sustainable	
			knowledge of a		technology;	
			chemical science		creativity in	
			specialism and		research and	
			applications in		applications	
			problem solving			

By working on	Engaging with	Learning support	Application of	
(and if applicable,	lectures and	workshops;	green catalytic	
assessed	learning support	formative	technologies	
through)	activities on	assessment	including	
	Heterogeneous	through	biocatalysis to	
	Catalysis,	supported	commercial	
	Homogeneous	workshop	activities in	
	Catalysis by	activities with	production	
	Transition Metal	summative	technology	
	Compounds,	assessment of	through	
	Asymmetric	written work	formative case	
	Catalysis,	covering	studies and	
	Enzymatic	complex,	workshop	
	Catalysis,	specialised	activities.	
	Catalysis with	chemical topics	Introduction to	
	Sustainable	through an MCQ	research topics	
	Metals and	assessment and	through lectures	
	Green Catalytic	examination.	and formative	
	Technologies.		case studies and	
	Applications to		workshop	
	unseen problems		activities.	
	and case studies		Summative	
	in workshops.		assessment of	
	Formative		aspects of	
	activities include		commercial	
	workshop		awareness	
	assignments and		through assessed	
	summative		workshop and	
	assessment is		exam.	
	through a MCQ			
	assessment			
	(Sustainable			
	Catalysis) and a			
	closed-book			
	examination			
	(January).			

Stage 3	Atmospheric	Progress towards	Applying learning	Critical data	Development of	Applications of	
	Chemistry	PLO	skills and core	analysis	written and	cutting-edge	
			chemical		problem-solving	chemistry;	
			principles to		skills	creativity in	
			gaining a detailed			research and	
			knowledge of a			implications for	
			chemical science			policy	
			specialism and				
			applications in				
			problem solving				
		By working on	Engaging with	Report on air	Learning support	Application of	
		(and if applicable.	lectures and	quality in cities:	workshops:	atmospheric	
		assessed	learning support	application of	formative	research	
		through)	activities on	computer	assessment	(through	
		0,7	Meteorology &	modelling;	through	measurement	
			Physical Climate,	summative	supported	and modelling) to	
			Chemistry of	assessment	workshop	policy-making	
			Gases in the	through a	activities with	through	
			Troposphere &	computer-based	summative	formative case	
			Stratosphere,	simulation	assessment of	studies and	
			Modelling	workshop and	written work	workshop	
			Techniques,	report (Modelling	covering	activities.	
			Measurement	Techniques)	complex,	Introduction to	
			Techniques and		specialised	research topics	
			Science into		chemical topics	through lectures	
			Health & Policy.		through an	and formative	
			Applications to		assessed report	case studies and	
			unseen problems		based on	workshop	
			and case studies		computer	activities.	
			in workshops.		modelling and	Summative	
			Formative		examination.	assessment of	
			activities include			modelling of	
			workshop			pollution in cities	
			assignments and			on aspects of	
			summative			policy through	
			assessment is			assessed	
			through a			workshop.	
			computer-based				
			simulation				
			workshop and				
			report (Modelling				
			Techniques) and				
			a closed-book				
			examination				
			(January).				

Stage 3	Chemistry &	Progress towards	Applying learning	Understanding	Development of	Applicat	ions of	
	Disease	PLO	skills and core	the role of	written and	cutting-	edge	
			chemical	computers in	problem-solving	chemist	ry;	
			principles to	chemistry	skills	creativit	zy in	
			gaining a detailed			research	n and	
			knowledge of a			implicat	ions for	
			chemical science			future a	ffordable	
			specialism and			and effe	ective	
			applications in			treatme	nts	
			problem solving					

By working on	Engaging with	Molecular	Learning support	Application of	
(and if applicable,	lectures and	graphics	workshops;	research at the	
assessed	learning support	workshop;	formative	interface of	
through)	activities on	summative	assessment	biological and	
0 /	Introduction to	assessment	through	medicinal	
	Chemotherapy,	through a	supported	chemistry to	
	Drug Metabolism	computer-based	workshop	current and	
	& Delivery	workshop using	activities with	future therapies	
	Introduction to	software to	summative	through	
	the Molecular	visualise active	assessment of	formative case	
	Basis of Disease	site-drug	written work	studies and	
	Cancer	interactions and	covering	workshop	
	Chemotherany	related report	complex	activities	
	Molocular	Modorn	complex,	Introduction to	
	Aspects of	(Nouern	specialiseu	research topics	
	Aspects of		through on	through lostures	
	Diseases	Drug Discovery)	through an	through lectures	
	Diseases,		assessed report	and formative	
	Nodern		based on	case studies and	
	Approaches to		modelling/molec	worksnop	
	Drug Discovery		ular graphics	activities.	
	and Metals in		software and	Summative	
	Medicine.		examination.	assessment of	
	Applications to			modelling of	
	unseen problems			molecular	
	and case studies			interactions on	
	in workshops.			drug design	
	Formative			through assessed	
	activities include			workshop.	
	workshop				
	assignments and				
	summative				
	assessment is				
	through a				
	computer-based				
	workshop using				
	software to				
	visualise active				
	site-drug				
	interactions and				
	related report				
	(Modern				
	Approaches to				
	Drug Discovery)				
	and a closed-				
	hook				
	evamination				
	(January)				
	(January).				

Stage 3	Synthesis - From	Progress towards	Applying learning	Development of	Applications of	
	Nature to the Lab	PLO	skills and core	written and	cutting-edge	
			chemical	problem-solving	chemistry;	
			principles to	skills	creativity in	
			gaining a detailed		research	
			knowledge at M-			
			level of a			
			chemical science			
			specialism and			
			applications in			
			problem solving			

				1
By working on	Engaging with	Learning support	Application of	
(and if applicable,	lectures and	workshops;	research at the	
assessed	learning support	formative	interface of	
through)	activities on	assessment	biological and	
	Advanced	through	synthetic	
	Organic	supported	chemistry to	
	Synthesis,	workshop	development of	
	Biosynthesis of	activities and a	creative and cost-	
	Polyketides,	problems class	effective	
	Terpenes and	with summative	synthetic	
	Alkaloids,	assessment of	strategies	
	Advanced	written work	through	
	Retrosynthesis,	covering leading-	formative case	
	Stereocontrolled	edge, specialised	studies and	
	Synthesis using	chemical topics	workshop	
	Organo-Main	and current	activities.	
	Group Chemistry	research	Introduction to	
	and Synthesis of	literature	research topics	
	Nitrogen-	through an	through lectures	
	containing	assessed	and formative	
	Pharmaceuticals	workshop and	case studies and	
	and Natural	examination.	workshop	
	Products.		activities. Implicit	
	Applications to		summative of	
	unseen problems		assessment	
	and case studies		creativity in	
	in workshops.		synthetic	
	Formative		strategy through	
	activities include		exam.	
	workshop			
	assignments and			
	a problems class			
	and summative			
	assessment is			
	through an			
	assessed			
	workshop			
	(Synthesis of			
	Polyketides,			
	Terpenes &			
	Alkaloids) and a			
	closed-book			
	examination			
	(Summer).			

Stage 3	Chemical Biology	Progress towards	Applying learning	Understanding	Development of	Applications of	
	& Molecular	PLO	skills and core	the role of	written and	cutting-edge	
	Interactions		chemical	computers and	problem-solving	chemistry;	
			principles to	spectroscopy in	skills	creativity in	
			gaining a detailed	biological		research	
			knowledge at M-	chemistry			
			level of a				
			chemical science				
			specialism and				
			applications in				
			problem solving				

By working on	Engaging with	Molecular	Learning support	Application of		
(and if applicable,	lectures and	graphics	workshops;	chemistry	1	
assessed	learning support	workshop	formative	techniques to	1	
through)	activities on	(formative) for	assessment	research in	1	
_	Current Topics in	probing	through	cellular processes	1	
	Molecular and	molecular	supported	and current	1	
	Cell Biology,	interactions; data	workshop	topics in	1	
	Modern Methods	analysis/interpret	activities	chemical biology.	1	
	of Probing	ation of	including	Creative	1	
	Biological	advanced	molecular	experimental	1	
	Interactions and	spectroscopic	graphics software	design through	1	
	Chemical Biology.	techniques	with summative	formative case	1	
	Applications to	including NMR,	assessment of	studies and	1	
	unseen problems	crystallography	written work	workshop	1	
	and case studies	and calorimetry;	covering leading-	activities.	1	
	in workshops.	summative	edge, specialised	Introduction to	1	
	Formative	assessment	chemical topics	research topics	1	
	activities include	through	and current	through lectures	1	
	a molecular	examination	research	and formative		
	graphics		literature	case studies and	1	
	workshop and		through an	workshop	1	
	summative		assessment	activities. Implicit		
	assessment is		based on a	summative	1	
	through an		review of	assessment		
	assessed activity		scientific papers	through exam.		
	involving a		and examination.		1	
	workshop and				1	
	follow-up written					
	exercise based					
	on a selection of				1	
	scientific papers				1	
	(Proteins in				1	
	Chemical Biology)				1	
	and a closed-				1	
	book				1	
	examination				1	
	(Summer).				1	

Stage 3	Chemical Theory	Progress towards	Applyi	ng learning	Understanding	Development of	Applications of	
	& Computation	PLO	skills a	nd core	the role of	written and	cutting-edge	
	····	_	chemi	cal	computers in	problem-solving	theoretical and	
			princip	ples to	chemistry	skills	computational	
			gainin	g a detailed	· · · · ,		chemistry:	
			knowl	edge at M-			creativity in	
			level o	fa			research	
			chemi	cal science				
			specia	lism and				
			applica	ations in				
			proble	m solving				
		By working on	Engagi	ing with	Computer-based	Learning support	Application of	
		(and if applicable,	lecture	es and	simulations and	workshops;	theoretical and	
		assessed	learnir	ng support	quantum-	formative	computational	
		through)	activit	ies on	chemical	assessment	techniques to	
			Solubi	lity and	calculations/mod	through	research and	
			Solven	it Design,	elling through	supported	industrial	
			Compu	uter	three formative	workshop and	commercial	
			Simula	ation of	workshop	computer-based	applications.	
			Molec	ular	assignments and	activities with	Creative	
			Systen	ns and	a single	summative	experimental	
			Quant	um	summatively	assessment of	design through	
			Chemi	cal	assessed	written work	formative case	
			Calcula	ations.	workshop.	covering leading-	studies and	
			Applic	ations to		edge, specialised	workshop	
			unseer	n problems		chemical topics	activities.	
			and ca	se studies		and current	Introduction to	
			in wor	kshops.		research	research topics	
			Forma	tive		literature	through lectures	
			activit	ies include		through an	and formative	
			compu	iter-based		assessed	case studies and	
			works	hop		workshop and	workshop	
			assign	ments and		examination.	activities. Implicit	
			summ	ative			summative	
			assess	ment is			assessment	
			throug	gh an			through exam.	
			assess	ed				
			works	hop and a				
			closed	-book				
			exami	nation				
			(Sumn	ner).				

Stage 3	Analytical &	Progress towards	Applying learning	Development of	Applications of	
	Forensic	PLO	skills and core	written and	cutting-edge	
	Chemistry		chemical	problem-solving	analytical	
			principles to	skills	chemistry;	
			gaining a detailed		creativity in	
			knowledge at M-		research	
			level of a			
			chemical science			
			specialism and			
			applications in			
			problem solving			
		By working on	Engaging with	Learning support	Application of	
		(and if annlicable	lectures and	workshons	analytical	
		assessed	learning support	formative	techniques to the	
		through)	activities on	assassment	ctudy of	
		linoughy	Multidimonsional	through	biological	
			Chromatography	currented	modical	
			with Mass	workshop	anvironmontal	
			Soloctivo	activitios and	and	
			Detection	activities and	nharmacoutical	
			Ecropsics & the	cummative		
			Foreirses & the	summative	sciences. Creative	
			Environment,	assessment of	experimental	
			Applications to	written work	design through	
			Forensic Science	covering leading-	iormative case	
			Directions in	euge, specialised	studies and	
			Directions in Application 8	chemical topics	workshop	
				and current	activities.	
			Forensic	research	Introduction to	
			Chemistry.	literature	research topics	
			Applications to	through an	through lectures	
			unseen problems	assessed	and formative	
			and case studies	workshop and	case studies and	
			in workshops.	examination.	worksnop	
			Formative		activities. Implicit	
			activities include		summative	
			workshop		assessment	
			assignments and		through exam.	
			summative			
			through an			
			assessed			
			workshop and a			
			CIOSED-DOOK			
			examination			
			(Summer).			

Stage 3	Bioinspired	Progress towards	Applying learning	Development of	Applications of	
	Chemistry	PLO	skills and core	written and	biomimetic	
			chemical	problem-solving	chemistry to	
			principles to	skills	catalysis and	
			gaining a detailed		materials;	
			knowledge at M-		creativity in	
			level of a		research	
			chemical science			
			specialism and			
			applications in			
			problem solving			

By working on	Engaging with	Learning support	Application of	
(and if applicable,	lectures and	workshops;	biomimetic	
assessed	learning support	formative	approaches to	
through)	activities on	assessment	the development	
	Bioinorganic	through	of green chemical	
	Model	supported	production	
	Complexes I & II,	workshop	processes and	
	Biological	activities with	novel materials.	
	Inspiration in	summative	Creative	
	Materials Science	assessment of	experimental	
	and Bioinspired	written work	design through	
	Solutions for	covering leading-	formative case	
	Sustainable	edge, specialised	studies and	
	Chemistry.	chemical topics	workshop	
	Applications to	and current	activities.	
	unseen problems	research	Introduction to	
	and case studies	literature	research topics	
	in workshops.	through an	through lectures	
	Formative	assessed	and formative	
	activities include	workshop based	case studies and	
	workshop	on paper	workshop	
	assignments and	comprehension	activities. Implicit	
	summative	and examination.	summative	
	assessment is		assessment	
	through an		through exam.	
	assessed			
	workshop			
	involving			
	scientific paper			
	comprehension			
	(Bioinorganic			
	Model			
	Complexes) and			
	a closed-book			
	examination			
	(Summer).			

Stage 3	Lasers in	Progress towards	Applying learning	Development of	Applications of	
	Chemistry	PLO	skills and core	written and	lasers in	
			chemical	problem-solving	chemistry/spectr	
			principles to	skills	oscopy; creativity	
			gaining a detailed		in research	
			knowledge at M-			
			level of a			
			chemical science			
			specialism and			
			applications in			
			problem solving			
		By working on	Engaging with	Learning support	Application of	
		(and if applicable,	lectures and	workshops;	lasers in high	
		assessed	learning support	formative	resolution and	
		through)	activities on	assessment	time-dependent	
			Introduction to	through	spectroscopy.	
			Lasers, Lasers in	supported	Creative	
			Frequency	workshop	experimental	
			Domain	activities with	design through	
			Spectroscopy and	summative	formative case	
			Lasers in the	assessment of	studies and	
			Time-Domain:	written work	workshop	
			Reaction	covering leading-	activities.	
			Dynamics.	edge, specialised	Introduction to	
			Applications to	chemical topics	research topics	
			unseen problems	and current	through lectures	
			and case studies	research	and formative	
			in workshops.	literature	case studies and	
			Formative	through an	workshop	
			activities include	assessed	activities. Implicit	
			workshop	workshop and	summative	
			assignments and	examination.	assessment	
			summative		through exam.	
			assessment is			
			through an			
			assessed			
			workshop and a			
			closed-book			
			examination			
			(Summer).			

Stage 4	Chemistry for	Progress towards	Fundamental	Fundamental	Design laboratory	Masters-level	Oral and written	Plan, design and	Problem solving,	Fundamental	
	Natural Sciences	PLO	investigation of	investigation of	experiments and	data	presentation	conduct an	time	investigation of	l
	14: MChem		specific chemical	specific chemical	carrying out risk	interpretation	skills	independent	management and	specific chemical	l
	Advanced		principles	principles	assessments.	and analysis		open ended	team working	principles	l
	Research Project				Documenting			investigative	during research		l
					work through a			research project	projects.		l
					lab book.				Creativity in		l
									research.		

By working on	M-level research	M-level research	Research Project.	Research Project.	Research project	Research Project.	Research Project.	M-level research
(and if applicable,	including	including	Collaboration	Collaboration	report and oral	Students	Students	including
assessed	literature	literature	with project	with project	presentation	experience an	experience an	literature
through)	comprehension.	comprehension.	supervisor and	supervisor and		extended,	extended,	comprehension.
	Formative	Formative	research group	research group		independent	independent	Formative
	research and	research and	encourages	encourages		project	project	research and
	laboratory	laboratory	development of	development of		experience	experience	laboratory
	experiences are	experiences are	increasingly	skills in data		within a research	within a research	experiences are
	guided by the	guided by the	independent	analysis.		group with the	group involving	guided by the
	supervisor and	supervisor and	approaches to	Summatively		potential to	engagement with	supervisor and
	other research	other research	safe working and	assessed though		produce	planning, time	other research
	group members.	group members.	the design and	the written		publishable	management,	group members.
	Formative	Formative	interpretation of	report.		research for	teamwork and	Formative
	assessment of a	assessment of a	experiments.			chemistry and	interpersonal	assessment of a
	project report	project report	Summatively			related journals.	communication	project report
	draft and	draft and	assessed though			Formative	with a range of	draft and
	practice	practice	the written			experience is	Departmental	practice
	presentations.	presentations.	report and the			provided through	staff and co-	presentations. A
	Summative	Summative	supervisor's			introductory	workers.	presentational
	assessment by	assessment by	project execution			courses	Formative	aspect will be
	final project	final project	mark.			(literature,	feedback	built in on a
	report,	report,				safety, planning	available through	project day,
	supervisor's	supervisor's				etc.) and through	academic	where students
	project execution	project execution				support within	supervision with	will be tasked to
	mark and oral	mark and oral				research groups	summative	present the
	presentation/exa	presentation/exa				and supervision.	assessment of	findings of their
	m.	m.				Summative	outcomes	research to their
						assessment is	implicitly	peers across their
						achieved through	assessed through	cohort. To enable
						assessment of	overall	students from
						the project by	productivity	different
						report and oral	(report/oral) and	disciplines to
						examination, and	execution.	understand their
						through the	Implicit	presentation, a
						supervisor's	assessment of	student will need
						assessment of	creativity in	to appreciate th
						student research	research	inter-disciplinary
						skills.	strategy.	aspects of their
								subject.

Stage 4	Chemistry for	Progress towards	Researching a	Col	llating,	Preparing a well-		
	Natural Sciences	PLO	project-related	inte	erpreting and	presented report		
	15: Literature		literature topic	pre	esenting	using ChemDraw		
	Review			res	sults from the	and related		
				che	emical	software.		
				lite	erature			
		By working on	Literature	Wr	riting a	Writing a		
		(and if applicable,	gathering,	lite	erature report;	literature review		
		assessed	analysis and	for	rmative	at a level		
		through)	interpretation.	ele	ements include	consistent with		
			Formative	a w	vorkshop on	published		
			workshop on the	usi	ing the	materials.		
			use of search	res	search	Commentary on		
			engines;	lite	erature and	a draft of the		
			commentary on	dat	tabases and	literature reivew		
			draft literature	cor	mmentary on a	by the project		
			review	dra	aft of the	supervisor before		
			document.	lite	erature reivew	the final		
			Summative	by	the project	literature review		
			assessment	sup	pervisor. The	is summatively		
			through final	fina	al literature	assessed.		
			written literature	rev	view is			
			review (2500-	sur	mmatively			
			3000 words).	ass	sessed.			
Stage 4	Chemistry for	Progress towards	Applying learning				Develop	
	Natural Sciences	PLO	skills and core				approaches to	
	16: Advanced		chemical				lifelong &	
	Chemistry		principles to				workplace	
			gaining a detailed				learning for CPD;	
			knowledge at M-				identifying	
			level of a				specific learning	
			chemical science				needs	
			specialism and					
			applications in					
			problem solving				 	

By working on	Advanced		Engage with	
(and if applicable,	distance learning		distance learning	
assessed	topics in (three		packages	
through)	from) Inorganic		covering	
	Chemistry;		interdisciplinary	
	Materials		modern chemical	
	Chemistry;		research in	
	Organic		preparation for	
	Chemistry;		summative	
	Physical /		examination.	
	Analytical		Distance learning	
	Chemistry.		materials contain	
	Formative		formative	
	assessments		assessment	
	through online		points through	
	tools/quizzes.		suitable VLE	
	Summative		quizzes etc.	
	assessment			
	through closed-			
	book exam			
	(Summer).			

#### **Programme Map: Module Contribution to Programme Learning Outcomes**

The information provided in this section should make clear why the students are doing the key activities of the programme, in terms of reaching the PLOs. You should use this section to provide commentary on the programme map and how current practice effectively propels student learning. Please indicate any changes that you plan to make to the programme linked to the pedagogic principles.

This section should capture reflections on the programmes and areas for development linked to the principles of the York pedagogy. Please provide an explanation of the programme and assessment design with reference to future enhancements aligned with the pedagogic principles.

**Contact with staff** 

Please explain how the programme's design maximises the value of students' contact time with staff (which may be face-to-face, virtual, synchronous or asynchronous), including through the use of technology-enhanced learning. An example might be giving students resources for their independent study which then enables a class to be more interactive with a greater impact on learning.

You should include:

i. An explanation of how contact with staff in the future programme will be designed to propel student learning

The vast majority of the programme is made up of modules from the Department of Chemistry. Therefore the relevant statements made in that department's respective submissions apply here. Note is also made to refer to the Arch, Bio, Env, Maths & Phys YP single subject documentation due to the various splits in Stages 1 and 2.

ii. Changes to the existing programme that will be explored to affect this change; make references to the map to include module level change.

Some changes are expected due to the rollout of the YP in Biol & Chemistry. The Maths & Phys rollouts have already begun and have been incorporated into the current programme. Further changes will roll out in concert with those of the corresponding departments. All courses, this one included, are reviewed annually and feedback will be given to all contributing departments. Any further changes that may be necessary will naturally arise during this constant process of review.

Students' independent study and formative work

Please outline key features of how independent study and formative work has been designed to support the progressive achievement of the programme learning outcomes. (For example, the use of online resources, which may also incorporate formative feedback; opportunities for further learning from work-based placements).

You should include:

i. An explanation of how students' independent study and formative work has been designed in the future programme to propel student learning?

Again, we refer to the corresponding statements in the Arch, Biol, Env, Maths & Phys enhancement plans for the reasons stated above.

ii. Changes to the existing programme to affect this change; make reference to the programme map to indicate module level change

Changes due roll out of the YP will be phased as they occur in the single subject rollouts. Reference is made to the corresponding statements in the Arch, Bio, Env, Maths & Phys enhancement plans.

Due to the nature of all our specialisation programmes and the fact that the learning and teaching in Stages 1 & 2 is spread across multiple departments, there may be bottle necks for the students in terms of assessment. Currently this is handled on a report to the BoS basis and then escalted outwards after a BoS meeting to the Departments. This is a challenge for Natural Sciences and and a definite enhancement to the programmes will be some way of monitoring and controlling these bottlenecks. Currently the YP doesn't help as its level of detail is module assessment and that we have more control over. Its the intra-module assessment. We will carry on investigating ways in which we can manage this issue effectively for our students.

One thing that we have not yet being able to do is use any NSS returns to identify issues or good practice as we have yet to have a graduating cohort. Once this data comes in then we will of course incorporate the outcomes into our annual review processes.

#### (c) Summative Assessment

Please outline how summative assessment within and across modules has been designed to support and evidence the progressive achievement of the programme learning outcomes. (For example, the use of different assessment methods at the 'introduction' stage compared to those used to evaluate deeper learning through the application of skills and knowledge later in the programme).

You should include:

i. An explanation of how formative and summative assessment has been designed in the future programme to propel student learning?

As in Item 5; Nat Sci honours the pedagogical practices of our contributing departments whenever possible and this is certainly the case in summative assessment. The vast majority of the programme is built on modules from the single subject diet and the assessment modes used are judged best to assess the various learning outcomes on these modules.

ii. Changes to the existing programme to affect this change; make reference to the programme map to indicate module level change

As for item 12.

The final year project is a major component of all our degrees and is a chance for our students to show not only their skills and ability in a specialisim, but also to work in their specialism on a project that is interdisciplinary. Indeed this is seen at the most natural place to assess any PLOs which emphasise interdisciplinarity. The full process of running projects is currently under review and any changes/improvements will be incorporated into the programmes.

We need to figure out how to faithfully capture the interdisciplinarity of the programme when a lot of it isn't assessed e.g.

(a) the intentional juxtaposition of modules from different departments that cover complementary/similar topics

(b) Natural Sciences hour

The latter is especially important as its a unique feature of the Nat Sci programmes.

Support with implementing programme enhancements

Support services will be able to provide guidance on enhancing programmes for example changing assessment and feedback practice, developing students' digital literacy capabilities and technology enhanced learning, employability etc. Please indicate in the space below if you would like additional guidance to implement you enhancements and what support you would require. For more information on the types of support that is available across the University please see the website:

https://www.york.ac.uk/staff/teaching/support/

Infrastructure: we look forward to the creation of a fully-functional programme & module catalogue which will enable:

the efficient sharing of information between departments (& the ASO) e.g. module changes the shared usage of information for a variety of purposes (e.g. programme specs, admissions materials, student handbooks, website, ...) identification of issues like assessment bottlenecks & student workload

Nat Sci would like to give a particular note of thanks to David Gent, Cecillia Lowe, Katy Mann Benn & colleagues for their support when compiling this documentation and undergoing the process of making our programmes YP compliant. Their input has been invaluable.